# THE POLITICS OF WATER SCARCITY IN THE EUPHRATES AND JORDAN RIVER BASINS

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The Politics of Water Scarcity in the Euphrates and Jordan River Basins

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## Abstract

Conventional works in international relations have generally concentrated on security policy concerns by calibrating the military and economic capabilities of states in order to explain state interaction, including violent conflict. Unfortunately, environmental issues are often neglected despite an increasing body of evidence that suggests that environmental decline has important consequences for international security. Thus, this thesis attempts to rectify this apparent oversight by exploring the nature of the relationship between environmental degradation and interstate conflict.

To this end, a theoretical framework is advanced suggesting that environmental decay, in the context of political and military tensions, acts as an important contributing cause of interstate conflict. An empirically based examination of the impact of diminishing water supplies on interstate relations in the Euphrates and Jordan River Basins is conducted as a means of testing the validity of the theoretical model. This thesis demonstrates that arid climatic conditions, unilateral hydrological developments, wasteful consumption patterns and rapid population growth have produced a situation where the demand for these shared waters is clearly outpacing available supply. This situation has significantly increased existing friction between Turkey, Syria and Iraq in the Euphrates River Basin and Israel (including the Occupied Territories), Jordan and Syria in the Jordan River Basin because each state views water as a crucial strategic asset and powerful political weapon with the potential to act as a destabilizing influence on the regional balance of power. The plethora of political and military tensions keenly felt between the riparian states ratchet up water related antagonisms. Thus, cooperation under conditions of water scarcity must be viewed as an improbable outcome. Indeed, the general conclusion arising from these various considerations is that increasing water scarcity, in the context of political and military tensions, helps to facilitate conflict between the states in question.

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# Introduction

## I. Introduction

It is fair to say that by any measurement, the Middle East[1] is a remarkable place. Its history and culture is diverse as it is troubled and rich. It is, for example, the birthplace of Christianity, Judaism and Islam. Geographically, it is situated in a most strategic position at the intersection of Europe, Asia and Africa. The region is also home to the largest deposits of petroleum in the world.

With about two-thirds of the world's proven oil reserves and 35 percent of the earth's known gas resources, thinking of the Middle East in terms of resource deficiencies is not something that readily comes to mind.[2] The well documented impoverished rags to bountiful riches success story of so many countries in this region masks a desperate poverty in a more basic and important resource -- water. In fact, water in the Middle East is as sparse as oil is abundant and plays an integral role in shaping the politics of the region.

In much of the world water is taken for granted. In Canada, because of our own abundant supplies -- 9 percent of the world's fresh water and the longest coastline in the world -- a sort of water blindness runs through us.[3] Water seems to be not only everywhere, but infinitely renewable. Yet, rarely does one stop to think about the many functions of which it, and it alone, can

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[1]For the purposes of this study, the Middle East is a geographical designation which comprises the following states: Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, South Yemen, Sudan, Turkey, United Arab Emirates and Yemen.

[2]Peter Kemp, "Water: As Precious As Oil is Plentiful," Middle East Economic Digest (MEED), Vol. 37 (29 January 1993), p. 7.

[3]Robin Clarke, Water: The International Crisis (London: Earthscan Publications Ltd., 1991), p. 24.

perform in the agricultural, industrial and domestic spheres. For example, water is a necessary ingredient for all forms of food production.

At the same time this vital resource which covers some 71 percent of the globe is finite. The vast majority of water on the planet is locked up in the oceans (97.4%), glaciers/icecaps (2.0%) or groundwater (.59%).[4] Of the readily accessible fresh water, rivers and lakes constitute less than one-hundredth of one percent of what is available at any given moment despite the fact that these constitute the primary source for humankind.[5] Moreover, total water use has grown 400 percent in the past five decades and 35-fold over the past three centuries putting increasing pressure on this limited resource.[6] In some areas, such as the Middle East where water rarely coincides with international borders, arid climatic conditions have conspired with exploding populations, wasteful consumption patterns and unilateral hydrological developments to produce a situation where demand is beginning to outpace available supply.

While the total amount available is not inconsiderable, its uneven distribution and the dependent nature of downstream states on upstream riparian[7] states for their water security creates serious problems particularly when one considers that this is a region where political hostilities are the

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[4]Roy Charles Ward and Mark Robinson, Principles of Hydrology 3rd ed. (London: McGraw-Hill Company, 1990). p. 56.

[5]Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," Emory International Law Review, Vol. 6 (Fall 1992), pp. 495-575; Allen J. Hammond, ed., World Resources 1992-93: A Report by the World Resources Institute (New York: Oxford University Press, 1992), p. 160. The vast majority of freshwater is locked up in glaciers/icecaps and groundwater.

[6]Maurice Strong, Birgitta Dahl, and Gudrun Goransson, "Preface," in Water: The International Crisis, Robin Clarke (London: Earthscan Publications Ltd., 1991), p. x.

[7]In international law, any country which borders a river is known as a riparian. The river must form part of the state's boundaries or cross its territory. Thomas Naff and Ruth C. Matson, eds., Water in the Middle East: Conflict or Cooperation? (Boulder: Westview Press, 1984), p. 227.

norm and not the exception. This last point has helped to preclude the possibility of a comprehensive water-sharing agreement anywhere in the Middle East. Indeed, like oil, water is the source of constant tension and occasional violence which could easily worsen in the near future. As Starr and Stoll explain:

> The Middle East stands at the precipice of another major natural resource crisis. Before the twenty-first century, the struggle over limited and threatened water resources could sunder already fragile ties among regional states and lead to *unprecedented* upheaval within the area (emphasis added).[8]

## II. Purpose of This Inquiry

While the purpose of this inquiry is multifaceted, it is most importantly driven by the desire to alert policy-makers and the general public to the growing water crises in the Euphrates and Jordan River Basins[9] which have serious implications for the future stability of a region already troubled by historical, cultural, ideological, ethnic, religious and territorial disputes. Caught up in promoting the sanctity of their own supply political leaders in influential countries, such as the United States, have largely focused their attention on oil as a strategic resource to the detriment of water. Multilateral organizations have similarly been neglectful. In general when government or multilateral bodies consider strategic resources, they relegate water issues to secondary or tertiary status behind not only oil but a host of other problems

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[8] Joyce R. Starr and Daniel C. Stoll, eds., "Preface," in their The Politics of Scarcity: Water in the Middle East (Boulder: Westview Press, 1988), p. ix.

[9] A River Basin, also known as a catchment area, drainage basin or river system "refers to the area within which rainfall drains into a given stream." Malin Falkenmark, "Fresh Water As a Factor in Strategic Policy and Action," in Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, ed., Arthur H. Westing (Oxford: Oxford University Press, 1986), p. 85.

such as food and forests. This unfortunate trend was most recently demonstrated by the parties to the Rio environmental summit of June 1992 where water issues were barely even addressed. As McDonald and Kay explain, given its multi-faceted nature and importance in many areas of life, it is surprising to note that in the resources field, water is the poor relation.[10]

While admittedly there has been a growing interest in the water problems of the Middle East, the vast majority of the works have been of article length. To date, there have been only two comprehensive monographs on the subject -- both edited compilations.[11] Thus, there is a need for more detailed and in-depth studies of this predicament. At the same time, the need for further research is evident if only to draw as much attention as possible to the quandary in the hope that those in positions of influence can positively contribute to conflict resolution.

Moreover, political scientists have given scant attention to this important subject. Instead, the topic has predominantly been the domain of geographers (especially hydrologists), scientists, historians and journalists. Some of these reports superficially treat the subject matter as if it were simply the result of bad luck in resource allocation.[12] However, in most cases what has been written tends be largely descriptive and/or highly technical in nature rather than analytically rigorous and/or policy prescriptive in orientation. In the roughly 200 pieces the author surveyed on the subject, only two or three attempted to address the problem in anything

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[10]Adrian McDonald and David Kay, Water Resources: Issues and Strategies (Essex, England: Longman Scientific and Technical Ltd., 1988), p. 2.

[11]Naff and Matson, eds., Water in the Middle East: Conflict or Cooperation?; Joyce R. Starr and Daniel C. Stoll, eds., The Politics of Scarcity: Water in the Middle East (Boulder: Westview Press, 1988).

[12]Joyce R. Starr, "The Quest for Water: From Biblical Times to the Present," Environmental Science and Technology, Vol. 27 (July 1993), p. 1264.

approximating a systematic fashion and there are depressingly few instances in the literature where possible solutions are proposed. Often the result is that the approaches taken fail to appreciate the political context in which these developments occur.

Thus, there is clearly a need for further work in this area and particularly from political scientists. This thesis is informed by such a perspective and, as such, aims to attempt to overcome some of the shortcomings of the existing literature on the subject. Ultimately, however, it should be noted that interdisciplinary research is desirable in order to grasp the full range of issues and nuances that such a complicated resource as water poses.

### III. Statement of the Issue-Area to be Investigated

Conventional works in international relations have generally concentrated on security policy concerns by calibrating such things as the military and economic capabilities of states in order to explain state interaction, including violent conflict. While there can be little doubt that such factors can play fundamental roles in shaping or modifying state behavior, the dominant security paradigms in the literature provide poor frameworks for studying trends outside those domains as will be demonstrated in chapter two. Moreover, the term security itself is problematic, posing an unwieldy array of sub-issues especially when it is defined to incorporate a wide number of concerns.[13]

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[13]Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," International Security, Vol. 16 (Fall 1991), pp. 76-77. Ullman, for example defines security to include human, physical, economic and social well-being. Richard H. Ullman, "Redefining Security," International Security, Vol. 8 (Summer 1983), pp. 129-153.

This thesis will approach interstate conflict from a different angle by developing the links between the burgeoning literature on environmental decay/resource scarcity and interstate conflict. While the links defy simple explanations, in the complex web of the causality war, it is increasingly acknowledged that environmental factors are often a key feature.[14] This is especially important to consider further, in light of current trends which point to an impending environmental catastrophe with potentially important consequences for global security. Thus, particular attention will be paid to how resource shortages may precipitate acute interstate conflict.[15]

Two case studies will be highlighted to further explore this relationship in an empirical fashion after an initial theoretical model is put forward. The Euphrates and Jordan River Basins are chosen here because there is clear evidence that water resources, primarily surface but also subsurface, are diminishing to such an extent that demand is on the verge of overtaking supply. In fact, the water situation in these two areas may be more precarious

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[14]Peter H. Gleick, "The Implication of Global Climatic Changes for International Security," Climatic Change, Vol. 15 (October 1989), p. 309; Stephen Lonergan and Barb Kavanagh, "Climate Change, Water Resources and Security in the Middle East," Global Environmental Change, Vol. 1 (September 1991), p. 273; Norman Myers, "The Environmental Dimension to Security Issues," The Environmentalist, Vol. 6 (Winter 1986), p. 253; Lloyd Timberlake and Jon Tinker, "The Environmental Origins of Political Conflict," Socialist Review, Vol. 15 (November-December 1985), p. 57.

[15]Acute interstate conflict can be defined as a hostile encounter between two or more states involving a high probability of violence including war. This definition can be seen as a refined version of the one put forth by Homer-Dixon. He defines acute national and international conflict as "conflict involving a substantial probability of violence." Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," p. 77. With respect to a definition of war, I employ the authoritative one established by the Correlates of War project. To describe in detail the elaborate parameters they set would involve going beyond the scope of this study; hence, only the two most significant components are utilized: <1> the conflict must involve at least 1000 related casualties and <2> the participants in the conflict must be states. See Melvin Small and J. David Singer, Resort to Arms: International and Civil Wars, 1816-1980 (Beverly Hills, C.A.: Sage Publications, 1982), pp. 31-61.

than anywhere else in the world. In addition, the dwindling resource overlaps national boundaries setting the stage for possible conflict. Finally, in an area where ethnic differences are keenly felt, a non-Arab state controls the headwaters in both instances creating the potential for further dispute.

Furthermore, it is equally obvious that the relevant parties to the dispute, Turkey, Syria and Iraq on the one hand, and Israel (including the Occupied Territories), Jordan and Syria on the other, all view water as a fundamental strategic asset, a bargaining tool and a potent political weapon with the potential to significantly influence the regional balance of power.[16] In fact, a secure water endowment is recognized as such an important cornerstone in continuing national development that in recent years most of the prominent leaders in each country have discussed the possibility of going to war over scarce water at one time or another in order ensure a stable supply. Moreover, there is evidence to suggest that water has historically acted as a source of friction between the states under review and such tension is likely to increase in light of the following: <1> current population growth rates which are among the highest in the world; <2> dubious consumption patterns -- especially the large amount allocated to the water "greedy" agricultural sector; <3> unilateral hydrological works which restrict the flow of water flowing downstream; and, <4> the continuing presence of parched climatic conditions.

The rapid diminution of water also happens to coexist with one of the world's heaviest concentrations of sophisticated weaponry as well as some of its fiercest national animosities which exacerbate these factors and work to prevent cooperative management of this resource: this is evident from the

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[16]Strategic Survey 1991-1992 (London: International Institute for Strategic Studies, 1992) [as cited in Brassey's (May 1992)], p. 220.

repeated failure of water sharing negotiations in these two areas. Thus, the relationship between diminishing water supplies and acute interstate conflict is explored as a means to understanding the broader picture -- the relationship between environmental degradation and political instability.

## IV. Statement of Hypotheses and the Limitations of the Study

There are three basic hypotheses that will be explored in this thesis:

<1> Environmental decline/diminishing resources are not a sufficient but an important contributing factor to acute interstate conflict.
<2> Water is an increasingly scarce resource in the Euphrates and Jordan River Basins.
<3> The scarcity of water in the Euphrates and Jordan River Basins, in the context of current political and military tensions, poses a threat to regional stability and will continue to do so in the future.

As far as the three hypotheses go, the first will be discussed in chapter two during the course of a literature review. A theoretical framework will also be advanced at this point and will inform the rest of the dissertation. Chapters three and four will demonstrate the validity of the second and third hypotheses by presenting empirical data through a largely historical analysis of water problems in the two river basins. In chapter five, an overview of the utility of the hypotheses is presented and some tentative conclusions are drawn.

Most theses, of course, are based to some extent on at least a few untestable assumptions, and this thesis is no exception to that rule. However, an effort has been made here to limit the number of untestable premises to as few as possible and to subject the rest to scrutiny. An important implicit assumption in this thesis is that the evidence of environmental decline and

resource scarcity is irrefutable and, hence, only a cursory overview, explaining the nature of the predicament, will be provided in chapter two. Another fundamental assumption that is made in this study is that human actions are primarily responsible for resource degradation.

As with all scholarly works, certain additional limitations manifest themselves depending on the scope and nature of the study as well as the actual subject matter in question. For example, the problem of accurately measuring hydrological data such as the discharge of a river is a source of one constraint.[17] The lack of primary data due to the closed and secretive nature of the countries under review is another problem. In addition, there are few figures for the region that come from unbiased or reliable sources.[18] Thus, the study is to some extent vulnerable to the value bias of individual authors and various other secondary materials, which provide important statistical information.

Moreover, one must be careful not to extrapolate and generalize too much on the basis of a work which draws its strength from only two case studies. This is particularly true in this instance since resource issues are extremely intricate and not easily subjected to concrete analysis because of the immeasurable interlocking webs of cause and effect.[19] Water is an especially

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[17]David Ingle Smith and Peter Stopp, The River Basin: An Introduction to the Study of Hydrology (Cambridge: Cambridge University Press, 1978), pp. 3-14; Ward and Robinson, Principles of Hydrology, pp., 15-26, 60-61, 110-121, 141-143, 148.

[18]Michael Elliott, "The Global Politics of Water," American Enterprise, Vol. 2 (September/October 1991), p. 30.

[19]Norman Myers, "Environment and Security," Foreign Policy, No. 74 (Spring 1989), p. 39.

difficult matter to analyze for this reason. As Naff and Matson state:

> Because it is essential to health, agriculture, energy, science, industry, transportation, and recreation -- in short, to human existence -- water is an incredibly complex matter, at once political, economic, legal, social and ecological in nature.[20]

The author's own lack of formal training in hydrology and resource matters made the task even more challenging. Thus, rather than an authoritative interpretation, a preliminary analytical framework is put forward accompanied by suggestive abstractions as opposed to definitive assertions. Indeed, a single overarching theory of water-generated conflict is probably impossible given the complexity of the subject matter.

## V. Organization of the Thesis

While Chapter I serves as an introduction, Chapter II reviews the relationship between environmental decay and interstate conflict in the context of a theoretical discussion of literature in this field. A brief outline of the scope and nature of environmental degradation is presented in the first section as a means to understanding the growing belief that there may be linkages between that phenomenon and interstate violence. In the next section, the usefulness and limitations of the contending approaches are assessed in the context of a literature review. The deterministic and spurious interpretations are shown to have serious flaws and it is therefore concluded that environmental decline is best viewed as an important contributing cause to international strife. In light of these observations, a theoretical framework

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[20]Naff and Matson, eds., Water in the Middle East: Conflict or Cooperation? p. 1; see also, Frederick W. Frey and Thomas Naff, "Water: An Emerging Issue in the Middle East?," Annals of the American Academy, No. 482 (November 1985), p. pp. 65-84.

is advanced which serves as an analytical foundation for the remainder of the thesis.

Chapters three and four are analytical case studies of a particular manifestation of the wider problem: environmental breakdown and conflict. These two studies are used as a means for testing the validity of the ideas put forth in chapter two. The most important aims of both of these chapters is to demonstrate that: <1> water is a scarce resource in both river basins and <2> water related disputes in the Euphrates and Jordan River Basins, in the context of political and military tensions, have posed a serious threat to regional stability in the past and will continue to do in the future.

In chapter three, the Euphrates River Basin is highlighted. The nature of transborder rivers is discussed in the initial section with a particular focus on the Euphrates. Next, the need for hydrological developments themselves are considered. In section three, an examination is conducted into how the Euphrates has been developed and utilized by its three riparian states: Turkey, Syria and Iraq. In section four, an analysis will be undertaken into how these developments have influenced relations between the three relevant countries. Finally, in the last section, the potential for acute interstate conflict is investigated with specific reference to the nature of political and military relations among the riparian states which add to water related friction and make cooperative management of that resource next to impossible.

In chapter four, water problems in the Jordan River Basin are the subject of inquiry. The first section will explore technical and hydrological aspects of the Jordan River Basin. The next section discusses the factors that serve to propel the development of hydrological structures within this river catchment. The third section examines how the Jordan River Basin has been developed and utilized by its three key claimants: Israel (including the

Occupied Territories), Jordan and Syria. In section four, an analysis will be conducted as to the impact of these developments on the relations among the countries in question. Finally, in the last section the potential for acute interstate conflict is highlighted; included in this part is an appraisal of the political and military relations between the riparian states which work to ratchet up water-based tensions and add to the likelihood of negative-sum or zero-sum outcomes with respect to this resource. Of special interest in this chapter is the noteworthy role that both surface and subterranean reservoirs, known as aquifers,[21] play in the water disputes of this basin.

In chapter five a number of proposals are suggested as a means for promoting a stable equilibrium and averting acute interstate conflict in the two river systems under consideration. In sections one and two a variety of technological solutions to the water crisis are advanced. In section three the problem of population growth and finite water supplies are discussed as are proposals to alleviate the pressures posed by contemporary demographic trends. In section four, the tepid response to water problems is examined with specific reference to the apathetic reaction of the United States and important multilateral organizations, such as the United Nations, as well as the lack of an internationally accepted legal regime. In the last section, a number of proposals are suggested as a means to ameliorating the growing water catastrophe in the Euphrates and Jordan River Basins with a special focus on

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[21] An aquifer can be defined as a subterranean "geological formation comprising layers of rock or unconsolidated deposits that contain sufficient saturated material to yield significant quantities of water." Ward and Robinson, Principles of Hydrology, p. 174. In the Middle East, two major categories of aquifers may be distinguished, the shallow and the deep. The latter tend to be confined in such a fashion that recharge rates may be extremely slow and thus are often referred to as nonrenewable or fossil aquifers. In other words, the water taken from them is "mined." Ewan W. Anderson and Khalil H. Rashidian, Iraq and the Continuing Middle East Crisis (London: Pinter Publishers, 1991), p. 87; John Kolars, "Trickle of Hope," The Sciences, Vol. 12 (November/December 1992), p. 19.

how the United States and multilateral organizations can positively contribute to conflict avoidance. In addition, the potential for interstate cooperation between the actors in question is treated at this time.

The final chapter summarizes the preceding discussions and presents some general observations about the utility of the analytical framework and its applicability to the case studies reviewed in the thesis.

## Conclusion

Water shortages are rapidly becoming issues of life and death in the Middle East. Thus, as mentioned earlier, this thesis is primarily motivated by the desire to alert policy-makers to the growing water crises in the Euphrates and Jordan River Basins. The draft treaty between Israel and the PLO is an unfortunate reminder that policy-makers have not fully understood the importance of water as a fundamental dividing line.[22] As this study will demonstrate, the reality is that water in the Euphrates and Jordan River Basins, perhaps more than any other issue, is the fluid dividing line that will determine the difference between peace and war.

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[22]The problem of water is only mentioned in a very limited fashion in the draft treaty. See Annex 3, "Mideast Accord: The Document," New York Times (9 September 1993), p. A7.

*Chapter 2*

# Environmental Decay and Interstate Conflict: A Literature Review

Just a decade ago, global environmental predicaments were regarded as low politics -- a group of relatively unimportant issues that were best left under the auspices of technical experts.[1] However, in recent years, there has been a flurry of activity suggesting that traditional conceptions of national security narrowly restricted to military concerns (i.e. high politics) is incongruent with the increasing prominence of environmental issues.[2] The common theme that unites these often disparate issue areas is the notion that environmental degradation is posing a fundamental threat to the security of the state. Unfortunately, these conceptions offer an unwieldy array of sub-issues[3], especially those pieces which attempt to define security in very wide terms.[4] Moreover, the dominant security paradigms within international

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[1]Gareth Porter and Janet Welsh Brown, Global Environmental Politics (Boulder: Westview Press, 1989), p. 1.

[2]Lester Brown, "Redefining Security," (Washington, D.C.: Worldwatch Paper, No. 14, October 1977); Peter H. Gleick, "Environment and Security: Clear Connections," The Bulletin of the Atomic Scientists, Vol. 47 (April 1991), pp. 17-21; Lassi Heininen, "The Conflict of Interests Between the Environment and Military Strategy in Northern Waters and the Arctic," in Perspectives on Environmental Conflict and International Politics, ed., Jyrki Kakonen (New York: Pinter Publishers, 1992), pp. 55-71; Norman Myers, "Environment and Security," Foreign Policy, No. 74 (Spring 1989), pp. 23-41; Jessica Tuchman Mathews, "Redefining Security," Foreign Affairs, Vol. 68 (September 1989), pp. 162-77; Michael Renner, "National Security: The Economic and Environmental Dimensions," (Washington, D.C.: Worldwatch Paper, No. 89, May 1989); Ian Rowlands, "The Security Challenges of Global Environmental Change," The Washington Quarterly, Vol. 17 (Winter 1991), pp. 99-114.

[3]Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," International Security, Vol. 16 (Fall 1991), pp. 76-116.

[4]Richard H. Ullman, "Redefining Security," International Security, Vol. 8 (Summer 1983), pp. 129-153. Ullman defines security as to include actions that <1> threaten to quickly and drastically reduce the quality of life for the inhabitants of that state or <2> threaten to narrow the range of policy options available to governments or non-governmental agencies to a meaningful degree. For a holistic interpretation of security, sometimes called common or environmental security, see Arthur H. Westing, "An Expanded Concept of International Security," in his Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action (Oxford: Oxford University Press, 1986); Nico Schrijver, "International Organization for Environmental Security," Bulletin of Peace Proposals, Vol. 20 (June 1989), pp.

relations, as this chapter will demonstrate, appear to be inadequate for studying and understanding this trend. Thus, this thesis will restrict its research to the question of how environmental decline may precipitate *acute interstate conflict*, defined as a hostile encounter between two or more states involving a high probability of violence[5] including war.[6]

Notice that this definition of conflict only includes that which may occur between states rather than within them. This is not to suggest that civil disorder and domestic instability caused by environmental change is unimportant. Indeed, there has been some excellent research in this area.[7] However, for the purpose of this analysis this study confines itself to how these trends affect state behavior.

This chapter will be organized into three parts. First, it will briefly outline the scope and nature of environmental degradation in order to understand why an increasing number of scholars believe this trend may produce interstate conflict. The next section will explore the linkages between state conflict and the environment in the context of a literature review

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115-122. It should be noted, however, that no matter how one defines national security its potential links to environmental degradation should be kept in mind.

[5]This definition can be seen as a refined version of the one put forth by Homer-Dixon. He defines acute national and international conflict as "conflict involving a substantial probability of violence." Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," p. 77.

[6]I employ the authoritative definition of war established by the Correlates of War project. To describe in detail their elaborate conditions would involve going beyond the scope of this study; hence, only the two most important components will be utilized : <1> the conflict must involve at least 1000 related casualties and <2> the participants in the conflict must be states. See Melvin Small and J. David Singer, Resort to Arms: International and Civil Wars, 1816-1980 (Beverly Hills, C.A.: Sage Publications, 1982), pp. 31-61.

[7]See, for example, Ted Robert Gurr, "On the Political Consequences of Scarcity and Economic Decline," International Studies Quarterly, Vol. 29 (March 1985), pp. 51-75. Gurr believes that material inequalities, group conflicts and authoritarian state structures (because they are better able to deal with crisis situations) are likely if ecological decline is not abated.

keeping in mind that this exercise is meant to be illustrative rather than exhaustive. The final part will offer some tentative ideas about the relationship between conflict and the environment with particular reference to how it pertains to the case studies reviewed in the preceding chapters.

## I. The Scope and Nature of Environmental Degradation

Two fundamental points will become clear during the course of this review: <1> that while developing countries by no means hold a monopoly over environmental decline, this is where the most immediate and obvious problems lie; and, <2> the nature of environmental devastation is ominous and likely to have profound effects including: increased social strife, diminished agricultural production, economic decline and population displacement. Let us now turn to explore these problems in further detail.

Human actions are the fundamental reasons for the strain on the environment and consequent resource scarcity.[8] Most importantly these include: <1> the continuing population explosion coupled with the expected 500 percent growth in global economic output within the next 50 years; and, <2> the reduction of the quantity of resources (faster than they can be renewed if they are so renewable) and the decline of their quality through mismanagement.[9] As both are inherently linked, it is necessary to discuss them in concert.

It took 130 years for the world population to expand from one billion to two billion: it will take but a decade to grow by the same margin.[10] By 2050,

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[8]The assumption here is that resources are a finite entity. Human activity is what makes them scarce when demand exceeds supply.

[9]Thomas F. Homer-Dixon, Jeffrey H. Boutwell, George W. Rathjens, "Environmental Change and Violent Conflict," Scientific American, Vol. 268 (February 1993), pp. 38-45.

[10]Mathews,"Redefining Security," p. 163.

the global population may be as a high as 12.5 billion.[11] If economic growth and technological innovation cannot keep pace with population proliferation, as is the case with developing countries, ecological disaster is a possible scenario. However, in the unmitigated pursuit of economic advancement in an effort to alleviate demographic pressures and poverty, resource conservation becomes an oxymoron.

All too often the result is the same: fertile land is overcultivated leading to soil erosion and desertification.[12] As a consequence, more marginal farmlands are utilized and land reclamation projects are instituted in an urgent effort to expand agricultural production. Unfortunately, this exacerbates the problem as it leads to further soil deterioration.[13]

Poorly managed irrigation schemes for agriculture further complicate this dire situation. This is especially problematic in developing countries because they lack the necessary capital, technology and education to run these projects efficiently. This leads to salinization, waterlogging[14] and loss of scarce water supplies. These factors can contribute to among other things: <1> lower

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[11]Steve Newman, "Ranking the World's 10 Most Urgent Environmental Problems," Vancouver Sun (3 April 1993), p. B5; John Stackhouse, "Scientific Summit Issues Call for Zero Population Growth," Globe and Mail (28 October 1993), p. A7. However, if fertility rates stabilize, the global population will grow to "only" 8 billion by the middle of the next century. (The United Nations projects a world population of 10 billion by 2050.)

[12]Desertification, technically known as dessication, can be defined as a process where a given piece of land is chararacterized by increasingly low soil productivity. See Michael Verstraete, "Defining Desertification: A Review," Climatic Change, Vol. 9 (August/October 1986), pp. 5-18.

[13]Lloyd Timberlake and Jon Tinker, "The Environmental Origins of Political Conflict," Socialist Review, Vol. 84 (November/December 1985), pp. 57-75.

[14]Waterlogging occurs either as a consequence of the continuous "downward percolation of irrigation water or when repeated irrigation raises the level of the water table to such an extent the roots of crops become literally submerged, killing them or reducing production dramatically." Robin Clarke, Water: The International Crisis (London: Earthscan Publications Ltd., 1991), p. 56.

food production[15]; <2> rural to city migration which places an overwhelming strain on overburdened infrastructures; and, <3> to the phenomenon of "environmental refugees" who in search of a better life cross borders into another country often already experiencing similar environmental stress. They are appropriately termed environmental refugees because they are clearly fleeing the "environmental degradation which undercuts their ability to survive in their native lands."[16]

Another significant problem is deforestation which interrupts the nutrient and hydrological cycles. The former manifests itself in fuelwood shortages, loss of soil fertility and, consequently, plant and animal species depletion and even extinction.[17] The latter causes river siltation, flooding, and droughts because the surface vegetation and soil can no longer act as a "giant sponge," regulating the flow and storage of water.[18] As a result of these factors, damage to irrigation and hydroelectric projects are a frequent occurrence.[19]

Finally, global warming, caused by the accumulation of gases emitted from fossil-fuel use and deforestation, is yet another human induced predicament and must be considered a serious threat to our existence. While

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[15]The ironic thing here is that there is clearly enough food to consume on a global scale; the limited ability to acquire it is what negatively facilitates this problematic situation. See Lester C. Thurow, Head to Head: The Coming Economic Battle Among Japan, Europe and America (New York: Morrow, 1992).

[16]Timberlake and Tinker, "The Environmental Origins of Political Conflict," p. 70. It should be noted, however, that there is considerable debate as to how much of a role economic and political considerations play in their status as environmental refugees.

[17]For example, it has been estimated 20 percent of all species, currently known to humankind, could become extinct by the year 2000. As many as 100 species apparently become extinct every day. Mathews, "Redefining Security," p. 165; Newman, "Ranking the World's 10 Most Urgent Environmental Problems," p. 5.

[18]Clarke, Water: The International Crisis, pp. 48-65.

[19]For example, excessive siltation can reduce the storage and electrical generating capacities of a dam.

there is considerable controversy as to the nature and scope of global warming, there is a general consensus within the scientific community that it is clearly happening.[20] These "greenhouse gases"[21] are expected to have far-reaching effects, including: rising atmospheric temperatures; sea-level increases with subsequent flooding of low-lying coastal regions[22] and salt-water intrusion into aquifers; alterations in rainfall patterns with consequent droughts, floods and diminished agricultural output; and, abrupt changes in habitats causing substantial die-offs of plant and animal life.[23] Not surprisingly then:

> The protracted effects of this worldwide climatic disruption dwarf many of the environmental problems of the past and augur political, economic, and social disruptions on an enormous scale. Global warming could have catastrophic consequences for the habitability of the whole planet.[24]

## II. The Environmental Dimension of Conflict: A Literature Review

Might these various problems, separately or in combination lead to interstate conflict? Although, historians and political scientists rarely agree on

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[20]Stephen Lonergan and Barb Kavanagh, "Climate Change, Water Resources and Security in the Middle East," Global Environmental Change, Vol. 1 (September 1991), p. 275.

[21]Most importantly these include: carbon dioxide (CO2), nitrous oxide (N2O), chloroflorocarbons (CFCs) and methane (CH4). Clarke, Water: The International Crisis, p. 39. However, Clarke states that there are at least 20 known "greenhouse gases."

[22]In some extreme cases, sea-level rises may wipe out an entire country, such as the Maldives, which is less than 2 meters tall at its highest point.

[23]Neville Brown, "Climate, Ecology and International Security," Survival, Vol. 31 (November/December 1989), pp. 519-532; Norman Myers, ed., GAIA: An Atlas of Planet Management (New York: Anchor Books, 1984), pp. 116-118; Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 273.

[24]David A. Wirth, "Climate Chaos," Foreign Policy, No. 74 (Spring 1989), pp. 3-22.

the causes of conflict and war[25], a growing number of scholars are exploring the relationship between environmental breakdown and violence. The association between interstate conflict and the environment can be seen in three principal ways. First, there is a minority that believes environmental decline, in some cases, to be a sole cause of interstate conflict. Second, there is another group that sees the relationship as a spurious one. Finally, there is a growing number that consider environmental stress to be a contributing factor to interstate conflict. This typology is a reflection of the studied opinion of the author and should be viewed as a provisional categorization of the literature rather than a final authoritative determination.

### i. Environmental Decline as a Sufficient *Cause* of Conflict

Perhaps what is most notable about the literature of those who seem to claim a reasonably tight causal link between environmental change and conflict, is how little present-day research there is in this vein.[26] Indeed, there does appear to be many examples from the past, such as Germany's efforts to

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[25]Historians and Political Scientists rarely agree about the cause or causes of conflict and war. Typical explanatory approaches involve: the psychology of an individual leader and/or their nations; geographical proximity between states; escalating arms races which threaten to get out of hand; excessive nationalism; rationally considered decisions by leaders who expect to gain from war; projection of internal discontent inside states; the disruption in the balance of power between states; and significantly, the pursuit of territory and/or resources; see Timberlake and Tinker, "The Environmental Origins of Political Conflict"; John G. Stoessinger, Why Nations Go to War, 4th ed. (New York: St. Martin's Press, 1985); Patrick James, Crisis and War (Kingston and Montreal: McGill-Queen's Press, 1988); Bruce Bueno de Mesquita, The War Trap (New Haven: Yale University Press, 1981); Nazili Chourcri and Robert C. North, Nations in Conflict (San Francisco: W. H. Freeman and Co., 1975).

[26]The earliest and most influential formulation was developed by Thomas Malthus. He stressed that human conflict was inevitable because food production would not be able to keep pace with population growth. Thomas Malthus, An Essay on the Principle of Population (New York: Penguin Books, 1970 [1798]).

secure valuable oil deposits and other minerals throughout Europe during World War II,[27] that suggest that this link is worthy of further investigation.

In echoing this sentiment, Arthur H. Westing states that the wars resulting from colonial expansionism, retention, and subsequent "national liberation," can in large part be viewed as wars over natural resources.[28] He claims that when the perceived needs of a state outpace the available supply of one or more important resources, belligerent political behavior including the onset of war to secure the resource in question must be seen as a real possibility. Contemporary resources likely to cause strife comprise both non-living resources (e.g. territory, fresh water, non-fuel minerals and fuels) and renewable resources (e.g. ocean fisheries and staple food crops).

In another piece, Bruce Russett indicated that the imperatives of economic growth will inevitably lead to state to state conflict over supplies of raw materials.[29] As economic decline is politically intolerable, intensifying competition over declining resources is probable as it becomes a matter of pressing concern for each state. Russett points to the fact that, in the modern world, self sufficiency is clearly in decline as home territory sources are increasingly depleted while population growth advances unabated. For the industrialized countries the multiplying loss of colonial and post-colonial controls over Third World areas presents an added dilemma. In light of these

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[27]Norman Rich, Hitler's War Aims: Ideology, The Nazi State and the Course of Expansion (New York: W.W. Norton and Co., 1973).

[28]Arthur H. Westing, "Environmental Factors in Strategic Policy and Action: An Overview," in his Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action (Oxford: Oxford University Press, 1986), pp. 3-21. For a similar point of view, see Ullman, "Redefining Security," especially pp. 139-141. Ullman states that competition for territory and resources are at the root of most interstate conflicts and that as resource scarcity increases, such conflicts are likely to grow in frequency.

[29]Bruce Russett, "Security and the Resources Scramble: Will 1984 be like 1914?" International Affairs, Vol. 58 (Winter 1981-82), pp. 42-58.

trends, the need for continuing access to raw materials "provides a powerful driving force toward present-day international conflict" and one can expect such conflicts to proliferate in the decades ahead.[30]

In a similar work, Nazili Choucri and Robert C. North claim that the activities of a country will be severely limited unless adequate resources can be supplied.[31] This is especially problematic when rapid population growth is occurring. When demands cannot be satisfied because existing resource capabilities are inadequate, lateral pressure[32] will transpire in order to alleviate the resource constraint. If the intensity and extent of this lateral pressure is significant, international conflict may result as was the case in the First World War.

Citing the "Cod War" between Iceland and Great Britain and the "Tuna War" that pitted Ecuador and Peru against the United States as evidence, Marvin S. Soroos argues that those common areas that are not clearly regulated provide the most fertile ground for hostilities.[33] This is especially the case when states are seen to have incompatible interests over the resource domain in question; the likely outcome of such a scenario is a "tragedy of the commons"[34] situation. Thus, he sees problems arising out of resource

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[30]Ibid., p. 48

[31]Choucri and North, Nations in Conflict. In an analogous piece, Robert L. Carnerio advances the thesis that throughout history, population pressures and resource scarcity were the primary engines of state formation and foreign expansionism. Carnerio, "A Theory of the Origin of the State," Science, Vol. 169 (August 21 1970), pp. 733-738.

[32]Choucri and North define lateral pressure as any state induced activity leading to foreign expansion. Choucri and North, Nations in Conflict, pp. 16-17.

[33]Marvin S. Soroos, "Conflict in the Use and Management of International Commons," in Perspectives on Environmental Conflict and International Politics, ed., Jyrki Kakonen (New York: Pinter Publishers, 1992), pp. 31-43.

[34]Garrett Hardin, "The Tragedy of the Commons," Science, Vol. 162 (13 December 1968), pp. 1243-1248. In his eminent piece, Hardin argued that in the medieval "commons," (unrestricted pasture land on which herders brought their livestock to graze), each individual herder, acting in conspicuous economic self-interest, maximized his or her use of the commons by bringing

conflicts in: <1> the international commons defined as a resource domain shared by one or more states; and <2> the global commons, or those areas shared by all international states.

Finally, perhaps the most prominent contemporary example of what appears to be at first glance a tightly deterministic ecologically driven conflict is the 1969 "Soccer War" between Honduras and El Salvador. Paul R. Ehrlich, Anne H. Ehrlich and John P. Holdren cite how explosive population growth, land erosion and deforestation contributed to declining food production and growing migration from El Salvador to Honduras.[35] These events triggered a crisis which eventually led to a six week war.[36]

While provocative, the problems with these conceptions and other similar ones[37], is that the causal chain is rarely so simply understood due to the large number of potential intervening variables.[38] While resource flow control is important, to suggest that it is a direct cause of international conflict is to not adequately address the other forces that motivate decision-makers into action. For example, it has been argued that resources should not be seen

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in as many additional cattle as possible. Sadly, as a consequence of the overgrazing of the commons, the herds starved. The immediate profits of additional grazing accrued to the individual herder but the costs were paid by the society at large.

[35]Paul R. Ehrlich, Anne H. Ehrlich, and John P. Holdren, Ecoscience: Population, Resources, Environment (San Francisco: W. H. Freeman and Co., 1977).

[36]James, Crisis and War, p. 53.

[37]See, for example, Gary Hawes, "Theories of Peasant Revolution: A Critique and Contribution from the Philippines," World Politics, Vol. 43 (January 1990), pp. 261-298; Gurr, "On the Political Consequences of Scarcity and Economic Decline," especially pp. 65, 70-72. Gurr states that "[r]esource scarcity... has consequences for foreign policy, many of which are conflictual. Historically, warfare has been a common response to ecological constraints."

[38]Johan Jorgen Holst, "Security and the Environment: A Preliminary Exploration," Bulletin of Peace Proposals, Vol. 20 (June 1989), pp. 123-128.

as fundamental sources of conflict because they have more often become important for sustaining efforts (e.g. war) undertaken for other reasons.[39]

To be fair, there are very few instances of what might be termed purely ecologically driven conflicts and most of these authors include population growth as an intervening variable in explaining the relationship between environmental change and conflict. However, even in the instance of what appears to be close to a purely ecologically driven conflict, the 1969 "Soccer War" between El Salvador and Honduras, other factors are clearly important to consider. William Durham, for example, demonstrates how changes in land distribution and agricultural practice -- to the detriment of peasant farmers -- were more important inducements to migration than population growth, land erosion and deforestation. In fact, small farmers appeared to be more often squeezed off the land by large land owners than by other forces.[40]

In general, environmental threats to security will always be affected to some degree by social, economic, cultural and political factors.[41] A list of potential intervening variables might include such things as: performance and efficiency of the economy; natural resource endowment; the nature of power relations within the international system; demographic structure; and the scope and nature of poverty between and within individual countries. Some of these may be more important than others. In other cases very few intervening variables may be at work.[42] The important thing to note at this

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[39]Ronnie D. Lipschutz and John P. Holdren, "Crossing Borders: Resource Flows, the Global Environment, and International Security," Bulletin of Peace Proposals, Vol. 21 (June 1990), pp. 121-133.

[40]William Durham, Scarcity and Survival in Central America: The Ecological Origins of the Soccer War (Stanford: C.A.: Stanford University Press, 1979).

[41]Peter H. Gleick, "Water and Conflict: Fresh Water Resources and International Security," International Security, Vol. 18 (Summer 1993), p. 83.

[42]Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," pp. 106-108. His persuasive conception of a simple scarcity conflict is close to a purely ecologically driven conflict.

stage is that the empirical evidence suggesting a tight relationship between environmental breakdown and conflict "is incomplete and the data insufficiently systematic to support theories about general trends."[43]

### ii. Environment and Conflict as a *Spurious* Relationship

Might the relationship between the environmental change and conflict be spurious? Perhaps the connection drawn is the result of overzealous academics searching for something novel to explore and examine. Indeed, there is ample evidence to suggest that international relations theorists simply suffer from their close proximity with the events they discuss and that the contemporary fascination with environmental issues will go the way of previous fads.[44]

One line of reasoning that rejects the environment and conflict connection, is advanced by Amory B. Lovins[45], and particularly Herman Kahn and Julian Simon.[46] They take as their starting point the premise that resource degradation has been grossly exaggerated. The transition from the oil crisis of the 1970s to the oil glut of the 1980s and 1990s is frequently cited as evidence. These studies are essentially grounded in the assumption that technological innovation in concert with human ingenuity and market forces will sustain economic and population growth indefinitely.

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[43]Holst, "Security and the Environment: A Preliminary Exploration," p. 122.

[44]Susan Strange, "Cave! hic dragones: A Critique of Regime Analysis," in International Regimes, ed., Stephen D. Krasner (Ithaca, N.Y.: Cornell University Press, 1983), pp. 337-354. Strange makes this point with respect to the current interest in international regimes and says that it may be "one of those shifts of fashion not too difficult to explain as a temporary reaction to events in the real world but in itself making little in the way of a long-term contribution to knowledge."

[45]Amory B. Lovins, Soft Energy Paths: Toward a Durable Peace (Cambridge, Mass.: Ballinger Publishing Co., 1977).

[46]Julian Simon and Herman Kahn, eds., The Resourceful Earth (Oxford: Basil Blackwell, 1984).

As indicated in a previous section, the optimistic interpretation advanced here contradicts available evidence that suggests that the evidence of environmental degradation is irrefutable. Moreover, these works place too much faith in the ability of market forces to adapt to these new environmental realities. Ted Robert Gurr, for example, points out that technological ingenuity requires an abundance of natural resources to sustain innovation.[47] Lester R. Brown rightly questions whether economic growth can keep pace with demographic pressures by pointing to current trends which point to just the opposite conclusion (see Table 2-1). In a similar vein, Paul R. Ehlrich, Anne H. Ehrlich and Gretchen C. Daily have concluded that the expansion of food production has not been able to keep pace with population growth.[48]

*Table 2-1*

World Economic Growth by Decade, 1950-1992

| Decade | Annual Growth of World Economy (%) | Annual Growth Per Person (%) |
|---|---|---|
| 1950-1960 | 4.9 | 3.1 |
| 1960-1970 | 5.2 | 3.2 |
| 1970-1980 | 3.4 | 1.6 |
| 1980-1990 | 2.9 | 1.1 |
| 1990-1992 | 0.6 | -1.1 |

Source: Lester R. Brown, "A New Era Unfolds," in his State of the World, 1993: A Worldwatch Institute Report on Progress Toward a Sustainable Society (New York: W.W. Norton and Co., 1993), p. 16.

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[47]Gurr, "On the Political Consequences of Scarcity and Economic Decline,", pp. 52-53.

[48]Paul R. Enrlich, Anne H. Ehrlich, and Gretchen C. Daily, "Food Security, Population, and Environment," Population and Development Review, Vol. 19 (March 1993), pp. 1-32. In the 1990s, global population growth rates averaged about 1.7 percent per annum compared to annual average growth of 0.9 percent for agricultural production.

A different approach in considering the environment as an arena that may produce interstate conflict is implicitly promoted by the dominant approach to the study of international relations[49], realism.[50] While one has to guard against sweeping judgements, in general, those who have practiced realism have been notable for their lack of attention to these concerns. The reason for this apparent oversight is due to realism's close attention to the high (e.g. military) low (e.g. socioeconomic) national security dichotomy.[51] The breadth and depth of the challenges posed by environmental decline suggests that the potential conflict arising as a result of these changes may render this dichotomy obsolete.[52]

Furthermore, realism focuses its analytic attention on unitary states as rational maximizers of power in an anarchic system characterized by self-help

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[49]Joseph S. Nye, Jr., "Neorealism and Neoliberalism," World Politics, Vol. 40 (January 1988), pp. 235-251.

[50]This chapter does not make a special effort, except when necessary, to delineate the differences between realism and neorealism (sometimes referred to as structural realism) since on most important issues (e.g. states are the foremost actors of the international system) they agree. See Paul R. Viotti and Mark V. Kauppi, eds., International Relations Theory: Realism, Pluralism, Globalism (New York: Macmillan Publishing Company, 1987), especially chapter 2; Robert G. Gilpin, The Richness of the Tradition of Political Realism," in Neorealism and its Critics, ed. Robert O. Keohane (New York: Columbia University Press, 1986), pp. 301-321. For a skeptical point of view, see Richard K. Ashley, "The Poverty of Neorealism," in Neorealism and its Critics, ed. Robert O. Keohane (New York: Columbia University Press, 1986), pp. 255-300.

[51]See Hans J. Morgenthau, Politics Among Nations: The Struggle for Power and Peace, 5th ed. (New York: Alfred A. Knopf Inc., 1978), especially pp. 3-15. However, in fairness to this intellectual tradition, some realists argue that high security means any significant event that is likely to effect state security. See Joseph M. Grieco "Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism, International Organization, Vol. 42 (Summer 1988), pp. 485-507.

[52]There are also those who believe that a number of economic issues (e.g. trade) render this dichtomy meaningless. See for example, Robert O. Keohane and Joseph S. Nye, Jr., Power and Interdependence (Boston: Little, Brown and Co., 1977).

because of the lack of an overarching sovereign[53]; as such, state behavior is understood in the context of the structure of power distribution and capabilities within the system.[54] The strict emphasis on the state neglects the fact that environmental issues do not respect territorial boundaries. Thus, it provides a poor framework for analyzing the relationship between the environment and conflict. The result is that realism encourages its practitioners to ignore or de-emphasize transboundary environmental issues because such problems:

> often cannot be linked to a particular country, and do not have any easily conceptualized impact on the structure of economic and military power relations between states. Realism induces scholars to squeeze environmental issues into a structure of [abstract constructs such as] "state," "sovereignty," "territory," "national interest," and "balance of power." The fit is bad which may lead theorists to ignore, distort, and misunderstand important aspects of global environmental problems.[55]

Finally, it is imperative to mention Daniel Deudney's two provocative essays[56] suggesting a spurious relationship between environmental decay and conflict. Indeed, they are worth exploring at some length because: <1> they are

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[53]For a lucid discussion of these points see Hedley Bull, The Anarchical Society: A Study of Order in World Politics (New York: Columbia University Press, 1977).

[54]Here I am referring to the seminal neorealist school; see Robert G. Gilpin, War and Change in World Politics (Cambridge: Cambridge University Press, 1981); Kenneth N. Waltz, Theory of International Relations (Reading, Mass.: Addison-Wesley, 1979).

[55]Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," pp. 84-85.

[56]Daniel Deudney, "The Mirage of Eco-War: The Weak Relationship among Global Environmental Change, National Security and Interstate Violence," in Global Environmental Change and Interstate Violence, eds., Ian H. Rowlands and Malory Greene (London: Macmillan Academic and Professional Ltd., 1992), pp. 169-191; Daniel Deudney, "The Case Against Linking Environmental Degradation and National Security," Millenium, Vol. 19 (Winter 1990), pp. 461-476; see also Barry Buzan, "New Patterns of Global Security," International Affairs, Vol. 67 (July 1991), pp. 451-452.

strongly informed by the literature on neoliberalism[57], the other paradigmatic contender within the discipline; and <2> Deudney has been the foremost advocate of questioning the link between environmental decline and violence.[58]

He begins by advancing the notions that the social sciences are far from understanding the causes of interstate conflict, and that environmental problems are similarly poorly understood. Thus he is dubious of those who would draw a connection between them proposing instead, that violent interstate interaction, if anything, is a less likely feature of contemporary society in an era where cooperation based on mutually beneficial exchange is becoming the norm.[59] With regards to the likelihood of resource wars, he

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[57]See Robert Axelrod, The Evolution of Cooperation (New York: Basic Books Inc., 1984); Stephan Haggard and Beth A. Simmons, "Theories of International Regimes," International Organization, Vol. 41 (Summer 1987), pp. 491-517; Robert O. Keohane and Joseph S. Nye, Jr., Power and Interdependence 2nd ed. (Boston: Little, Brown and Co., 1989); Robert O. Keohane, International Institutions and State Power: Essays in International Relations Theory (Boulder: Westview Press, 1989); Stephen D. Krasner, ed., International Regimes (Ithaca, N.Y.: Cornell University Press, 1983); John Gerard Ruggie, "Multilateralism: The Anatomy of an Institution," International Organization, Vol. 46 (Summer 1992), pp. 561-598; Oran R. Young, International Cooperation: Building Regimes for Natural Resources and the Environment (Ithaca, N.Y.: Cornell University Press, 1989). Sometimes referred to as the Grotian or Liberal tradition, these theories, while substantively different in many important respects, tend to stress the significance of the domestic arena, international society, international law, complex interdependence and international institutions (e.g. regimes) on shaping or modifying state behavior.

[58]Neville Brown, "Ecology and World Security," The World Today, Vol. 48 (March 1992), p. 52.

[59]This is an important claim made by many who are influenced by Grotian or Liberal theories especially in light of the seminal changes in world politics in recent years. Scholars of this persuasion tend to see violent interaction between states as the exception while cooperative patterns of interstate behavior are generally considered to be the norm. Thus most liberals would probably see environmental decay as at least as great an opportunity for cooperation as conflict. See James N. Rosenau and Ernst-Otto Czempiel, eds., Governance Without Government: Order and Change in World Politics (Cambridge: Cambridge University Press, 1992); Adam Roberts, "A New Age in International Relations?" International Affairs, Vol. 67 (July 1991), pp. 509-

states that the needs of modern states are most often met without the territorial control of the resource in question[60]; that resource imperialism through the conquest of territory is prohibitively costly in the contemporary world; and finally, that the world has entered a period where substitutes can be found for an increasing variety of substances.

Deudney also questions the scenario that environmental devastation will lead to economic and political instability and hence, result in international conflict. He points out that there is no "natural" connection between resource availability and wealth (e.g. Japan) or between economic decline and interstate conflict. To those who claim that environmental decline might alter interstate relations in such a fashion as to cause war by upsetting the relative power capacities of states, Deudney retorts that this is increasingly unlikely due to the decoupling of the link between economic and military might. Further, he dismisses the possibilities of conflict resulting over cross-state pollution because highly asymmetrical pollution exchange and environmental degradation are rare. Finally, Deudney argues that potential conflicts relating to those breaking global commons agreements are unlikely. For example, it would be hard to see military coercion resulting from a state, such as China, not adhering to a global climate agreement.

While Deudney is an innovative thinker with an insightful perspective on the subject of the connection between environmental change and conflict, several criticisms of his work can be made. Firstly, and most importantly, his suggestion that resource wars are increasingly unlikely in an era where such aggression is prohibitively costly seems suspect. For example,

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526; Arthur A. Stein, Why Nations Cooperate: Circumstance and Choice in International Relations (Ithace: Cornell University Press, 1990), chapter 1.

[60]On this point, see also, Ronnie D. Lipschutz, When Nations Clash: Raw Materials, Ideology and Foreign Policy (New York: Ballinger Publishing Co., 1989).

Iraq's invasion of Kuwait "had deep and pervasive environmental and resource roots".[61] Two of Baghdad's primary objectives were directly related to: <1> an effort to secure 20% of the world's crude oil reserves in order to service the debt incurred during its war with Iran and <2> have a stronger hand controlling the price of oil.[62] The enormous strategic and economic importance of oil in a politically tense region that contains two-thirds of known oil stocks suggests that future conflicts over this valuable commodity are only too likely.

The northern Arctic regions could also be the host to conflict as countries compete to exploit its substantial oil and natural gas reserves. Several nations such as Russia, the United States, Norway and Canada are attempting to reduce their dependence on Middle Eastern energy by developing these zones. Disputes over jurisdiction point to the potential for future resource driven conflicts as these efforts become more intense. There are also rival claims to oil deposits in the Aegean Sea by Turkey and Greece.[63] The two countries have exchanged military threats and to date there is no resolution. In the South China Sea, a similar situation exists between China and Vietnam. Both claim title to the Paracel islands believed to be underlain

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[61]Gleick, "Water and Conflict: Fresh Water Resources and International Security," p. 82.

[62]R.T. Naylor, Bankers, Bagmen and Bandits: Business and Politics in the Age of Greed (Montreal: Black Rose Books, 1990), pp. 160-166. In addition, there were other important reasons for Iraq's invasion of Kuwait including: the elimination of Iraq's considerable debt to Kuwait incurred during its war with Iran; the related demand that Kuwait pay compensation to Iraq for its defence of Arab "interests" during that war; Baghdad's attempt to rebuild and supply its growing war machine; and border disputes including the status of the Rumalia oil field which straddles the two states' frontier. On this question see, Fred Halliday, "The Gulf War and its Aftermath: First Reflections," International Affairs, Vol. 67 (April 1991), pp. 223-234.

[63]Alexander A. Arbatov, "Oil as a Factor in Strategic Policy and Action: Past and Present," in Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, ed., Arthur H. Westing (Oxford: Oxford University Press, 1986), p. 33.

with substantial oil deposits. When Vietnam stationed troops there in 1974, China replied with a military strike and succeeded in driving off the Vietnamese. Again, the conflict is not close to being resolved to the satisfaction of both countries.

Meanwhile, the disputed status of offshore fishery resources was an important reason for the Anglo-Icelandic clash of 1972-1973 and the Falklands-Malvinas conflict.[64] Perhaps the most prominent contemporary example of a conflict over fishery resources can be seen between Japan and Russia over the status of the "fish-rich" Kurile islands north of Hokkadio (Etorofu, Kunashiri, Shikotan and Habomais). In fact, it is probably the major obstacle to a rapprochement between the two and indicates increasing trouble ahead in the absence of a solution. Japan needs these islands back in order to sustain its catch quota and would appear willing to compromise Russian political-economic transformation in order to achieve that goal. Russia, on the other hand, is second only to Japan in total catch (in tons) per year[65] and this is a vital reason why it has shown markedly little interest in reaching a compromise over the islands in question. Today, despite the end of the Cold War, the countries continue to have diametrically opposed views on the status of the islands -- seriously undermining the future stability of the region.[66]

Perhaps even more troubling, essential raw materials such as chromium (which makes steel harder, more heat resistant and less subject to

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[64]Westing, "Environmental Factors in Strategic Policy and Action: An Overview," p. 16

[65]Mark S. Hoffman, ed., The World Almanac and Book of Facts, 1993 (New York: Pharo Books, 1992), pp. 768, 792.

[66]Tsuyoshi Hasewaga, "Soviet-Japanese Relations in the 1990s," in Japan and the United States: Troubled Partners in a Changing World, ed., Mike Mochizuki (Cambridge, Mass.: Brassey's (US), Inc., 1991), pp. 57-89; James Walsh, "The Territorial Imperative," Time (25 October 1993), pp. 26-29.

coercion) and cobalt (extremely resistant to high temperatures) all come almost exclusively from vulnerable or potentially unstable states such as Albania, Zimbabwe, Zaire, South Africa, Zambia and Russia.[67] In 1976, for example, the transportation of cobalt from two of the three main exporting countries, Zambia and Zaire was interrupted for several years by the Angolan civil war. A NATO sponsored force was deployed in 1978 to stabilize supply routes in both countries.[68] The continuing political volatility of southern Africa is thus the source of great concern and occupies a central position in the strategic thinking of the major powers.[69]

Secondly, while resource substitutability is indeed a possibility in many cases, it is not technologically feasible in some instances (e.g. water) and is not seen as cost effective in others (e.g. oil). For example, in the case of water there are simply no substitutes for its fundamental use in the production of food stuffs. In other instances, a state may find alternative sources to be prohibitively expensive or there may be political or technical reasons which make substitutes impossible.[70]

Thirdly, to dismiss the potential for conflict because asymmetrical pollution exchange is rare is to ignore a plethora of recent examples which suggest just the opposite. Canada has historically been the recipient of American pollution that has helped to facilitate endemic acid rain in that country. This issue was a serious source of tension between the states during

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[67]Helge Hveem, "Minerals as a Factor in Strategic Policy and Action," in Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, ed., Arthur H. Westing (Oxford: Oxford University Press, 1986), pp. 55-84; Russett, "Security and the Resources Scramble: Will 1984 be like 1914?" p. 45.

[68]Hveem, "Minerals as a Factor in Strategic Policy and Action," pp. 74-75.

[69]Westing, "Environmental Factors in Strategic Policy and Action: An Overview," pp. 10-11.

[70]Hveem, "Minerals as a Factor in Strategic Policy and Action," p. 69.

the 1980s. The Rio Grande and Colorado rivers meanwhile, have been a source of conflict between the United States and Mexico since the turn of the century. In the 1960s, the salinity of the river draining into the Mexicali Valley, considered by some to be Mexico's most productive land, increased so much as result of projects in Arizona that it effectively wiped out agriculture in the region for several years.[71]

Finally, like much of the literature sympathetic to notions of complex interdependence, Deudney's writings smack of a normative bias. To suggest that there is no connection between environmental decline and economic and political instability that might trigger interstate conflict seems to be highly questionable at best. Perhaps what is more important, there are two hidden assumptions in his work that suggest: <1> environmental decline will never be intense enough to produce conflict; and <2> that cooperative outcomes between states will always emerge out of environmental decay.

One could cite any number of cases which clearly refute these assumptions. One example of environmental decline and conflict occurred in Africa during the 1970s. The rapid soil erosion in Ethopia fostered a fall-off in agricultural production and created food shortages. This resulted in a massive movement of impoverished Ethopian peasants into a strip of farmland that straddles Ethopia's disputed border with Somalia helping to propel the two countries into war in 1977.[72]

More recently, a particularly compelling study has shown how the dearth of land in Bangladesh and the consequent overexploitation of the available agricultural land -- against a backdrop of ubiquitous poverty -- led to

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[71]Timberlake and Tinker, "The Environmental Origins of Political Conflict," pp. 67-68.

[72]Norman Myers, "The Environmental Dimension to Security Issues," The Environmentalist, Vol. 6 (Winter 1986), p. 251.

the creation of millions of environmental refugees pouring into neighboring India. This has led to conflict between the two countries.[73] In sub-Saharan Africa meanwhile, Sudan, despite a bitter civil war, has taken in more than a million environmental refugees from Chad, Uganda and Ethopia. This has further destabalized an already unstable region while putting new burdens on Sudan's limited food supply and agricultural land. As Mathews comments, unfortunately these refugees are "spreading the environmental stress that originally forced them from their homes."[74] Overall, Africa is the reluctant home to two-thirds of the world's environmental refugees.[75]

### iii. Environmental Decline as a Contributing Cause of Conflict

The most persuasive arguments for linking environmental degradation with conflict come from those who see it as a contributing factor. Thus, while environmental factors are not necessarily a sufficient cause of violent conflict, a growing number of scholars are convinced that they are an important contributing factor in the intricate causality of conflict and war. In general, these essays tend to be: <1> similar in style and substance; and, <2> forward looking and theoretical (i.e. what types of conflicts may develop) rather than empirical and tangible (i.e. what conflicts have evolved).

Peter H. Gleick, for example, suggests that while he questions the extent

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[73]Homer-Dixon, Boutwell and Rathjens, "Environmental Change and Violent Conflict," pp. 40-41.

[74]Mathews, "Redefining Security," p. 168.

[75]Jim MacNeill, "The Greening of International Relations," International Journal, Vol. 40 (Winter 1989-90), pp. 4-6.

that resource depletion or environmental problems alone can lead to conflict:

> it is widely acknowledged that resources can act as roots leading to economic pressures and tensions or as triggers to conflict when other pressures and tensions exist between states.[76]

He identifies conflicts over food supplies, water and mineral resources as potential "hot spots" that may be made worse by changes in the global climate. In two separate papers, Fen Osler Hampson and David A. Wirth concur with this sentiment in worrying about the foreign policy consequences for all countries as a result of the accompanying strain and potential upheaval that the effects of global warming might have on international security.[77] Wirth, for example, states that "[t]he greenhouse effect, if unchecked, is likely to cause disruptions in the balance of power worldwide, exacerbating the risk of war."[78] In a similar work, Stephen Lonergan and Barb Kavanagh advance the notion that every nation needs an uninterrupted supply of water, food, fuel, land and a variety of raw materials; these resource requirements provide a powerful catalyst for potential conflict in order to meet these ends.[79] Finally, Neville Brown argues that the danger posed by global warming is such that acute communal and state to state conflicts, might be aggravated by the negative effects (e.g. rainfall variations, rising sea levels) of this trend.[80]

In a more concrete vein, Lloyd Timberlake and Jon Tinker suggest that while it is difficult to evaluate what role environmental factors play in

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[76]Peter H. Gleick, "The Implications of Global Climatic Changes for International Security," Climatic Change, Vol. 15 (October 1989), pp. 309-325.

[77]Fen Osler Hampson, "Climate Change: Building Coalitions of the Like-minded," International Journal, Vol. 40 (Winter 1989-90), pp. 36-74; Wirth, "Climate Chaos," pp. 3-22.

[78]Wirth, "Climate Chaos," p. 10.

[79]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 273.

[80]Brown, "Climate, Ecology and International Security," pp. 519-532.

violent conflict, it is clear that environmental forces are likely to play an important contributing role. The authors document three specific types of environmental factors that they associate with recent and contemporary strife: confrontations over fuelwood and food shortages as a result of the degradation of the forest and soil (e.g. Central America); conflicts over scarce water in shared river basins (e.g. Middle East); and disputes over marine fisheries (e.g. United States and Peru). In a comparable essay, Ronnie D. Lipschutz and John P. Holdren have identified a number of threats which may in the future contribute to conflict.[81] These include the intricate relationships between climate change, deforestation, soil erosion and the availability of water supplies. The associated stress and impacts of these changes might furnish the conditions, in the context of existing problems (e.g. economic decline, widespread poverty), that could provide the catalyst to armed conflict between states.

In his treatise, Jim MacNeill sees the relationships between unsustainable development, environmental destruction, increasing social tension and conflict as extraordinarily complicated because every situation has its own intricate dynamics.[82] Nevertheless, he predicts as resources become scarcer, conflict is likely to increase as a result of the competition for remaining supplies. Thus, it is not surprising that environmental degradation is one of the major forces behind some of today's most contentious relationships. For example, deforestation, depletion of water resources and desertification have increased possibilities of military violence

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[81]Lipshutz and Holdren, "Crossing Borders: Resource Flows, the Global Environment, and International Security," pp. 121-133.

[82]MacNeill, "The Greening of International Relations," pp. 1-35; see also, Jim MacNeill, Peter Winseming and Taizo Yakushiji, Beyond Interdependence: The Meshing of the World's Economy and the Earth's Ecology (Oxford: Oxford University Press, 1991), especially chapter 3.

and political upheaval between neighboring states (e.g. Egypt and Sudan over the Nile River). Norman Myers in two separate essays and Johan Jorgen Holst in another agree with MacNeill in reaching the same conclusion: environmental decline may ratchet up existing conflicts or add new dimensions to them.[83]

Finally, in two complex and ambitious studies, Thomas F. Homer-Dixon and his associates, use cognitive mapping[84] to demonstrate how environmental change, in the context of important intervening factors -- physical, technological, social and economic -- may produce acute conflict. Human induced scarcity of renewable resources is especially problematic because they are linked in a highly complex and interdependent environment. Thus, the overextraction of one resource may have multiple negative repercussions on the others. A particularly disconcerting scenario where the likelihood of conflict is high is when rapid population growth is combined with the reduction of quantity or degradation of the resource faster than it can be naturally replenished.[85] Water shortages along the major rivers in the Middle East can be understood in this context.

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[83]Myers, "The Environmental Dimension to Security Issues," pp. 251-257; see also, Myers, "Environment and Security," pp. 3-22; Holst, "Security and the Environment: A Preliminary Exploration," pp. 123-128.

[84]Cognitive mapping refers to a way of dealing with and understanding issue complexity through a simplified image of cause and effect. Robert Axelrod is generally credited with inventing cognitive mapping. See Robert Alexrod, ed., Structure of Decision: The Cognitive Maps of Political Elites (Princeton, N.J.: Princeton University Press, 1976).

[85]Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," pp. 76-116; Homer-Dixon, Boutwell and Rathjens, "Environmental Change and Violent Conflict," pp. 38-45.

## III. Assessing the Linkages: Toward An Analytical Framework

These studies share the feeling that strategic studies need to incorporate this ecological threat to peace into its corpus of knowledge. One commentator believes this to be necessary in light of the fact that in an increasing array of cases, it appears that states are arming themselves in order to solve environmental conflicts.[86] Another has even gone as far as to claim that the primary focus of security analysts should be to concern themselves with the question of where and when resource-related disputes are most likely to arise.[87] However, this is easier said than done. Trying to determine the reasons behind international violence is always problematic because the causes are highly interrelated.[88] As Morgenthau has stated:

> The first lesson the student of international politics must learn and never forget is that the complexities of international affairs make simple solutions and trustworthy prophecies impossible.[89]

With environmental issues, the task is made even more difficult because they do not lend themselves to ready and concise analysis; thus, it is very difficult to prove that problem A will lead to consequence B: "[t]he myriad interlocking webs of cause and effect do not permit a linear interpretation of discrete relationships among members of the international

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[86]Jyrki Kakonen, "The Concept of Security - From Limited to Comprehensive," in his Perspectives on Environmental Conflict and International Relations (New York: Pinter Publishers, 1992), p. 150. Kakonen seems to suggest that Ethopia has armed itself with the express purpose of "dealing" with the problem of environmental refugees from neighboring countries.

[87]Gleick, "Water and Conflict: Fresh Water Resources and International Security," pp. 80-83.

[88]Choucri and North, Nations in Conflict, p. 1.

[89]Morgenthau, Politics Among Nations: The Struggle for Power and Peace, p. 21.

community."[90] Understandably then, the lack of concrete causal and explanatory variables is the chief failing of most of the literature which posits a relationship between environmental destruction and conflict.

Despite these formidable problems, complexity does not necessarily rule out theory; rather, theory is a way of dealing with complexity.[91] Moreover, theory is important because without it, "all attempts at forecasting and prediction would be reduced to random guessing."[92] Thus, based on the material presented thus far, it is possible to offer some tentative ideas that may help to elucidate this association with particular reference to the connection between water and interstate conflict. The propositions that will be advanced are important because they inform this thesis and help to provide a preliminary framework with which to analyze these conundrums. Hopefully, their usefulness will be demonstrated in the course of chapters three and four. However, before that, some necessary caveats are order.

Firstly, the abstractions put forth are meant to be more suggestive than definitive. A single authoritative model or theory attempting to explain the link between environmental decline and conflict is probably not possible (as indicated above) due to its multifaceted nature. Nonetheless, as long as one is aware of the inherent limitations of such a study as this and is careful not to extrapolate too much from the basis of a couple of cases that deal with one specific manifestation of the problem (i.e. diminishing water supplies) in one idiosyncratic area (i.e. the Middle East), the intellectual integrity of this thesis should remain sound. Furthermore, this thesis is, on the whole, not

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[90]Myers, "Environmental Security," p. 39.
[91]Kenneth N. Waltz, "Realist Thought and Neorealist Theory," Journal of International Affairs, Vol. 44 (Spring/Summer 1990), pp. 21-37.
[92]John Lewis Gaddis, "International Relations Theory and the End of the Cold War," International Security, Vol. 17 (Winter 1992/93), p. 6.

concerned with normative prescriptions (i.e what ought to be), but rather it is motivated by the concern to find what is. With this in mind, let us now turn to the task of advancing some rudimentary propositions about the relationship between environmental destruction and conflict.

Firstly, when thinking about where conflict might develop one must be particularly concerned with the declining resource base and especially those resources that: <1> are essential to human existence; <2> overlap two or more national territories; <3> are in short supply when demand is high; and, <4> can be physically seized and commandeered.[93] When all these conditions are satisfied such resources are likely to be a proximate and powerful cause of interstate conflict. These resources will be termed *supersalient resources.* An excellent example of a supersalient resource is water in the two river basins under review.

Secondly, the author expects that the propensity for state actors to rationally perceive and calculate their interests in a zero-sum or negative-sum situation increases significantly if: <1> supersalient resources are involved; and <2> existing political and military tensions between states are severe.[94] In such a scenario, constructive attempts aiming for a cooperative solution may become impossible. Why is this the case?

The familiar lifeboat analogy will illustrate the importance of the first proposition. Stranded at sea, a constant set of actors competes for a diminishing supply of fresh water. Left to themselves, positive-sum and

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[93]Some of these ideas draw inspiration from Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," pp. 76-116; and Westing, "Environmental Factors in Strategic Policy and Action," pp. 3-21.

[94]Although the realist enterprise was criticized earlier, that does not mean it has to be completely jettisoned as an analytical framework. Here I am adopting some important realist principles: that states are unitary actors who rationally calculate their interests in an attempt to gain the most optimal outcome. The perceived external constraints they face, most notably the structure of power relationships between states, conditions and shapes their preferences.

cooperative outcomes can be viewed as less and less likely as supplies dwindle. Perceived in this fashion, it is not difficult to imagine states behaving in a similar manner in a situation that approximates the conditions outlined above as states seek relief from scarcity. In fact, one can surely expect that the scope for environmental conflict will expand as increasing numbers of states seek to sustain themselves from declining resource stocks.[95] This is especially true of supersalient resources such as water: "[a]s water shortages occur and full utilization is reached these policies tend to be framed more and more in zero-sum terms, adding to the probability of discord."[96]

In addressing the second point, if an atmosphere of political and military friction between states is already prevalent, insufficient supersalient resources add a new dimension to the previously existing tensions. These political and military tensions may have also have social, economic, and cultural dimensions. Regardless, they will have the effect of significantly raising the probability of interstate conflict. Such a predicament exists in the case studies to be presented and, thus, provide good tests as to the applicability/viability of these propositions. The Middle East is already an area where political and military hostilities among states are acute because of historical, religious, ideological, geographical and ethnic differences among other things; adding declining water supplies ratchets up the existing strife significantly and contributes to the possibility of hydrologically influenced interstate conflict. Therefore, the author expects that, in the context of existing political and military tensions between states, water as a supersalient resource may provide the trigger which could lead to acute interstate conflict. Sadly, as long as the idea of national sovereignty remains sacred, one can expect that a

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[95]Myers, "The Environmental Dimension to Security Issues," p. 251.
[96]Thomas Naff and Ruth C. Matson, eds. Water in the Middle East: Conflict or Cooperation? (Boulder: Westview Press, 1984), p. 1.

state's resort to violence to preserve mastery of its own natural resources or to perpetuate its access to extraterritorial sources will remain a fully admissible and customary means of dispute resolution.[97]

## Conclusion

In the course of a literature review, this chapter has demonstrated that environmental decline can potentially play an important role in contributing to conflict between states. The deterministic and spurious approaches to understanding the relationship between environmental change and conflict were shown to have serious limitations and shortcomings. Finally, a preliminary analytical framework has been outlined and its explanatory utility will be developed in the subsequent discussions.

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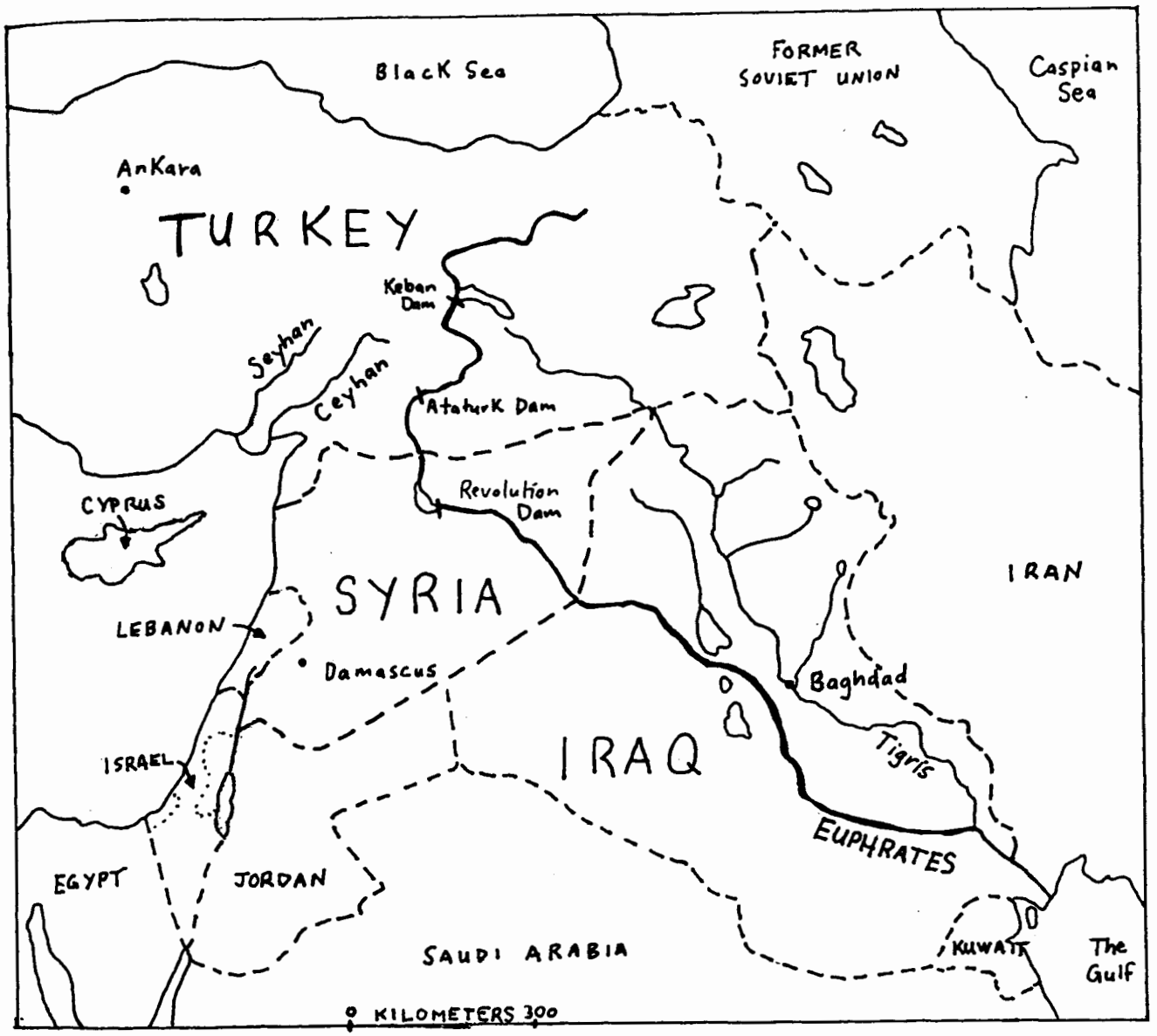
[97]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 274.

*Chapter 3*

## Acute Interstate Conflict Along the Euphrates

Map of the Euphrates River Basin




Source: Adapted from the Economist, "Where Dams Cause Wars," Economist (18 July 1987), p. 37.

> **November 3, 1998.** *The specter of war returned to the Middle East today as a violent struggle for diminishing water supplies erupted along the Euphrates River. In a closely coordinated effort, Syria and Iraq cast aside long held animosities for one another by engaging in a wide ranging air attack against Turkey. The aim of this lightening strike appeared to be to destroy the massive hydroelectric and irrigation projects undertaken by Turkey in recent years which had reduced the flow of the Euphrates to a trickle by the time it crossed into Syria and Iraq...* [1]

In 1993, this represents a worst case scenario; however, there is a growing consensus among water and military experts on the one hand, and the political and military elite of the Middle East on the other, that the next major conflict in the area may be fought not over oil, the regions most ubiquitous resource, but over water, its scarcest.[2] For example, in April 1991,

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[1]Richard Z. Chesnoff, "When Water Feeds Flames: Growing Shortages in the Mideast Add to Regional Tensions," U.S. News and World Report (21 November 1988), p. 47. This represents an adaptation of a fictitious (but all too plasuible) scenario posed by Chesnoff.

[2]See for example, Addeane S. Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," in A Shared Destiny: Near East Regional Development and Cooperation, eds. Joyce R. Starr and Addeane S. Caelleigh (New York: Praegar Publishers, 1983), pp. 121-137; John K. Cooley, "Middle East Water: Power for Peace," Middle East Policy, Vol. 1 (Summer 1992), pp. 1-15; John K. Cooley, "The War Over Water," Foreign Policy, No. 54 (Spring 1984), pp. 3-27; Michael Elliott, "The Global Politics of Water," American Enterprise, Vol. 2 (September/October 1991), pp. 27-31; Abdel Majid Farid and Hussein Sirriyeh, eds., Israel and Arab Water (London: Ithaca Press, 1985); Frederick W. Frey and Thomas Naff, "Water an Emerging Issue in the Middle East," The Annals of the American Academy, No. 482 (November 1985), pp. 65-84; Angus Hindley, "A New Source of Conflict for the Region," Middle East Economic Digest (MEED), Vol. 35 (25 January 1991), pp. 10-11; Malin Falkenmark, "Middle East Hydropolitics: Water Scarcity and Conflicts in the Middle East," Ambio, Vol. 18, No. 6 (1989), pp. 350-352. Chris Hellier, "Draining the Rivers Dry," Geographical Magazine, No. 62 (July 1990), pp. 32-35; John Kolars, "The Course of Water in the Arab Middle East," American-Arab Affairs, Vol. 33 (Summer 1990), pp. 57-68; Thomas Naff and Ruth Matson, eds., Water in the Middle East: Conflict or Cooperation? (Boulder: Westview Press, 1984); Chris Savage, "Middle

shortly after the Persian Gulf War, no less an authority than the Secretary General of the United Nations, Dr. Boutros Ghali[3] (then former Minister of State at the Egyptian Foreign Ministry), stated unequivocally that the next war in the Middle East would be over water because the issue of its scarcity was so acute that it could become a "time bomb ready to explode."[4] With virtually all of the rivers in the region being shared by several countries, Ghali ominously predicted that "the 1990's will be a decade of conflict over limited water resources."[5] Indeed, the disputes which currently divide much of the region over race, religion and borders may pale into insignificance when compared to the potential for future conflicts over water.[6]

This chapter will discuss the possibility of such an incident occurring along the highly contested Euphrates River. With that in mind, this chapter is divided into five sections. The first section will explore the nature of transnational rivers with specific reference to the Euphrates. The next section will examine the reasons that are the driving forces behind the construction of hydraulic structures along this river. Section three will discuss how the

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East Water," Asian Affairs, Vol. 22 (February 1991), pp. 3-10; Joyce R. Starr and Daniel C. Stoll, eds., The Politics of Scarcity: Water in the Middle East (Boulder: Westview Press, 1988); Joyce R. Starr, Foreign Policy, No. 82 (Spring 1991); pp. 17-36; Thomas R. Stauffer, "The Price of Peace: The Spoils of War," American-Arab Affairs, Vol. 24 (Spring 1982), pp. 43-54; Carl Widstrand, ed., Water Conflicts and Research Priorities (New York: Pergamon Press Ltd., 1980).

[3]There are a wide number of spellings and transliterations of names in Middle Eastern Arabic, Hebrew and Turkish. Thus, I have arbitrarily chosen the spellings which I have most frequently come across during the course of my research.

[4]Peter Kemp, "Water: As Precious as Oil is Plentiful" MEED Vol. 37 (29 January 1993), p. 7.

[5]MENA, "Ghali: Nile Not Part of Mideast Water Problems" (text). Cairo MENA in Arabic (24 April 1991). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 25 April 1991 (FBIS-NES-91-108, p. 5).

[6]Ibid.; see also his comments in Sandra Postel, "Facing Water Scarcity," in State of the World, 1993: A Worldwatch Institute Report on Progress Toward a Sustainable Society, ed. Lester R. Brown (Washington, D.C.: World Resources Institute, 1993), p. 24.

Euphrates has been developed and utilized by its three riparian states: Turkey, Syria and Iraq. In section four, an analysis will be conducted into how these developments have impacted on relations among the three countries in question. Finally, in the last section, the potential for acute interstate conflict will be investigated with special reference to the nature of political and military relations among the riparian states which exacerbate and fuel water related tensions.

## I. The Nature of Transborder Rivers

The vast majority of water on the planet is locked up in oceans (97.4%).[7] The total available supply of fresh water is thus very small with almost the entirety of that miniscule amount made up in glaciers/icecaps (2.0%) and groundwater (0.59%). Of the remaining fresh water, rivers make up but a tiny fraction (0.00012%). Nonetheless, in an area as arid and dry as the Middle East, they are the life giver *par excellence.*

The most advantageous position for any country positioned along a river is to be the uppermost riparian user in control of the headwaters where river flow begins. This is because the flow of a river is generally substantially decreased as it moves downstream due to the various reservoirs constructed to hold water for consumptive purposes and to facilitate hydroelectric, irrigation and flood control projects.[8] For example, any amount of impounded water will lose some of its volume through evaporation while simultaneously reducing stream flow. Meanwhile, the river will also be polluted to some extent by salts, chemical pollutants, miscellaneous

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[7]Roy Charles Ward and Mark Robinson, Principles of Hydrology 3rd ed. (London: McGraw-Hill Book Company, 1990), p. 56.
[8]Ibid., p. 276.

discharges, and agriculture runoff from upstream users.[9] Thus, the lowest riparian is the worst off because the quality and the quantity of the water flow is considerably less than would be expected if it naturally reached its borders.[10] Conversely, as one would expect, the furthest upstream riparian is the best off. Clarke has cogently indicated the relative importance of this position:

> upstream countries can unilaterally affect the amount of water reaching countries further downstream - reducing it, and causing domestic or agriculture shortages, or increasing it and causing flooding... [and through its discharges] upstream countries... can also reduce the amount of water which the downstream country can use for drinking or for agriculture.[11]

In some instances there may be an abundance of water which minimizes the potential problems associated with such developments. In other cases, the absence of upstream interference will ensure a fixed amount of water coming into a downstream country.[12] Along the Euphrates however, the use of one part of the river has a significant and demonstrably negative effect on the other areas of the river. As will be argued in section four, the

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[9]Priit J. Vesilind, "Middle East Water - Critical Resource," National Geographic (May 1993), p. 56.

[10]Jonathan E. Cohen, "International Law and the Water Politics of the Euphrates," International Law and Politics, Vol. 24 (Fall 1991), pp. 503-556. However, it is important to note that the river system is a single, integrated hydrological unit. Thus, the water environment downstream also affects the nature of the river upstream. For example, "a downstream riparian may wish to construct locks and dams to regulate flow, affecting the rate of flow upriver."

[11]Robin Clarke, Water: The International Crisis (London: Earthscan Publications Ltd., 1991), p. 90.

[12]Malin Falkenmark, "Fresh Waters as a Factor in Strategic Policy and Action," in Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, ed., Arthur W. Westing (Oxford: Oxford University Press, 1986), p. 86.

location of a country along a river can have a considerable influence on its international relations.[13]

## The Euphrates

The Euphrates, about 2330 kilometers (km) in length[14], rises in the high mountains of northeastern Turkey[15] where it is fed by snow and winter rainfalls to the tune of one meter a year of water.[16] The seasonal input of melting snow into the river produces a maximum flow in April/May, while minimum flows are in September/October.[17] As the Euphrates twists and turns 455 km southward, it enters the progressively drier central lowlands of Syria near Jarablus. Through the course of 680 km across Syria it is joined by its largest tributary, the Khabur, before arriving in Iraq at Abu Kamal.[18] The Euphrates travels another 705 km at which point it converges with the Tigris at Baghdad. The two rivers meet 370 km later, just above Basra, where they form the Shatt al-Arab. From there it gently runs out another 120 km before finally emptying out into the Persian Gulf.[19] In conjunction with its tributaries, the Euphrates drains an area of 444,000 square kilometers, of

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[13]Ibid., p. 87.

[14]The length of the Euphrates seems to be controversial. In the course of my research I have seen it quoted as long as 2800 km (see Philip Robins, Turkey and the Middle East (London: Pinter Publishers, 1991), p. 88). I suspect the difference of opinion rises from two debated points: <1> where the river originates and <2> at one point the river ends to form the Shatt-al-Arab.

[15]Elevations here reach more than 3000 meters above sea level. Walid A. Saleh, "Development Projects on the Euphrates," in Israel and Arab Water, eds., Abdel Majid Farid and Hussein Sirriyeh (London: Ithaca Press, 1985), p. 69.

[16]Ibid.

[17]John F. Kolars and William A. Mitchell, The Euphrates River and the Southeast Anatolia Development Project (Carbondale, Illinois: Southern Illinois University Press, 1991), p. 4.

[18]Cooley, "Middle East Water," p. 11.

[19]Sydney Nettleton Fisher and William Ochsenwald, The Middle East: A History 4ed. (New York: McGraw-Hill Publishing Company, 1990), p. 2.

which 40 percent lies in Iraq, 28 percent in Turkey, 17 percent in Syria and 15 percent in Saudi Arabia.[20] Roughly 90 percent of this annual flow originates within Turkey and the rest is generated almost exclusively within Syria.[21] The mean annual river discharge[22] works out to be roughly 32,000 millions of cubic meters (mcm).[23] The maximum average annual volume is 35.9 billion cubic meters (bcm).[24]

## II. The Need for Developments Along the Euphrates

The need to exploit the Euphrates lies in a number of factors. First, rainfall is in short supply in a region most noted for its "scorched" environmental conditions and oft visited droughts. The annual mean precipitation is 1000 millimeters (mm), the average rainfall near the Turkish-Syrian border is 300 mm and near the Syrian-Iraqi border only 100 mm.[25] In desert areas of all three countries annual mean rainfall approaches 0 mm.[26] Much of what does fall does so in extremely short spans of time. For example, in Damascus, which receives 254 mm of precipitation a year on average, 40 percent of that has been known to descend in one morning.[27]

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[20]Cohen, "International Law and the Water Politics of the Euphrates," p. 507.
[21]Ibid.
[22]As Smith and Stopp explain, a river discharge can be defined as the "volume of water passing through a given cross-section of the river during a given period of time." David Ingle Smith and Peter Stopp, The River Basin: An Introduction to the Study of Hydrology (Cambridge: Cambridge University Press, 1978), p. 3.
[23]Ewan W. Anderson, "Water: The Next Strategic Resource," in The Politics of Scarcity: Water in the Middle East, eds. Joyce R. Starr and Daniel C. Stoll (Boulder: Westview Press, 1988), p. 11; Starr, "Water Wars," p. 30.
[24]Kolars and Mitchell, The Euphrates River and the Southeast Anatolia Development Project, p. 3.
[25]Saleh, "Development Projects on the Euphrates," p. 70.
[26]Anderson, "Water: The Next Strategic Resource," p. 1.
[27]Fischer and Ochsenwald, The Middle East: A History, p. 4.

Contributing to this problem are the substantial seasonal temperature deviations which can cause rainfall to be highly irregular.[28] As Naff and Matson note, because of the extreme weather fluctuation from year to year "in one year as much as twice the average amount of water may flow in the Euphrates, while in another little more than half the average annual discharge may be generated."[29] In addition, there are very few alternative surface water sources (with the Tigris providing the only notable exception) and this predicament is further exacerbated by the pronounced lack of groundwater sources in the area such as aquifers. Thus, it is vital to utilize all existing water supplies and, if possible, develop/acquire new ones.

In considering these facts, it is not surprising that there are very few areas in the Middle East that are "naturally" suitable for agriculture. The region simply does not receive adequate precipitation to support subsistence agriculture without comprehensive irrigation because cultivation of any kind requires a minimum of 400 mm.[30] However, paradoxically, a large percentage of the region's population -- including a majority in Turkey -- is dependent on agriculture for its very livelihood undeterred by the problems posed by the arid climate and the fact that, in most cases, it remains the least successful aspect of national economic development.[31] Agriculture accounts for about 17-20 percent of the gross domestic product (GDP) in Turkey; 20-27 percent of

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[28]Stephen Lonergan and Barb Kavanagh, "Climate Change, Water Resources and Security in the Middle East," Global Environmental Change, Vol. 1 (September 1991), p. 280.

[29] Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 86.

[30]Ewan W. Anderson and Khalil H. Rashidian, Iraq and the Continuing Middle East Crisis (London: Pinter Publishers, 1991), p. 84; Cooley, "The War Over Water," p. 5.

[31]Cooley, "The War Over Water," p. 6.

the GDP in Syria; and, about 11-12 percent of Iraq's GDP (pre Gulf War).[32] In each case this is well below what one might expect given the large number of people employed in these sectors (see Table 3-1). Indeed, both Syria and Iraq are net importers of food stuffs .[33]

*Table 3-1*

Employment by Sector (%), by Country: 1990.

| | Turkey | Syria | Iraq |
|---|---|---|---|
| Agriculture | 56 | 32 | 33 |
| Industry/Comm | 14 | 29 | 28 |
| Services | 29 | 39 | 39 |

Source: Mark S. Hoffman, ed., The World Book Almanac and Book of Facts, 1993 (New York: Pharo Books, 1992), pp. 765, 802, 806.

In general, as Beschorner states, the marginal value-added of water from agriculture means low returns when compared to industrial or municipal uses.[34] In spite of this, the competing needs of industry, where water is basic to processing, cooling, boiling and transporting, are most often ignored in favor of agriculture which can soak up to 90 percent or more of a state's water allocation budget (see Table 3-2).[35] As Allan explains, the

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[32]Miles Smith Morris, ed., The Economist Book of Vital World Statistics (London: The Economist Books Ltd., 1991), pp. 55-57; The World Book Encyclopedia, Vols. 10, 18, 19 (Chicago: World Book Inc., 1993), pp. 412, 1073, 1218.

[33]J.A. Allan, "Substitutes for Water Being Found in the Middle East and North Africa," GeoJournal, Vol. 28 (November 1992), p. 378. Allan states in mid-1990, Syria imported $500 million worth of food stuffs while Iraq imported $2 billion in agriculture produce. Turkey, on the other hand, exported $1.5 billion worth of agricultural goods. It should be noted that all monetary figures cited in this thesis are in US dollars.

[34]Natasha Beschorner, "The Problem of Regional Rivalry," MEED, Vol. 37 (29 January 1993), p. 12; for a similar argument see, Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," p. 375.

[35]Some of the reasons behind this high allotment figure for agriculture are due to human shortcomings and are common features to all three riparian

decisions to apportion water for agriculture are not made for purely economic reasons; rather, they are mostly made with regards to the perceived need to address a national security imperative -- food security.[36] In such a tumultuous region, no state feels comfortable relying on another for something as vital as food stuffs. As a result, each state works rigorously to avoid a dependence on imports and a consequent loss of economic and political autonomy.[37] The case of Iraq is particularly instructive. Iraq uses more water for agriculture on a per capita basis than any other country in the world; however, its continuing ability to hold out against the UN food embargo underscores the crucial nature of local agricultural production.[38]

*Table 3-2*
Water Use (%), by Country: 1992

| | Turkey | Syria | Iraq |
|---|---|---|---|
| Agriculture | 57 | 83 | 92 |
| Industry | 19 | 10 | 5 |
| Homes & Cities | 24 | 7 | 3 |

Source: Allen J. Hammond, ed., Environmental Almanac, 1993 (Boston: Houghton Mifflin Company, 1993), pp. 467, 503, 507.

Rapid population growth is probably an even more significant strain on freshwater resources. The population growth rates of Turkey, Syria and Iraq are among the highest in the world. While a 1 percent growth rate per

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countries: <1> lack of parsimonious water management; <2> antiquated irrigated and cultivation techniques that result in over-irrigation; <3> seepage; <4> water logging; <5> soil salination; <6> and the poor drainage of irrigation waters. These problems will be expanded upon in chapter five during a discussion of potential technical solutions to the water shortages along the Euphrates.

[36]Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," p. 376; see also, Falkenmark, "Fresh Waters as a Factor in Strategic Policy and Action," p. 87.

[37]Beschorner, "The Problem of Regional Rivalry," p. 12.

[38]Hindley, "A New Source of Conflict for the Region," p. 10.

annum is considered manageable, the countries under consideration "are caught in a population spiral spinning out of control" with population growth ranging from 2.2 percent in Turkey to almost 4 percent in both Iraq and Syria (see Table 3-3).[39] Their combined population is expected to reach approximately 185 million by 2020 up from 91 million in 1992.[40] Current population projections suggest that Iraq and especially Syria will, in short order, have great trouble meeting the accepted minimum of 1000 cubic meters ($m^3$) per capita per annum of water availability.[41] As Falkenmark states, "[t]he larger the population, the less water is available on a per-capita basis, making population increases a real dilemma in countries where the supply of water is scarce."[42]

*Table* 3-3
Population, by Country (in thousands): 1950 to 2010

| | Turkey | Syria | Iraq |
|---|---|---|---|
| 1950 | 21,122 | 3,495 | 5,163 |
| 1970 | 35,758 | 6,258 | 9,414 |
| 1990 | 57,285 | 12,484 | 18,782 |
| 2010 | 81,248 | 25,642 | 34,096 |

Source: U.S. Department of Commerce, Economics and Statistics Administration, World Population Profile (Washington, D.C.: GPO, 1991), p. A5.

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[39]Starr and Stoll, "Water in the Year 2000," p. 151; U.S. Department of Commerce Economics and Statistics Administration, World Population Profile, (Washington, D.C.: Government Printing Office, 1991), p. A10.

[40]Population Reference Bureau, World Population Data Sheet, 1992 (Washington, D.C.).

[41]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, pp. 85-86.

[42]Falkenmark, "Fresh Waters as a Factor in Strategic Policy and Action," p. 86.

## III. Developments Along the Euphrates

Up until the mid-1960s, Iraq was the only country which made use of the Euphrates.[43] In recent years, this picture has changed as the growing needs of Turkey and Syria have led to a situation where today all three riparian countries are in the process of implementing extensive water retrieval plans. However, because the projects are uncoordinated, the demands on the river are rapidly reaching the threshold of exceeding its available supply. Let us now turn to briefly outline the major development projects in each country undertaken in recent years that have led to this unfortunate situation.

As the furthest upstream riparian and the country with the most impressive projects, Turkey represents a logical place to begin. With little question the Ataturk Dam, set for completion in 1995[44], is the most significant hydrological undertaking by any Middle Eastern country since Egypt's Aswan High Dam (1970) was constructed. As Kolars and Mitchell conclude, it is simply "one of the most ambitious [engineering] feats ever attempted."[45] Situated 130 km upstream of Syria, Ataturk is the fourth or fifth largest dam in the world with a holding capacity of nearly 50 bcm -- ten times the volume of the Sea of Galilee.[46] It will generate 2400 megawatts (mw) of hydroelectric

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[43]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," p, 124; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 89. The first modern project was completed in 1913. Anderson, "Water: The Next Strategic Resource," p. 12.

[44]The first of the dams' eight turbines began operating in 1991. The dam itself was finished in 1992 but the associated irrigation works will not be completed until at least 1995 at the earliest.

[45]Kolars and Mitchell, The Euphrates River and the Southeast Anatolia Development Project, p. 38.

[46]William Hale, "Turkey, the Middle East and the Gulf Crisis," International Affairs, No. 68 (October 1992), p. 682; Pat McConnel, "Ataturk Dam - The Biggest Yet," The Middle East, No. 115 (May 1984), p. 75; T.W. Mermel, "The World's Major Dams and Hydro Plants," Water Power and Dam Construction, No. 41 (July 1989), pp. 35-43; Vesilind, "Middle East Water - Critical Resource," p. 46.

power and irrigate between 730,000 and 875,000 hectares of land just north of the Turkish-Syrian border, making it the first or second largest irrigation project from a single source scheme in the world.[47]

Ataturk represents the linchpin of a complex and grandiose development called the Grand Anatolia Project (GAP). Primarily located in southeastern Turkey, GAP will include the introduction of 15 large dams along the Euphrates[48], 14 hydroelectric stations, 19 irrigation projects, and associated infrastructure at a cost $33 billion.[49] When completed[50], the various projects will have the combined potential to produce a maximum of 7620 mw of hydroelectric power and supply irrigation water to between 1.6 and 2 million hectares -- an area the size of Israel.[51] In addition, GAP will produce 53 percent of Turkey's electricity.[52]

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[47]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 87; Kolars and Mitchel, The Euphrates River and the Southeast Anatolia Development Project, p. 38; Robins, Turkey and the Middle East, p. 89.

[48]Three have thus far been constructed: Keban (1974), Karakaya (1987) and Ataturk (1995) but the year of its initial operation was 1991. In addition there are reports that Turkey is moving forward with a plan to begin construction of a fourth dam along the Euphrates. There are also as many as seven dams being readied for construction along the Tigris with the potential to irrigate an additional 525,000 hectares. INA, "Turkey Urged to Consult on New Euphrates Data Project" (text) Baghdad INA in Arabic (24 January 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 26 January 1993 (FBIS-NES-93-051), p. 31; Kolars and Mitchell, The Euphrates River and the Southeast Anatolia Development Project, pp. 22-23; Mermel, "The World's Major Dams," p. 33.

[49]John Kolars, "Trickle of Hope: Negotiating Water Rights is Crucial to Peace in the Middle East," The Sciences, Vol. 12 (November/December 1992), p. 16; Kolars and Mitchell, The Euphrates River and the Southeast Anatolia Development Project, pp. 19-23. Associated infrastructure include such things as new transportation routes and improved education and health services. Indeed, the Turkish government views this project as a comprehensive and integrated development program for southeastern Turkey that will greatly improve the overall quality of economic and social life in the area.

[50]Estimates at the completion date run between 2006 and 2040.

[51]According to Hurwitz, this represents 50 percent of the total irrigated land in Turkey. Bruce A. Hurwitz, "The Water Crisis in the Middle East," Middle East Focus, Vol. 13 (Fall 1991), p. 6; see also, Economist, "The Arab World Survey,"

The effect of the full implementation of these programs would be to make Turkey the bread basket of the Middle East with a tangible surplus in both food and water -- rare commodities in an area characterized by increasing aridity. In fact, already Turkey is the only country in the region that has achieved self-sufficiency in both food and water.[53] The sale of agricultural products (and perhaps water at some point in the near future) should earn Turkey significant foreign exchange earnings and not only help alleviate a region well known for its poverty but turn it into an "agro-economic powerhouse."[54] In addition, the ongoing implementation of GAP is making Turkey far less dependent on fossil fuels; increasingly, hydroelectric power is providing an important substitute.[55] The GAP is thus seen by Turks as an essential component, indeed crucial, to their national security and an important step toward the achievement of regional superpower status.[56]

Syria, the next country in line to receive the Euphrates has harnessed the largest river to enter its borders[57] for its own ends allocating as much as 40

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Economist (12 May 1990), p. 9; Kolars and Mitchell, The Euphrates River and the Southeast Anatolia Development Project p. 23.

[52]Strategic Survey, 1991-1992 (London: International Institute for Strategic Studies, 1992) [as cited in Brassey's (May 1992)], p, 227.

[53]Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," p. 378. In addition to the Euphrates, the Ceyhan and Seyhan rivers fall completely within Turkey's geographical borders while the Tigris originates just south of the Euphrates.

[54]Joseph R. Gregory, "Liquid Asset," World Monitor, No. 4 (November 1991), p. 29; Hellier, "Draining the Rivers Dry," p. 62; Kolars, "The Course of Water in the Arab Middle East," p. 59; Pat McConnel, "Ataturk Dam - The Biggest Yet," p. 75.

[55]Cohen, "International Law and the Water Politics of the Euphrates," p. 508; Strategic Survey, 1991-1992, pp. 226-227. In 1989, for example, Turkey imported 18.5 tons of crude oil at cost of $2.5 billion. This represented the first reduction in imported oil since the dramatic increases in that commodity in the wake of the Iranian revolution in 1979. In the short-term, however, Turkey is likely to remain heavily dependent on the importation of oil until the GAP project is fully completed. Robins, Turkey and the Middle East, pp. 100-113.

[56]Ibid.

[57]It is important to note here that Syria also utilizes the Orontes, the Jordan, the Yarmuk and even the Tigris which briefly touches its borders. The

percent or more of recent budgets to water and hydroelectric schemes.[58] The central component is the Revolution Dam[59] (completed in 1974), which created Lake Assad at Tabqa some 65 km south of the Turkish border. The capacity of the lake is 14.2 bcm and the water is used for both electricity generation and agriculture designs.[60] The initial Syrian plan was to irrigate up to 650,000 hectares; however, this has not yet been realized.[61] Despite this failure, the significance of the project cannot be underestimated as it has raised "agricultural production and allowed Syria to reduce the costs of imports which currently amount to half of Syria's foreign exchange income."[62] In addition, water earmarked for industrial use has also increased as a result of this development.

In recent years the Syrians have begun to build a second dam[63], equally large, on the major tributary of the Euphrates, the Khabur. This dam will provide water for both the generation of electricity and the irrigation of large tracts of land.[64] Eventually, the Syrians hope that the total impact of these

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Euphrates, however, accounts for 90 percent of the surface water utilized by Syria. Hurwitz, "The Water Crisis in the Middle East," p. 5.

[58]Hindley, "A New Source of Conflict for the Region," p.11; Joyce R. Starr and Daniel C. Stoll, "Water for the Year 2000," in their The Politics of Scarcity: Water in the Middle East (Boulder: Westview Press, 1988), p. 148.

[59]Referred to variously as the Thawrah Dam, the Tabqa Dam, and the Euphrates Dam.

[60]Robins, Turkey and the Middle East, p. 89.

[61]Anderson, "Water: The Next Strategic Resource," p. 12; Naff and Matson, Middle East Water: Conflict or Cooperation?, p. 90.

[62]Cohen, "International Law and the Water Politics of the Euphrates," p. 509.

[63]Two additional smaller dams intended primarily to increase Syria's electric power generating capacity have also recently come onto line. They are the al-Baath (1988) and the Tishrin (1993). Several other "mini" dams along the Euphrates and Khabur may eventually irrigate an additional 300,000 hectares of land. Cooley, "Middle East Water: Power for Peace," p. 13; Kolars, "The Course of Water in the Arab Middle East," p. 60.

[64]Saleh, "Development Projects on the Euphrates," p. 7.

projects will be to put some 1.4 million hectares under irrigation by the year 2010.[65]

The last of the riparian countries to receive the Euphrates is Iraq. For many years Iraq enjoyed a surplus of river water owing to the fact that it controls several tributaries of the Tigris -- a river far less exploited by Turkey[66] -- and was said to have, with the possible exception of Israel, the most innovative hydrologists in the world.[67] Thus, Baghdad, chose to invest little in the way of water infrastructure.

However, like both Turkey and Syria, Iraq can no longer afford to be so complacent. Recently, Iraq has spent an enormous amount of capital in water related projects -- particularly in the aftermath of its 8 year war with Iran and more recently following the devastation it incurred during the Persian Gulf War.[68] The goal of agricultural self-sufficiency, as evidenced by the fact that one third of the work force is employed in this sector, is also a driving impetus behind these outlays.[69] Indeed, as was alluded to earlier, the significance of local agricultural production has become even more important in light of the continuing United Nations food embargo.

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[65]Beschorner, "The Problem of Regional Rivalry," p. 12.

[66]However, Iraqi officials are apparently concerned over speculation from "responsible" sources that Turkey is planning to build as many as 12 dams on the Tigris that would have the potential to hold pack 50 percent of the river's waters from Iraq. INA, "Turkey Reportedly Seeks Half of Tigris Waters" (text). Baghdad INA in Arabic (31 March 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 6 April 1992 (FBIS-NES-92-066, p. 24).

[67]Elliott, "The Global Politics of Water," p. 31.

[68]Immediately following the Gulf War, water supply in Baghdad, for example, was reportedly less than five percent of the original supply and sewage flooded its streets because the electric pumps had been knocked out of commission by allied bombing raids. Maryam M. Shahin, "UNICEF Warns of Epidemics in Iraq" (text). Amman Jordan Times in English (7 March 1991). Foreign Broadcast Information Service Daily Report - Near East and South Asia, 10 March 1991 (FBIS-NES-81-045, p. 42); Hindley, "A New Source of Conflict for the Region," p. 11; Vesilind, "Middle East Water - Critical Resource," p. 56.

[69]Cohen, "International Law and the Water Politics of the Euphrates," p. 510.

To accomplish these goals several schemes have recently been completed or are in the design stage. One important development is the Tharthar Canal project which is now being expanded to do more than simply control the flood flow of the Tigris. A canal running from Lake Tharthar to the Euphrates with outlet canals running back into the Tigris as needed is currently being constructed; this will provide irrigation water for central Iraq.[70]

However, the most interesting new development is a major water diversion scheme which was completed in December 1992. Known as the third river or Saddam river project, it is part of a comprehensive plan that has seen three new waterways constructed in the past year.[71] The heart of the development consists of a 565 km agricultural canal running from Baghdad to Basra which is designed to drain excess irrigation water. As Kemp reports, it will be used to reclaim upwards of an impressive 1.5 million hectares of land for agriculture.[72]

The only significant dam along Iraq's portion of the Euphrates was completed in 1985. With a holding capacity of 10 bcm, the Hadith or Qadisiyah

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[70]Fischer and Oschenwald, The Middle East: A History, p. 623; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 92; Joyce R. Starr, "Water Politics in the Middle East," Middle East Insight, Vol. 7 (No. 2/3 1993), p. 67; Starr, "Water Wars," p. 30.

[71]Steve Newman "Earthweek: A Dairy of the Planet," Vancouver Sun (3 April 1993), B5; INA, "Progress on 'Mother of Battles River' Reported" (text). Baghdad INA in English (13 December 1992). FBIS Daily Report - Near East and South Asia, 16 December 1992 (FBIS-NES-92-242, p. 31). 6000 engineers, technicians and workers laboring around the clock completed the project in 180 days. The other two waterways constructed in the past year are the 140 km long Qadissiya River and the 120 km long Umm-al-Ma'arick River.

[72]Iraqi officials describe the project as the largest single irrigation development in the history of the region. Peter Kemp, "Water: As Precious as Oil is Plentiful," p. 7; see also, INA, "More Reportage on Saddam River Project in South: Celebration Detailed" (text). Baghdad INA in English (7 December 1992). FBIS Daily Report - Near East and South Asia, 8 December 1992 (FBIS-NES-92-236, p. 31).

Dam is considered important for providing water for irrigation and industrial purposes as well as facilitating energy production and regulating the effects of potential floods.[73]

## IV. Developments along the Euphrates and Their Effects Upon Riparian Relations in Historical Perspective

As was explained above, the reasons for these developments are obvious; in fact, many of them are of unquestionable social and economic benefit. However, the uncoordinated developments have significantly reduced the quantity and quality of the water. This in turn has severely ratcheted up existing frictions between the riparian countries in question. The events of the spring of 1975 and the first few months of 1990 serve as excellent examples of the potential for a hydrologically induced conflict along the Euphrates.

Significant competition for the water began, for all intents and purposes, when Syria completed its Revolution Dam in 1973. Shortly thereafter, in 1974, Turkey finished the Keban Dam at the head of the Euphrates which would later be considered the first stage of the well-integrated GAP project.[74]

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[73]Fischer and Oschenwald, The Middle East: A History, p. 623; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 89; Robins, Turkey and the Middle East, p. 94; Saleh, "Development Projects on the Euphrates," p. 72. However, a new dam for the Euphrates, the Baghdadi is reportedly under consideration.

[74]Although the Keban Dam has been producing 1360 mw of electricity for twenty years, its future output is very much in doubt due to the accumulation of two mcm of silt over the past two decades. Hellier, "Draining the River Dry," p. 33. Since the operating and fuel costs of hydropower are considerably lower than alternative power-generating technologies (e.g. nuclear, oil, natural gas, solar) but the initial capital outlays are considerably higher, it does suggest that it would be cost-effective to dredge out the accumulated silt. On this point, see Adrian McDonald and David Kay, Water Resources: Issues and Strategies (New York: Longman Scientific & Technical, 1988), pp. 171-176.

The construction of these two large dams so close together had severe consequences for Iraq because huge reservoirs formed behind the Revolution and Keban Dams substantially reducing the flow of the Euphrates.[75] In 1974, Syria acquiesced to Iraqi demands that an additional 200 mcm of water be released from the Revolution Dam and thus the year passed without incident. However, Baghdad became incensed in 1975 when its hydrologists reported that: <1> the flow of the Euphrates had been reduced from 920 cubic meters a second (cms) in 1973 to 197 cms by 1975; and, <2> that the quality of the river was rapidly deteriorating because of saline drainage water flowing back into the Euphrates from irrigated areas upstream.[76]

Baghdad immediately proclaimed that the lives of three million of its farmers were at risk over this move as 70 percent of their winter crops had been ruined and cultivation in some areas had been reduced to 4 percent of normal.[77] In response, Damascus protested claiming it was sending 71 percent of the waters it received from Turkey on toward Iraq.[78] Confrontational statements were traded back and forth with Baghdad issuing the most inflammatory declaration stating that it would "take any action necessary to insure the Euphrates flow."[79]

Throughout April unsuccessful mediation attempts were made under the auspices of the Arab League. At the beginning of May, Saudi Arabia

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[75]Cohen, "International Law and the Water Politics of the Euphrates," p. 511.
[76]Eberhard Kienle, Ba'th v. Ba'th. The Conflict Between Syria and Iraq, 1968-1989 (London: I.B. Tauris and Co. Ltd., 1990), p. 99; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, pp. 93-94. While this seems to be the accepted figure, Kolars calculates that the flow was reduced to 57.5 cms - a loss of 94 percent. Kolars, "Trickle of Hope," p. 16.
[77]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," p. 127; Economist, "Where Dams Can Cause Wars," Economist (18 July 1987), p. 37; Fischer and Oschenwald, The Middle East: A History, p. 623; Starr, "Water Wars," p. 31.
[78]Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 94.
[79]Ibid.

stepped in to try to diffuse the rapidly building crisis. Its efforts were also rebuked. Meanwhile the situation atrophied. Syria closed its airspace to all Iraqi aircraft and simultaneously transferred a significant number of troops away from its border with Israel and to its common border with Iraq.[80] Baghdad responded with a similar move and there were reports that Iraqi jets were being readied to take out the Revolution Dam.[81]

With acute interstate conflict seemingly imminent as May turned into June, Saudi Arabia tried another effort at mediation. Finally, on June 3, an understanding was reached. Although the terms of the agreement were never made public, Iraqi officials privately stated "that Syria agreed to take only 40 percent of the river's water, leaving the remainder for Iraq."[82]

More recently, the events surrounding the construction of the Ataturk dam have proven even more contentious. Syrian and Iraqi officials nervously watched as the massive dam and associated GAP projects took shape through the 1980s -- a decade characterized by droughts. Reports surfaced that in order to fill the reservoir behind the Ataturk Dam in one go, the flow of the Euphrates would have to be stopped for two years[83] and that the full realization of GAP could cut Syria's permanent share of the Euphrates by up to 70 percent and Iraq's by 90 percent.[84] Tensions increased

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[80]Kienle, Ba'th v. Ba'th: The Conflict Between Syria and Iraq, 1968-1989, pp. 106-108.

[81]Anderson, "Water: The Next Strategic Resource," p. 13.

[82]Cohen, International Law and the Water Politics of the Euphrates," p. 512.

[83]Economist, "Survey of the Arab World," p. 9. In practice the filling is a gradual process. Before the Ataturk Dam was constructed, the Euphrates used to carry just over 30 bcm of water into Syria. The Ataturk dam could hold nearly 50 bcm. Thus, to fill it completely at once, Turkey would have to halt the flow of the Euphrates for nearly two years.

[84]Clarke, Water: The International Crisis, p. 103; Hellier, "Draining the Rivers Dry," p. 33; Hurwitz, "The Water Crisis in the Middle East," p. 5. Impoundment and high evaporation losses from the reservoirs and irrigation channels are primarily responsible for the reduction in stream flow. The Iraqi figure

substantially in 1986 when Turkey allegedly uncovered a Syrian plot that would blow up the Ataturk Dam; quickly thereafter, Ankara moved to station surface-to-air missiles at the site.[85]

A 1987 protocol between Turkey and Syria in which the former agreed to release an average of 500 cms of water to the latter appeared to alleviate the friction temporarily. Included in the agreement was a provision that would see Damascus end its support for the Kurdish Workers' Party (PKK), the Kurdish guerillas based in southern Turkey. However, problems related to water again arose when then Prime Minister Turgut Ozal accused Syria of reneging on its promises. Ozal declared that in retaliation, Ankara would consider turning off the taps of the Euphrates. As Starr explains the response came in October 1989, when Syrian MIG fighter jets on a "training mission" shot down a Turkish survey plane, well within Turkey's borders, killing five.[86]

In January 1990, riparian relations reached a boiling point when Turkey began to fill the reservoir behind the Ataturk Dam in the midst of a severe drought which saw the flow of the Euphrates drop to approximately 55 percent of its normal flow.[87] Syria and Iraq were not impressed by statements from Turkish officials that the interruption was done for technical reasons[88];

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represents the combined effect of the dams planned for construction in both Turkey **and** Syria.

[85]Hindley, "A New Source of Conflict for the Region," p. 11; Starr, "Water Politics in the Middle East," p. 68. In addition it is said that the Ataturk Dam is heavily guarded by soldiers in order to protect it against potential attack. Hellier, "Draining the Rivers Dry," p. 35; Vesilind, "Middle East Water - Critical Resource," p. 49.

[86]Starr, "Water Wars," p. 31.

[87]Cohen, "International Law and the Water Politics of the Euphrates," p. 515.

[88]Ibid., p. 513. According to Cohen these technical reasons related to: <1> work being carried out on a diversion tunnel; and <2> in order to let the waters reach the sluice gates of the dam wall. See also, Hale, "Turkey, the Middle East and the Gulf Crisis," p. 682.

that the project was really a benefit to all in that it would continue to provide an even flow of water regardless of weather conditions (i.e. drought or flooding)[89]; and, that additional quantities of water, totalling 50 percent (or 750 cms)[90], were discharged in the previous November in order to compensate for the reduced flow.[91] In a rare display of unanimity, both Damascus and Baghdad rejected Ankara's explanations unequivocally and called for the period of interruption to be immediately halved.[92]

Syrian officials cited evidence that power supplies were curtailed and that water rationing had to be instituted. As an example, Damascus pointed to the water level at Lake Assad which was apparently so low in January of 1990 that only one of the eight 100 mw hydropower turbines at the Revolution Dam was operational.[93] Considering that this particular development

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[89]However, as the Iraqis see it, the flood control projects have increased the salinity of the soil because seasonal floods that once washed and leached the soil have been sharply curtailed by the effects of Turkish hydrological developments. Vesilind, "Middle East Water - Critical Resource," p. 56.

[90]This was apparently done by releasing water from Turkey's other two existing dams, the Keban and Karakaya, further upstream. Robins, Turkey and the Middle East, p. 92.

[91]Norman Frankel, "Water and Politics: The Turkish Perspective," Middle East Focus, Vol. 14 (Spring 1992), p. 4; Hindley, "A New Source of Conflict in the Region," p. 10; Hurwitz, "The Water Crisis in the Middle East," p. 6; Kolars, "The Course of Water in the Arab Middle East," p. 60. It should also be understood that the decision to begin filling at the beginning of the year was based on the fact that January is traditionally a "wet" month.

[92]Hindley, "A New Source of Conflict for the Region," p. 11; Hurwitz, "The Water Crisis in the Middle East," p. 6; Robins, Turkey and the Middle East, p. 90.

[93]Nick B. Williams, Jr., "Parched Iraq, Syria Jittery as Turks Divert Euphrates to Power Project," L.A. Times (14 January 1990), p. A8. Syria is also well known for the poor management of its water utilities. Rusty pipes, broken water meters, inadequate staffing and shortages of hydrological expertise must be considered important contributory reasons to this predicament. In addition, Western engineers and water experts reportedly suspect that the Russian built installations at the Revolution dam site have salient technical deficiencies. For example, Kamran Inan, Turkey's State Minister in charge of GAP, believes that the essential problem is that the generators are too highly placed in the dam to operate efficiently. On this point see, Frankel, "Water and Politics: The Turkish Perspective," p. 5; Hellier, "Draining the Rivers Dry," p. 33; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 97.

produces 60 percent of the country's electricity, Syria had reason to worry.[94] Indeed, it seemed hard to believe that just ten years before the dam had generated such a surplus of energy that it enabled Syria to export electricity to Lebanon, Jordan and Turkey.[95] Iraq meanwhile angrily proclaimed that subsequent shortages had left 7 million of its citizens imperiled and produced widespread crop failures. Moreover, both governments repeatedly stressed that this brief interruption accounted for only 3 to 5 percent of the reservoir's total capacity.[96]

A surge of diplomatic warnings, cables and visits ensued while newspapers in both countries discussed the possibility of war in order to ensure an adequate flow of water.[97] These acts eventually provided the catalyst for an April meeting to resolve the contentious issue.[98] Turkey offered to reaffirm the objectives of its 1987 protocol with Syria and a Turkish Charge d'Affaires and stated that the issue of water was "a mere technical problem," easily solvable.[99] The Syrian foreign minister responded that in light of the changed circumstances, the 1987 protocol was no longer acceptable.[100] Iraq meanwhile complained that Ankara's flippant attitude

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[94]Economist, "Where Dams Can Cause Wars," p. 37; Kolars, "Trickle of Hope," p. 16.

[95]Judith Perea, "Water Politics," The Middle East, No. 76 (February 1981), p. 49.

[96]Kolars, "The Course of Water in Arab Middle East," p. 60.

[97]Starr, "Water Wars," p. 30; Hurwitz, "The Water Crisis in the Middle East," p. 7.

[98]Starr, "Water Wars," p. 30.

[99]Pazit Rabina, "Turkish Charge on Gulf Situation, Water Issue," (text). Tel Aviv DAVAR in Hebrew (17 August 1990). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 24 August 1990 (FBIS-NES-90-165, p. 36).

[100]Ahmad Rajab, "Al-Shar' on Euphrates Waters, Al-Ta'if Agreement," (text). Jeddah 'UKAZ in Arabic (2 August 1990). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 8 August 1990 (FBIS-NES-90-154, p. 48); AFP, "Iraq Requests More Water," (text). Paris AFP in English. FBIS Daily Report - Near East and South Asia, 2 October 1991 (FBIS-NES-92-192, p. 31).

coupled with the fact that no one in the Turkish delegation specialized in water affairs proved, in the words of a top Iraqi official, that "[t]he Turkish side came... determined not to discuss the water issue."[101] Baghdad demanded that at least 700 cms be released to the downstream riparian countries because Iraq's 58 percent share (agreed to in a separate meeting with Syria) of the 500 cms was insufficient.[102] Shortly thereafter, Syria released a statement which closely mirrored Iraq's demands of 700 cms but rejected an increased share for Baghdad. Upon hearing these requests, Turkish President Turgut Ozal is alleged to have described them as baseless propaganda and completely nonsensical.[103]

Three years later there is still no agreement despite numerous meetings under the auspices of the tripartite ministerial and technical committees charged with finding a solution to this impasse. Most worryingly, Ankara has expressed no interest in negotiating accords concerning the sharing of the Euphrates fueling speculation that the GAP project may be the *casus belli* of acute interstate conflict between the riparian states in question.[104] As the Syrian Foreign Minister recently stated:

> the water issue is serious with regard to the future and we must find common ground in order to resolve it before it worsens and leads to armed conflicts.[105]

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[101]Abd-al-Rasul Husayn, "Minister Criticizes Turkey on Euphrates Issues," (text). Baghdad ALIF BA in Arabic (6 June 1990). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 15 June 1990 (FBIS-NES-90-116, pp. 21-23).

[102]Hindley, "A New Source of Conflict for the Region," p. 10.

[103]Hellier, "Draining the Rivers Dry," p. 33; Hurwitz, "The Water Crisis in the Middle East," p. 7.

[104]Cohen, "International Law and the Water Politics of the Euphrates," p. 528.

[105]Rajab, "Al-Shar' on Euphrates Waters, Al-Ta'if Agreement," p. 48.

## V. The Potential For Future Interstate Conflict Along the Euphrates River

If these two examples can be used as indicators, in the future, as developments are brought to fruition and if population growth continues its present trajectory, problems over the quantity and quality of water are likely to become far more severe. The fruitlessness of negotiations points to the fact that water along the Euphrates is viewed as a zero-sum game. The lack of common technical data and objective, neutral, analysis feeds upon the mistrust and fear inherent in the relationships among the riparian states.[106] As Kolars notes, it is very difficult to come to any constructive agreements when the three countries have such radically differing understandings on what constitutes justifiable use of the water:

> Turkey argues that water is a natural resource belonging to the country wherein it is found just as petroleum is the property of its oil-rich, water poor neighbors to the south. Syria points to its need and to its legal claim as a downstream user. Iraq relies upon the doctrine of prior usage to press its claims.[107]

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[106]Starr, "Water Wars," p. 129.

[107]Kolars, "The Course of Water in the Arab Middle East," p. 60. Turkey is arguing from the perspective of the theory of absolute territorial sovereignty which holds that a state can use water within its borders as necessary without regard for any other riparian state. Although some upstream states still cite the theory of absolute territorial sovereignty, the vast majority of countries reject this argument. As for Syria and Iraq, both countries advance similar arguments based on the theory of absolute integrity. Under this conception, a riparian state may not utilize a section of a river if it will harm another riparian state in any fashion. Again, there is little support for this argument among legal scholars or in state practice. The major problems with international water law will be touched upon in chapter 5. Needless to say, the open-ended nature of the existing laws provide an opportunity for each state to interpret it as it pleases either to justify or rationalize its appropriation of the waters in question or to serve its own rhetorical ends. For a detailed discussion of the legal arguments behind these claims see, Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-Navigational Uses of International Watercourse to the Water Disputes Involving the Nile River and the Jordan River," Emory International Law Review, Vol. 6 (Fall 1992), pp. 496-75; Cohen, "International Law and the Water Politics of the Euphrates," pp. 518-556; Gretta Goldenman, "Adapting to Climate Change: A Study of International

However, it is Turkey's control of the headwaters of the Euphrates which gives its arguments the most pause for thought -- not to mention an enormous amount of leverage over its southern neighbors. This is exemplified by the strong reactions in Baghdad and Damascus to then Prime Minister, now President, Suleyman Demirel's statement at the inauguration of the Ataturk dam in July 1992. Standing proudly at the top of the site, Demirel declared that Turkey had the unilateral "right to do what it wanted with its waters."[108] Both Syria and Iraq then, are perhaps justified in their feelings that Ankara's ambitious developments and plans for the future will make them hydrological paupers.

What is particularly alarming to Iraq and Syria is that the scope of the GAP project might tempt Ankara to use its increasingly advantageous upstream position as a political weapon.[109] For example, in some future crisis, Turkey might engineer a substantial reduction in the flow of the Euphrates.[110] Such coercion would not be without precedent. In 1990, Ankara turned off the taps of its petroleum pipeline linked up with Baghdad as part of the international sanctions imposed against Iraq in response to its invasion of Kuwait. As explained earlier, a comparable shut down of the Euphrates river was hinted at by then President Turgut Ozal in 1989 if Syria continued to aid Kurdish guerillas fighting for independence in southern Turkey. More

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Rivers and their Legal Arrangements," Ecology Law Quarterly, Vol. 17 (Winter 1990), pp. 791-802.

[108]MENA, "Paper Criticizes, Turkey's 'Dangerous' Water Policy" (text). Cairo MENA in Arabic (26 July 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 29 January 1992 (FBIS-NES-92-146, p. 19).

[109]Hurwitz, "The Water Crisis in the Middle East," p. 7.

[110]Under certain conditions the flow of the Euphrates could be meaningfully reduced. However, it is not feasible to completely stop the flow as the "water would need to be stored and the obvious storage area, the Ataturk dam lake, has already been filled." Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 91.

recently, the late President ominously warned that a "sufficient" amount of water will flow into Syria provided it abides by "certain" terms.[111]

The Turks, meanwhile, do not understand what the fuss is all about. In fact, as they see it, the reservoirs will provide water to all in times of drought while mitigating the negative effects of floods when they occur. In addition, Turkish officials point out that they have the best climatic rationale for their dam projects because the country is geographically positioned in a comparatively cooler climate which means less lost water through evaporation.[112] However, Turkey alone is blessed with an abundance of good quality water in this region. Thus, it is not beyond the realm of possibility that despite Ankara's stated good intentions, "it is difficult to imagine that water will not be used, whether explicitly or implicitly, as a lever of its foreign policy."[113] Indeed, Saddam Hussein has recently implied as much by accusing Turkey of "play[ing] with the taps from time to time" when it serves Ankara's interests.[114]

Meanwhile, water deficits are projected for both Syria and Iraq to the tune of 60 percent or more by the year 2000.[115] As stated earlier, the full implementation of GAP may reduce the flow of the Euphrates up to 70 percent upon entering Syria and 90 percent upon crossing into Iraq. Even if the GAP was to have a slighter impact, it is unlikely that either downstream country could service their minimum estimated needs.[116] In addition, any

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[111]Hindley, "A New Source of Conflict in the Region," p. 10.
[112]Gregory, "Liquid Asset," p. 33; Economist, "Survey of the Arab World," p. 10.
[113]Robins, Turkey and the Middle East, p. 99.
[114]Lufti Akdogan, "Turkish Paper HURRIYET Interviews Saddam" (text). Instanbul HURRIYET in Turkish (9 February 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 11 February 1992 (FBIS-NES-92-028, p. 29).
[115]Cohen, "International Law and the Water Politics of the Euphrates," p. 532.
[116]Anderson, Iraq and the Continuing Middle East Crisis, p. 90; Starr and Stoll, "Water for the Year 2000," pp. 148-149.

reduction in the amount of Euphrates water coming into Syria and Iraq represents a significant stumbling block to the attainment of agricultural self-sufficiency -- perceived to be a critical component of national security for both countries.[117] Finally, in urban areas the situation is also likely to become far more critical as municipal and domestic water is increasingly diverted to agricultural and industrial sectors in an attempt to minimize the impact of diminishing water supplies. Already both Damascus and Aleppo, for example, suffer continuously from chronic shortages of water and electricity.[118]

*Table 3-4*
Water Deficit/Surplus in cubic kilometers by Country: 1990

| | Turkey | Syria | Iraq |
|---|---|---|---|
| Deficit/Surplus | +10.00 | -0.15 | 0.00 |

Source: J.A. Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," GeoJournal, Vol. 28 (November 1992), p. 378.

Problems are also likely to erupt more prominently over issues of water quality as new developments take shape. While Syria is undoubtedly affected, as the final riparian along the Euphrates, Iraq suffers the most from the salinity, agricultural runoff (including pesticides, herbicides and fertilizers) and various forms of pollution discharge (e.g. raw sewage) into the

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[117]Cohen, "International Law and the Water Politics of the Euphrates," p. 532.
[118]Ibid., p. 515. As was indicated earlier, the reduction of the flow of the river does not solely lie in the increased developments on the Euphrates. For example, Syria is said to lose some 30 percent of its water through an archaic network of leaking pipes. On this last point, see Hurwitz, "The Water Crisis in the Middle East," p. 5; Starr, "The Quest for Water from Biblical Times to the Present," Environmental Science and Technology, Vol. 27 (July 1993), p. 1266.

Euphrates.[119] The result is that drinking water is jeopardized, waterborne disease is rampant, industrial installations are being damaged and more than a million hectares -- or 65 percent -- of Iraq's irrigated land may be rendered useless in the near future by the combined effects of shrinking supplies and the decreasing quality of the river.[120] By way of illustration, official sources in Baghdad maintain that the level of salinity in the water has increased five-fold in recent years turning previous arable lands into salt fields.[121] For Iraq this has meant an increasing interest in developing the as yet relatively underutilized and less polluted Tigris.[122] Syria, however, has far less room to maneuver as it receives 90 percent of its surface water from the Euphrates and depends on that river to generate 70 percent of its electricity.[123]

Ultimately, water in and of itself, may not be sufficient to induce war. However, if the problems associated with this valuable substance are combined with the continous hostility and suspicion that surrounds the three countries under review, acute interstate conflict must be considered a very real possibility. The competing regional leadership ambitions and the

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[119]Falkenmark, "Middle East Hydropolitics: Water Scarcity and Conflicts in the Middle East," pp. 350-352; Starr and Stoll, "Water for the Year 2000," p. 149. These problems were exacerbated in light of the devastating effects of the 43 straight days of bombing during the Gulf War.

[120]Hellier, "Draining the Rivers Dry" p. 33; Kolars, "The Course of Water in the Arab Middle East," p. 60; Robins, Turkey and the Middle East, p. 95; Strategic Survey 1991-1992, p. 227. Apparently, water is currently so scarce that untreated sewage is regularly used to irrigate vegetables and in some areas of Iraq, villages have begun to import water by truck. Vesilind, "Middle East Water - Critical Resource," p. 51

[121]INA, "Turkey Reportedly Seeks Half of Tigris Waters" (text) Baghdad INA in Arabic (31 March 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and Asia, 6 April 1992 (FBIS-NES-92-066, p. 24).

[122]Iraq is currently investing over $300 million in more than 20 flood control, hydroelectric, water storage and irrigation projects on the Tigris. Starr, "The Quest for Water from Biblical Times to the Present," p. 1266; Starr, "Middle East Water Politics," p. 67.

[123]Dov Hoch, "The Middle East Water Crisis," Midstream, Vol. 39 (May 1993), p. 16; Hurwitz, "The Water Crisis in the Middle East," p. 5.

abundance of natural and human resources which give substance to these aspirations exacerbate and provide further fuel for water related antagonisms.[124]

### i. Iraq and Syria

Iraq and Syria have a long history of bitter relations and intense rivalry dating back to the Ba'athist revolutions in both countries which ultimately propelled Hussein and Assad to power.[125] This schism has its roots in competing interpretations of what authentic Ba'athism means and stands for with each regime claiming to be the sole representative of the true Ba'ath Party.[126] This ideological contest manifests itself in a fierce battle for leadership of the Arab world through endless rhetorical hostilities (fascist right-wing criminal is standard invective), angry exchanges, threats, accusations, general intrigue, subversion, including terrorism, quarrels over economic matters and a headlong rush to break the relative military parity between them through the acquisition of nuclear weapons.[127] Not surprisingly, the rivalry between the two Ba'athist regimes and, in particular, between their two leaders, has produced a climate of extraordinary

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[124]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," p. 126; Robins, Turkey and the Middle East, p. 49.

[125]For an excellent discussion of this problem see, Kienle, Ba'th v. Ba'th: The Conflict Between Syria and Iraq, 1968-1989, pp. 1-60.

[126]The Arab Ba'ath Party was founded in Syria in 1947 by, most notably, two Syrians, Michel Aflaq and Salah al-Din al-Bitar. Ba'athism has three important ideals: <1> total Arab unity, <2> socialism and <3> liberation (from external forces such as colonialism and internal liberty in the form of democracy). Amazia Baram, "Ideology and Power Politics in Syrian-Iraqi Relations, 1968-1984," in Syria Under Assad: Domestic Constraints and Regional Risks, eds., Moshe Ma'oz and Avner Yaniv (London: Croom Helm Ltd., 1986), pp. 126-128; Alasdair Drysdale, "Syria and Iraq - The Geopathology of a Relationship," GeoJournal, Vol. 28 (November 1992), pp. 348-350.

[127]Patrick Seale, Asad of Syria: The Struggle for the Middle East (London: I.B. Tauris and Co. Ltd., 1988). On this last point see Leonard Spector, "Nuclear Proliferation in the Middle East," Orbis, Vol. 36 (Spring 1992), pp. 181-199.

animosity.[128] A recent state sponsored editorial on Syria's Assad provides a forceful example:

> [Assad] is... an agent of Zionism who works to serve its interests in exchange for his remaining in power to continue his authority over [the] Syrian people and to enslave and humiliate them.[129]

Apart from propaganda warfare, each country has employed many additional measures against the other. In the early 1970s, Iraq began providing huge amounts of funds to rebel groups operating in Syria supporting the "historic leadership" of the Ba'ath in exile in Baghdad[130], and simultaneously backed numerous unsuccessful attempts to overthrow Assad.[131] Syria replied by aiding the Kurdish rebels operating in northern Iraq seeking independence, through arms shipments and by allowing them to open bases on Syrian territory -- a set of policies which continue to this day.[132]

Moreover, in 1979 and again in 1980, Syria was alleged to have employed the political assassins who came precariously close to toppling the

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[128]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 129; John E. Priest, "International Competition for Water and Motivations for Dispute Resolution," Agricultural Water Management, Vol. 21 (1992), pp. 331-332.

[129]Voice of Palestine, "Baghdad VIP Calls Syria's al-Asad 'Agent of Zionism'" (text). Baghdad Voice of Palestine in Arabic (25 January 1993). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 26 January 1993 (FBIS-NES-93-015, p. 33).

[130]Kienle, Ba'th v. Ba'th: The Conflict Between Syria and Iraq, 1968-1989, p. 32; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 95.

[131]Moshe Ma'oz, Asad: The Sphinx of Damascus (London: Wiedenfeld and Nicolson Ltd., 1988), p. 70.

[132]Kienle, Ba'th v. Ba'th: The Conflict Between Syria and Iraq, 1968-1989, p. 85; Voice of the People of Kurdistan, "Second Installment of Talabani Interview Aired" (text). Clandestine Voice of the People of Kurdistan in Arabic (16 June 1993). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 17 January 1993 (FBIS-NES-93-115, p. 28).

Iraqi regime.[133] Syrian diplomats were ordered to leave Baghdad in August 1980 after Iraqi authorities seized a large quantity of explosives from the Syrian embassy.[134] Damascus responded by expelling the Iraqi ambassador and his staff officially ending a brief period of rapprochement which had come about as a result of the Camp David accords.[135]

During the Iran-Iraq war, Damascus broke with Arab solidarity and officially supported Tehran providing it with an abundance of armaments, other materials and intelligence information in return for subsidized oil from Iran.[136] Baghdad responded by breaking off all diplomatic contact with Damascus (they have yet to be restored) one month after the September 1980 invasion.[137] In 1982, Syria went a step beyond demanding increasingly high royalties from Baghdad by closing Iraq's pipeline to the Mediterranean inflicting a significant blow to Iraq which reportedly shipped half its oil through Syria.[138] In addition, Syria closed its border with Iraq in an effort to prevent the infiltration of saboteurs and weapons supposedly sponsored by Baghdad.[139]

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[133]Baram, "Ideology and Power Politics in Syrian-Iraqi Relations, 1968-1984," p. 135; Ma'oz, Asad: The Sphinx of Damascus, p. 172.

[134]Drysdale, "Syria and Iraq - The Geopathology of a Relationship," p. 351.

[135]Baram, "Ideology and Power Politics in Syrian-Iraqi Relations, 1968-1984," p. 136; Efraim Karsh and Inari Rautsi, Saddam Hussein: A Political Biography (London: Brassey's Inc., 1991), p. 105.

[136]Kienle, Ba'th v. Ba'th: The Conflict Between Syria and Iraq, 1968-1989, p. 159; Seale, Asad of Syria: The Struggle for the Middle East, p. 358.

[137]Drysdale, "Syria and Iraq - The Geopathology of a Relationship," p. 352.

[138]Drysdale, "Syria and Iraq - The Geopathology of a Relationship," p. 351; Fischer and Oschenwald, The Middle East: A History, pp. 537, 541; Peter Mansfield, A History of the Middle East (London: Penguin Books, 1992), pp. 331-332. These so-called "transit" fees which saw Iraqi oil exported to the Mediterranean through Syria has cost Baghdad $600 million annually. Ma'oz, Asad: The Sphinx of Damascus, p. 113.

[139]Baram, "Ideology and Power Politics in Syrian-Iraqi Relations, 1968-1984," p. 136.

By 1988 and 1989, the Iraqi-Syrian feud had spilled over into Lebanon, with fierce battles between local proxies.[140] Baghdad, attempting to get even with Damascus for its support of Tehran during the Iran-Iraq war, provided arms to Michel Aoun of Lebanon, thereby strengthening the Lebanese Army's resolve to challenge the Syrian takeover there.[141] Although these efforts brought little in the way of tangible results, an infuriated Assad wasted little time in lending troops to the American led coalition against Iraq following the latter's invasion of Kuwait in August, 1990, an important symbolic gesture that was crucial to the political success of the mission.[142] Since the war Assad has played an active role in coordinating and aiding the various Iraqi opposition groups bent on toppling Saddam Hussein further fracturing an already hostile relationship.[143] Today, it is safe to say that it will almost certainly require a change of regime in order for these two enemies to move toward a normalization of relations. As Indyk bluntly asserts, a Syrian-Iraqi rapprochement is impossible given the current enmity between Hussein and Assad.[144]

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[140]Karsh and Rautsi, Saddam Hussein: A Political Biography, p. 201; Yezid Sayigh, "The Gulf Crisis: Why the Arab Regional Order Failed," International Affairs, Vol. 67 (July 1991), p. 501.

[141]Drysdale, "Syria and Iraq - The Geopathology of a Relationship," p. 353; Martin Indyk, "The Postwar Balance of Power in the Middle East," in After the Storm: Lessons From the Gulf War, eds., Joseph S. Nye and Roger K. Smith (Lanham, Maryland: Madison Books, 1992), p. 93.

[142]As Drysdale comments, "Syria's stance was crucial... [b]ecause of its Arab nationalist and anti-imperialist credentials [which thereby] provided vital legitimating cover for Western intervention in the region." Drysdale, "Syria and Iraq - The Geopathology of a Relationship," p. 347.

[143]Abdallal al-Dardari, "Iraq Opposition Aide's Talks with al-Asad Reported," (text). London AL-HAYAH in Arabic (11 June 1993). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 14 June 1993 (FBIS-NES-93-115, p. 52).

[144]Indyk, "The Postwar Balance of Power in the Middle East," p. 103.

### ii. Syria and Turkey

Syria and Turkey have also never had anything approaching cordial relations.[145] The most important reason for this is historical and relates to Syria's loss of the Sanjak of Alexandretta (currently known as the Turkish province of Hatay) in 1939 through a Turko-French "conspiracy." The outstanding territorial dispute was an important factor that brought the two countries to the brink of war in 1957 and again in 1958.[146] Syrian resentment and anger over this issue continues to be only slightly less intense than its loss of Palestine.[147] To this day maps of Syria still include the disputed area within its borders.[148] In general, Turkey is widely viewed by Syrian officials to have sold its Muslim soul in order to advance an imperialist agenda.[149] In particular, Damascus has frowned on Turkey's membership in NATO, its

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[145]Robins, Turkey and the Middle East, p. 49.

[146]David Kushner, "Conflict and Accommodation in Turkish-Syrian Relations," in Syria Under Assad: Domestic Constraints and Regional Risks, eds., Moshe Ma'oz and Avner Yaniv (London: Croom Helm Ltd., 1986), p. 93.

[147]Ma'oz, Asad: The Sphinx of Damascus, p. 58; Robins, Turkey and the Middle East, p. 24, 50; Seale, Asad of Syria: The Struggle for the Middle East, pp. 27-28. Syria has always felt territorially injured. Insofar as Syrians identified with a place called Syria, it included not only Palestine and Alexandretta but also Lebanon and Jordan all eventually dismembered through colonial gerrymandering and the creation of Israel in 1948.

[148]Don Peretz, The Middle East Today 5ed. (New York: Praegar Publishers, 1988), p. 404.

[149]This plays into the cultural aspect of this dispute. Historically there is certainly no love lost between the Turks and the Arabs. As Hurwitz explains, an "Arab saying has it that the final act of a Turk is a stab in the back." This is due in large part to Turkey's uncertain relationship to the Middle East, culturally and politically, as it is a hybrid of European and Middle Eastern influences. Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, pp. 114-115; Hale, "Turkey, the Middle East and the Gulf Crisis," p. 679; Hurwitz, "The Water Crisis in the Middle East," p. 8. Indeed, this is exemplified by the fact that in some works on the Middle East, Turkey is totally excluded from consideration. See for example, Amid Hewedy, Militarization and Security in the Middle East (London: Pinter Publishers, 1989).

application to the European Community and Ankara's rapidly improving relations with Israel.[150]

On the other hand, Syria is viewed within the foreign policy establishment in Ankara as politically adept, but highly unscrupulous and on balance, Turkey's biggest headache.[151] Turkish officials are said to be anxiously watching developments in the peace process fearing that a Syrian-Israeli breakthrough could renew Damascus' claims to Hatay with aggressive energy -- especially when placed in the context of Syria's rapid acquisition of arms and its emergence as a regional superpower.[152]

However, the most important source of friction between the two countries is Syria's twenty year support of ethnically oriented groups in Turkey. While Damascus has played an active role in backing Armenian terrorists, relations between the countries have been mainly strained over Damascus' continuing support for the PKK. The PKK insurgence in Turkey has cost over 6200 lives since 1984 and continues with no end in sight.[153] The Turkish military has recently stepped up its campaign against the Kurdish guerillas and it now absorbs about 30 percent of the active military forces and a sizable, although undisclosed, portion of the state budget.[154]

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[150]On this last point see, Voice of the Islamic Republic of Iran "Turkey's Upgraded Ties with Israel 'Unjustifiable,'" (text). Tehran Voice of the Islamic Republic of Iran in English (8 March 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 10 March 1992 (FBIS-NES-92-047, p. 41).

[151]Robins, Turkey and the Middle East, pp. 50-53.

[152]Morton I. Abramowitz, "Dateline Ankara: Turkey After Ozal," Foreign Policy, No. 91 (Summer 1993), p. 166.

[153]Associated Press, "Turkish Firms, Consulates Target of Kurdish Attacks," Globe and Mail (5 November 1993), p. A6; Russell Watson, "The Kurds Are Suffering: A Stateless People Turns Europe into a Target," Newsweek (5 July 1993), p. 37.

[154]Abramowitz, "Dateline Ankara: Turkey After Ozal," pp. 165, 174-175; Amberlin Zaman, "Kurds at the End of the Road," The Middle East, No. 233 (May 1993), p. 10.

For its part, Syria had encouraged the formation of PKK bases inside its borders until the 1987 protocol (discussed in section four); since that time, the PKK has trained in Lebanon's Bekaa Valley under Syrian auspices, while its leader, Abdullah Ocalan, retains his official residence in Damascus and continues to lead party congresses there.[155] Turkey has attempted a number of economic inducements (e.g. help with oil and gas prospecting) in an effort to get Syria to end its support for the insurgents. On certain occasions Ankara has been successful in managing to get such a commitment only to see it broken, sometimes violently as was the case in the mid-1980s when Syria was implicated in two PKK led terrorist attacks in Turkey.[156] On other occasions, Damascus' support for the guerillas has taken more subtle forms such as when Assad attended a ceremony in 1990 for PKK officers in the Bekaa Valley.[157]

The result is an increasing legacy of bitterness and recrimination on the Turkish side. Moreover, Syria's activities have prompted Ankara to take retaliatory actions -- including the harboring of the Muslim Brotherhood which "has been responsible for deaths and destruction inside Syria" -- when it feels such a response is necessary in order to teach Damascus a lesson.[158] Thus, not surprisingly, prospects for the future course of relations between

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[155]Nur Batur, "Al-Zu'bi Interviewed on PKK, Ocalan, Euphrates" (text). Istanbul MILLIYET in Turkish (20 January 1993). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 29 January 1993 (FBIS-NES-93-018, p. 44).
Cooley, "Middle East Water: Power for Peace," p. 14; Robins, Turkey and the Middle East, p. 52.

[156]Cohen, "International Law and the Water Politics of the Euphrates, p. 548; Robins, Turkey and the Middle East, p. 52.

[157]Strategic Survey, 1991-1992, p. 229.

[158]Robins, Turkey and the Middle East, p. 51.

Turkey and Syria are not bright. As Robins concludes:

> "[t]he best that can be hoped for in the foreseeable future is that the structural problems which divide the two sides can be managed in such a way as to promote compromise and defuse tension.[159]

### iii. Turkey and Iraq

Turkey and Iraq had, until recently, the strongest ties of the three riparian combinations. Turkish relations with Iraq have been generally close for several reasons. The mainly secular orientation of both states and the fact that there are no serious outstanding territorial disputes between the two countries are two points that immediately come to mind.

Moreover, large Kurdish populations (10 million in Turkey and 4 million in Iraq[160]) bent on achieving independence provide a natural point of convergence for Ankara and Baghdad. In each case, the two states have pursued similar policies with respect to the Kurds. These generally consist of extremely repressive measures, including open warfare, in an attempt to tame Kurdish opposition. Although there are other states with significant Kurdish populations (e.g. Iran, Syria and the Caucasus republics of the former Soviet Union), "Iraq and Turkey have suffered the most from Kurdish rebellion... both absolutely and as a proportion of their total population."[161] Thus, in the past Ankara and Baghdad have cooperated on issues relating to Kurds particularly those based near or on their common border. For example,

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[159]Ibid., p. 53.

[160]Daniel Pipes and Patrick Clawson, "Ambitious Iran, Troubled Neighbors," Foreign Affairs, Vol. 72 (Spring 1993), p. 134.

[161]Robins, Turkey and the Middle East, p. 59

throughout the 1980s, the Turkish military was allowed to enter northern Iraq in pursuit of PKK troops.[162]

Secondly, the level of economic interdependence between Turkey and Iraq -- particularly during the Iran-Iraq war -- has been significant and has served to strengthen ties between the two countries.[163] Iraq is essentially landlocked and must rely on a second country in order to ensure the security of its supply lines and communications.[164] Iraq's uneasy relations with its other neighbors, notably Syria, has made Turkey an obvious choice. Turkey in return has received an important transit route to the Gulf for its exports as well as a ready supply of oil. By 1987, Ankara had become Baghdad's largest trading partner in the Islamic world.[165]

However, in the two or three years before the Gulf War, the nature of their association began to take a negative turn. Turkey became increasingly concerned about Iraq's brutal treatment of its Turcoman and Kurdish populations which created large scale refugee problems for Ankara. Moreover, the qualitative and quantitative improvements of Iraq's weapons arsenal was met with growing alarm in Turkey.[166] Baghdad's active pursuit of chemical and nuclear capabilities coupled with its invasion and annexation of Kuwait in August 1990 convinced Turkish officials that Iraq was bent on

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[162]Sabri Sayari, "Turkey: The Changing European Security Environment and the Gulf Crisis," The Middle East Journal, Vol. 46 (Winter 1992), p. 13.

[163]Hale, "Turkey, the Middle East and the Gulf Crisis," p. 682; Robins, Turkey and the Middle East, pp. 58-62. However, we should note that despite the close economic relationship of the two countries, Turkey went to great lengths to ensure its neutrality during this period.

[164]Robins, Turkey and the Middle East, p. 58.

[165]Fischer and Ochsenwald, The Middle East: A History, p. 502.

[166]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 129; Robins, Turkey and the Middle East, p. 62.

establishing hegemony in regional affairs.[167] The latter event effectively ended any remnants of the previously friendly nature of their relationship.

Ankara closed the twin pipelines running between the two countries that was responsible for 50 percent of Iraq's oil exports and 48 percent of its foreign exchange earnings; moreover, it severed all economic ties with Baghdad.[168] Turkey also took a surprisingly strong position in favor of military action and assumed a central role in the allied coalition against Iraq by allowing American jets generous use of its bases and positioning 120,000 Turkish troops along its border with Iraq.[169] Baghdad responded by sending eight divisions of its own to meet Ankara's show of force.

Although the guns stayed silent, relations have not markedly improved in the aftermath of the Persian Gulf War.[170] With Iraq effectively divided following Saddam's brutal repression of the Kurdish minority in Iraq, the PKK established several bases in the northern "no-fly zone" part of that country.[171] This has led to numerous confrontations along their common border between PKK units and Turkish soldiers. Currently, Turkish troops are said to be stationed in Iraqi Kurdistan and concerns have been raised as to whether Turkish generals are seeking "to take care of the Kurdish problem by annexing northern Iraq."[172] In response to Ankara's close cooperation with Allied forces during the Gulf Crisis and perhaps Ozal's suggestion earlier this year that a change of regime in Iraq would be most

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[167]Sayari, "Turkey: The Changing European Security Environment and the Gulf Crisis," p. 13.

[168]Robins, Turkey and the Middle East, pp. 59-60; Miron Rezun, Intrigue and War in Southwest Asia: The Struggle for Supremacy from Asia to Iraq (New York: Praegar Publishers, 1992), p. 119.

[169]Sayari, "Turkey: The Changing European Security Environment and the Gulf Crisis," p. 10.

[170]Cohen, "International Law and the Water Politics of the Euphrates," p. 548.

[171]Zaman, "Kurds at the End of the Road," pp. 8-10.

[172]Pipes and Clawson, "Ambitious Iran, Troubled Neighbors," p. 135

welcome, Saddam Hussein has reportedly begun supplying the PKK with arms.[173] Moreover, Iraq has linked any bilateral cooperation, and a subsequent improvement in relations, to the Euphrates water issue which it regards as a political problem not a technical one.[174]

## Conclusion

> "I do not believe in worrying about threats of war resulting from development projects in Turkey. If there is a threat we will repel it." (Suleyman Demirel, President of Turkey).[175]

Arid climatic conditions, unilateral hydrological works, dubious consumption patterns and rapid population growth rates have produced a situation where demand is beginning to outpace supply in the Euphrates River Basin. Constant political tensions have coincided with the reduction in Euphrates waters producing a volatile mixture that has come close to igniting into war in both 1975 and again in 1990. The fundamental source of water related tension is Turkey's extensive and ambitious development program of hydrological works which has significantly reduced the quantity and quality of the flow of the Euphrates as it moves downsteam.

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[173]Republic of Iraq Radio Network, "Turkish President's Comments on Regime Criticized," (text), Baghdad Republic of Iraq Radio Network in Arabic (28 January 1993). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 29 January 1993 (FBIS-NES-93-018, p. 25); Sayari, "Turkey: The Changing European Security Environment and the Gulf Crisis," pp. 20-21.

[174]Muhammad Allam, "Water Dispute with Turkey Escalates," (text) London AL-HAYAH in Arabic (24 December 1992) Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 6 July 1990 (FBIS-NES-92-251, p. 44); Faruq Shukri, "Saddam Visits Governates, Discusses Water and Stresses Economy" (text), Manama WAKH in Arabic (4 July 1990). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 6 July 1990 (FBIS-NES-90-130, p. 18).

[175]Quoted in Strategic Survey 1991-1992, p. 229.

Turkey has further exacerbated these frictions by continually expressing little or no interest in negotiating any accords concerning the sharing of the Euphrates with Syria and Iraq. The Syrian-Iraqi-Turkish technical committee has now met almost 20 times and has produced no tangible results except some exchanges of information relating to climatic and hydrological conditions as well as a few sporadic technical details with respect to new dam developments.[176] Ankara's continuing intransigence does not sit well with Damascus and Baghdad who are moving to link their general relations with Turkey to a water resolution.[177] Meanwhile, water deficits in Syria and Iraq are steadily becoming more pronounced suggesting that water disputes can be expected to amplify.

In spite of the markedly bad relations between Syria and Iraq, a "marriage of convenience" against a militarily weaker Turkey is the alignment most conducive to conflict over the Euphrates.[178] Two other scenarios are also plausible. A unilateral attack by either downstream nation against Turkey would be strategically more dangerous but could occur if either Syria or Iraq felt so outraged by continuing Turkish diversions of Euphrates water that it felt that military action was the only solution. A

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[176]INA, "Turkey Urged to Consult on New Euphrates Data Project" p. 31; Starr, "Water Politics in the Middle East," p. 68.

[177]Allam, "Water Dispute with Turkey Escalates," p. 44; Shukri, "Saddam Visits Governates, Discusses Water and Stresses Economy" p. 18.

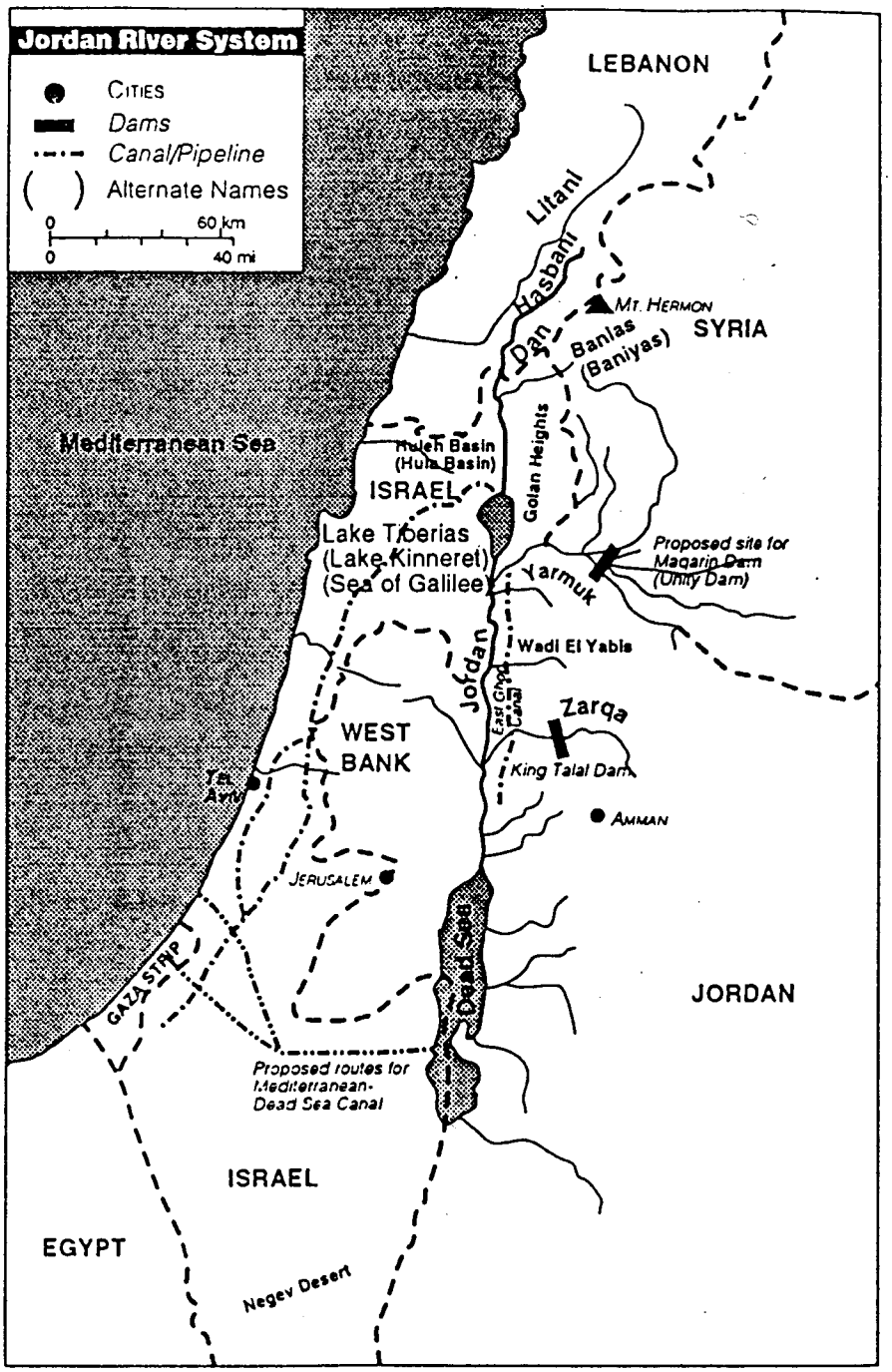
[178]It is estimated that Iraq has about 382,500 active armed soldiers and 650,000 reserves. Syria has approximately 408,000 active armed soldiers and 400,000 reserves. While Syria enjoys an advantage in the number of tanks and combat aircraft at its disposal, Turkey, on the other hand, has active armed forces numbering 560,000 with 1,100,000 reserves. However, it is generally regarded to have inferior "fighting" equipment as compared to its two downstream neighbors despite its enormous population advantage and membership in NATO. International Institute for Strategic Studies in London, The Military Balance 1992-93 [as cited in Asia-Pacific Defence Reporter, Vol. 19 (December/ January 1992/1993)], pp. 110, 133, 138. For more detail on the defense configurations of Iraq, Syria and Turkey, see Appendix A.

conflict pitting Syria against Iraq might also occur given the especially intense antagonism between the two regional rivals and Syria's ability to influence the quantity and quality of water flowing from its borders to Iraq. However, the relative military parity between the two countries in question suggests this is the least likely of three scenarios presented here. While such outcomes may seem implausible in the short term, the overall prospect is gloomy and one can expect a steadily rising potential for water conflict in this river basin in the continuing absence of a water sharing agreement.

*Chapter 4*

# Acute Interstate Conflict in the Jordan River Basin

## Map of the Jordan River Basin




Source: Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," Emory International Law Review, Vol. 6 (Fall 1992), p. 528.

*I can think of no reason that would cause me to go to war with Israel except water (King Hussein of Jordan, 1990).*[1]

Writing in 1953, thirty years before the issue was even seriously discussed, M.G. Ionides predicted that major problems regarding the distribution of the Jordan Basin's waters were imminent.[2] The events that have transpired since that time clearly bear out his astute prediction. Indeed, the clearest case of the impact of environmental decline on acute interstate conflict can be seen in the Jordan River Basin.[3]

The continuous struggle for the diminishing waters of the Jordan River Basin is now widely recognized as a proximate cause of the 1967 Arab-Israeli war[4] and could very well precipitate a new round of violence, deadlier and even more dangerous than what this tortured area has thus far experienced. Indeed, it is generally acknowledged that the competition for water in the Jordan River Basin is stronger than anywhere else in the world.[5]

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[1]Quoted in Bruce A. Hurwitz, Middle East Focus, Vol. 13 (Fall 1991), p. 8.

[2]M.G. Ionides, "The Disputed Waters of Jordan," Middle East Journal, Vol. 7 (Spring 1953), pp. 153-164.

[3]A River Basin, also known as a catchment area or drainage basin "refers to the area within which rainfall drains into a given stream." Malin Falkenmark, "Fresh Water As a Factor in Strategic Policy and Action," in Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, ed., Arthur H. Westing (Oxford: Oxford University Press, 1986) p. 85.

[4]Sydney D. Bailey, Four Arab-Israeli Wars and the Peace Process 3rd. ed. (London: Macmillan Press Ltd., 1990), p. 189; Adam Garfinkle, Israel and Jordan in the Shadow of War (New York: St. Martin's Press, 1992), p. 38; Ian J. Bickerton and Carla L. Klausner, A Concise History of the Arab-Israeli Conflict (Englewoods, N.J.: Prentice-Hall Inc., 1991), pp. 142, 146.

[5]See for example, Ewan W. Anderson, "Water: the Next Strategic Resource," in The Politics of Scarcity: Water in the Middle East eds., Joyce R. Starr and Daniel C. Stoll (Boulder: Westview Press, 1987), pp. 1-22; Addeane S. Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," in A Shared Destiny: Near East Regional Development and Cooperation, eds., Joyce R. Starr and Addeane S. Caelleigh (New York: Praegar Publishers, 1983), pp. 121-137; John K. Cooley, "Middle East Water: Power for Peace," Middle East Policy, Vol. 1 (Summer 1992), pp. 1-15; Falkenmark, "Fresh Water As a Factor in Strategic Policy and Action,"

Although seldom mentioned, it is also a fundamental aspect that underlies the continuing Israeli-Arab-Palestinian conflict.[6]

Unless present consumption patterns change significantly and there is a concerted, coordinated effort to redistribute available water in the Jordan River Basin along equitable lines, "there is a high probability that the riparian states will face acute and progressively worsening shortages by the middle 1990s."[7] This chapter will demonstrate that the current trend toward growing water scarcity combined with the deep-seated political enmity keenly felt among the actors involved in this river basin provide such a lethal mix that there is a high probability that acute interstate conflict will erupt.

Although there are four countries within the Jordan River Basin, the two most crucially interested states, with regards to water supply, are Israel (including the Occupied Territitories) and Jordan which both depend almost exclusively on its water resources.[8] Syria is generally more preoccupied with

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p. 85-113; Abdel Majid Farid and Hussein Sirriyeh, eds., Israel and Arab Water (London: Ithaca Press, 1985); John Kolars, "Trickle of Hope," Science, Vol. 12 (November/December 1992), pp. 16-20; George D. Moffet III, "Middle East's Cup Runneth Dry," Christian Science Monitor (8 March 1990), pp. 8-9; Thomas Naff and Ruth C. Matson, eds., Water in the Middle East: Conflict or Cooperation? (Boulder: Westview Press, 1984), pp. 17-62; Gareth Porter and Janet Welsh Brown, Global Environmental Politics (Boulder: Westview Press, 1991), p. 110; Thomas R. Stauffer, "The Price of Peace: The Spoils of War," American-Arab Affairs, Vol. 24 (Spring 1982), pp. 43-54.

[6]Frank Collins, "The Vanishing Waters of the Middle East," The Washington Report on Middle East Affairs, Vol. 9 (April 1991), p. 30. For an interesting perspective on the Palestinian position with reference to the waters of the West Bank see, "Palestinian Working Paper on Water," (text), Algiers Voice of Palestine in Arabic (21 September 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 21 September 1992 (FBIS-NES-92-183, pp. 5-7).

[7]Stephen Lonergan and Barb Kavanagh, "Climate Change, Water Resources and Security in the Middle East," Global Environmental Change, Vol. 1 (September 1991), pp. 272-290.

[8]Ewan W. Anderson and Khalil H. Rashidian, Iraq and the Continuing Middle East Crisis (London: Pinter Publishers, 1991), p. 89; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 194.

issues concerning the Euphrates where it receives the vast majority of its water but nevertheless, is an important party to this dispute. The last riparian state, Lebanon will be treated with only passing reference as our discussion requires. The rationale for this is based on a number of interrelated factors. Firstly, Lebanon draws almost no water from the area, as it has focused almost all of its attention on developing the Litani River (which runs completely within its own borders), and therefore, according to two noted water experts, has at best a cursory interest in the state of affairs of the Jordan River Basin.[9] Secondly, Lebanon is the only country in this region that is fairly well endowed with water resources in both a quantitative and qualitative fashion.[10] Thirdly, Beirut is currently preoccupied with basic internal restructuring (including rebuilding damaged water infrastructure) in the aftermath of its destructive civil war. Finally, Syria's "hegemony" over Lebanon gives the latter little room to maneuver independently in important foreign policy matters such as water.[11] Israel has also maintained considerable influence over Lebanese affairs and since 1982 has been in control of a 16 kilometer (km) buffer zone or "security zone" in the southern part of that country. In short, "Lebanon is not in total control of its water...[and in general

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[9]Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 194.

[10]Starr, "Water Wars," pp. 28-29; Strategic Survey, 1991-1992 (London: International Institute for Strategic Studies, 1992) [as cited in Brassey's (May 1992)], p. 223. As Starr notes, if Lebanon overcomes the crippling effects of its civil war it has the potential to become a Middle East water power.

[11]Peter Mansfield, A History of the Middle East (London: Penquin Books, 1992), pp. 304-322; Itamor Rabinovich, "Israel, Syria, and Lebanon," International Journal, Vol. 40 (Summer 1990), pp. 528-552. As Drysdale reports, the Treaty of Brotherhood, Cooperation, and Coordination, signed between the two countries in May 1991, "effectively confirmed Syria's hegemony and institutionalized its control over Lebanon's foreign and security policies." Alasdair Drysdale, "Syria and Iraq - The Geopathology of a Relationship," GeoJournal, Vol. 28 (November 1992), p. 354.

has] limited writ of Lebanese sovereignty over its own soil."[12] Therefore, this chapter will focus primarily on Israel, Jordan and to a lesser degree, Syria.

The organization of this chapter is as follows. The first section will explore the nature of the Jordan River Basin. The next section will discuss the factors that serve as catalysts for the development of hydraulic structures within the Jordan River Basin. Section three will examine how the Jordan River Basin has been developed and utilized by its three key actors. In section four, an analysis will be conducted as to the impact of the developments on relations among the three countries in question. In the final section, the potential for acute interstate conflict will be highlighted; included in this part, will be an appraisal of the political relations among the relevant states which work to ratchet up and fan the flames of water-based frictions.

## I. The Jordan River Basin

The Jordan River Basin includes a total area of 18,300 km.[13] Of this total, Jordan makes up 54 percent; Syria 29.5 percent; Israel 10.5 percent and Lebanon the final 6 percent.[14] The Jordan River is the most important source of water in the basin. It represents a classic example of what is known as an exotic river -- those that rise in amply watered areas but grow progressively smaller as they flow through deserts.[15] The Jordan is formed by the confluence of the Baniyas which rises in Syria; the Dan which begins in Israel;

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[12]Cooley, "Middle East Water: Power for Peace," pp. 2, 15.

[13]Frederick W. Frey and Thomas Naff, "Water: An Emerging Issue in the Middle East?" The Annals of the American Academy, No. 482 (November 1985), pp. 67.

[14]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 89. It is worth noting here that pre-1967 Israel only accounts for 3 percent of the geographical area of the Jordan basin.

[15]John Kolars, "The Course of Water in the Arab Middle East, American-Arab Affairs, Vol. 33 (Summer 1990), p. 58.

and the Hasbani which rises in Lebanon.[16] The Dan is the most important of the three sources in both a quantitative and qualitative sense. With reference to the former, it is responsible for roughly 50 percent of the Jordan's discharge. In addressing its quality, the Dan is remarkably pure or "sweet" in a area well known for its tainted springs.[17]

The three streams converge 6 km inside Israel where they form the Jordan River. From there, the Jordan moves though the Jordan Valley, "a vast rift running from Turkey in the north to East Africa in the south."[18] Along the way, the river flows into Lake Tiberias -- also known as the Sea of Galilee or Lake Kinneret. Just 7 km south of Lake Tiberias, the Yarmuk, which rises in the Syrian side of the Golan Heights, joins the Jordan and in the process contributes between 400-500 mcm of water.[19], The Yarmuk is easily the Jordan's most important tributary because it is responsible for: <1> draining Syrian and Jordanian territory; <2> forming the border between Syrian and Jordanian territory for most of its westward flow; <3> demarcating

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[16]However, Israel's annexation of the Golan Heights and invasion of southern Lebanon has, for all intents and purposes, given it control over the Banias and the Hasbani. Strategic Survey, 1991-1992, p. 222.

[17]Anderson, "Water: the Next Strategic Resource," p. 7.

[18] Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," Emory International Law Review, Vol. 6 (Fall 1992), p. 531; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 19.

[19]Garfinkle, Israel and Jordan in the Shadow of War, p. 165; Hurwitz, "The Water Crisis in the Middle East," p. 5; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 21; Mahmoud Riyadh, "Israel and the Arab Water in Historical Perspective," in Israel and Arab Water, eds. Abdel Majid Farid and Hussein Sirriyeh (London: Ithaca Press, 1985), p. 13. Syria contributes 90 percent of the sources to the Yarmuk. Ze'ev Schiff, "Jordan Water Allocation Agreement Said Needed," (text), Tel Aviv HA'ARETZS in Hebrew (16 July 1990) Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 17 July 1990 (FBIS-NES-90-137, p. 28)

the border between Jordan and Israel as it nears the Jordan; and <4> contributing a rather significant volume of water to the Jordan River.

South of the junction of the Yarmuk and Jordan, the latter becomes the boundary between Jordan and Israel.[20] Three other tributaries of note, the Harod, the Yabis, and the Nahr az Zarqa, spill into the Jordan at this point. From there, it twists and turns through a deep gorge known as the Zor before finally draining into the Dead Sea some 113 km after it first converges with the Yarmuk.[21] In terms of riparian position, Syria is the uppermost riparian along the Yarmuk River, Jordan comes next, followed by Israel. In the case of the Jordan River, Syria and Lebanon are the uppermost riparian states, and Israel is an upper riparian to Jordan.[22]

The average annual discharge of the Jordan is 1850 million cubic meters.[23] However, after accounting for various abstractions (e.g. losses from evaporation, irrigation, diversions etc.) the total useable amount is approximately 1290 mcm.[24] In comparison with the major rivers of the Middle East, the Jordan, at 320 kilometers long, seems rather inconsequential. For example, the total discharge of the Jordan into the Dead Sea is roughly equal to 2 percent of the annual flow of the Nile, a river 6700 km in length.[25] Despite this, its importance must be recognized in such an arid region as it

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[20]Selig A. Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," in The Politics of Scarcity: Water in the Middle East eds., Joyce R. Starr and Daniel C. Stoll (Boulder: Westview Press, 1987), p. 42.

[21]Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 532; Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 42.

[22]Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 43.

[23]Frey and Naff, "Water: An Emerging Issue in the Middle East?" p. 67.

[24]John E. Priest, "International Competition for Water and Motivations for Dispute Resolution," Agricultural Water Management, Vol. 21 (1992), p. 7; Joyce R. Starr and Daniel C. Stoll, "Water for the Year 2000" in their The Politics of Scarcity: Water in the Middle East (Boulder: Westview Press, 1987), p. 143.

[25]Anderson, "Water: The Next Strategic Resource," p. 7.

provides between 30-60 percent of Israel's annual supply and between 45-75 percent of Jordan's yearly water stock.[26]

While the focus of this discussion will deal primarily with the problems surrounding the Jordan River and its principal tributary, the Yarmuk, it is also important to keep in mind the noteworthy role that groundwater,[27] in the form of national and transnational aquifers,[28] plays in this basin. For several millenniums, aquifers in this region have served as both an important source and convenient storage area for water.[29] Jordan makes extensive use of one renewable and two nonrenewable aquifers: <1> the Arzaq Oasis northeast of Amman; <2> the Disi/Daq aquifer in the southeastern portion of the country ; and <3> the renewable Umm Qays aquifer which runs under the east bank of the Jordan River and which it shares with Israel. Israel utilizes many aquifers to help service its need of which two renewable ones are the most prominent: <1> the Coastal aquifer which runs along the Mediterranean in the Gaza Strip and <2> the transnational Mountain aquifer (also known as the Yarqon-Taninim or West Bank aquifer) which lies under the West Bank and alone provides between

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[26]Anderson, "Water: The Next Strategic Resource," p. 7; Frey and Naff, "Water: An Emerging Issue in the Middle East?," p. 67; Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 43.

[27]Groundwater is defined as water found beneath the surface in rocks and soil that have been fully saturated. Roy Charles Ward and Mark Robinson, Principles of Hydrology 3rd. ed. (London: McGraw-Hill Book Company, 1990), p. 174.

[28]An aquifer can be defined as a subterranean "geological formation comprising layers of rock or unconsolidated deposits that contain sufficient saturated material to yield significant quantities of water." In the Middle East, two major categories of aquifers may be distinguished, the shallow and the deep. The latter tend to be confined in such a fashion that recharge rates may be extremely slow and thus are often referred to as nonrenewable or fossil aquifers. In other words, the water taken from them is 'mined.' Ward and Robinson, Principles of Hydrology, p. 174; Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 87; Kolars, "Trickle of Hope," p. 19.

[29]Robin Clarke, Water: The International Crisis (London: Earthscan Publications Ltd., 1991), p. 88.

25-40 percent of Israel's total water needs.[30] Because of its size and geographical position, the latter aquifer is a particularly critical component of any future Arab-Israeli peace agreement which would grant autonomy to the Palestinians on the West Bank. Syria has no known significant aquifers which it can exploit.[31]

### II. The Need For Developments In the Jordan River Basin

The demands of rural to urban migration, industrialization and social and economic modernization all work to drive the construction of new developments in the Jordan River Basin. However, arid climatic conditions, intensive agricultural production, and rapid population growth are the most immediate catalysts behind the appropriation of the Jordan River region's fresh waters.

Precipitation, as was the case along the Euphrates, is once again scarce and in many places simply nonexistent. What rainfall does occur is at best sporadic. The vast majority of it falls in winter downpours.[32] Only in Lebanon's Atlas Mountains and Israel's northwest does rainfall meet or exceed 1000 millimeters (mm) a year. In other areas of the basin, precipitation ranges from 0 mm per annum in the extensive desert areas of the southern region to 400 mm per year at the northern end of the Jordan River Valley.[33]

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[30]Malin Falkenmark, "Middle East Hydropolitics: Water Scarcity and Conflicts in the Middle East," Ambio, Vol. 18, No. 6 (1989), p. 350; Starr, "Water Wars," p. 24.

[31]Kolars, "Trickle of Hope," p. 20; Hisham Zarour and Jad Issac, "Nature's Apportionment and the Open Market: A Promising Solution to the Arab-Israeli Water Conflict," Water International, Vol. 18 (March 1993), p. 43.

[32]Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 532.

[33]Judith Perera, "Water Politics," The Middle East, No. 76 (February 1981), p. 47; Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-

In general, rainfall diminishes rapidly as one moves north to south.[34] In Jordan for example, 78 percent of the country receives less than 250 mm of rain.[35]

On reflection, the Jordan River Basin seems to be a particularly inhospitable place for agriculture. As was indicated in chapter three, 400 mm of rain a year is considered a basic minimum for cultivation of any kind without extensive irrigation.[36] Moreover, the lower the annual total, the less reliable the rainfall becomes, so that consecutive years of drought may be succeeded by the incidence of catastrophic floods.[37] Short growing seasons further compound the chronic shortage of precipitation.[38] Ironically, a rather sizeable percentage of the Jordan River Basin's population is dependent on agriculture for its subsistence despite agriculture's relatively poor economic returns and the massive quantities of water required to make the desert "bloom" (see Table 4-1). To put it simply, water use for agricultural purposes in the Jordan catchment is a non-viable economic activity because it generates so little per cubic meter of water.[39] Stauffer emphasizes the point lucidly in drawing upon the case of Israel which is illustrative of many countries in the

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Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 532.

[34]Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 43.

[35]Frey and Naff, "Water: An Emerging Issue in the Middle East?" p. 68.

[36]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 84.

[37]Ibid., p. 85.

[38]Malin Falkenmark and Carl Widstrand, "Population and Water Resources: A Delicate Balance," Population Bulletin Vol. 47 (November 1992), p. 19.

[39]J.A. Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," GeoJournal, Vol. 28 (November 1992), p. 382.

region:

> Israel's agricultural sector enjoys massive subsidies that include cheap or free infrastructure, tax remissions, special credit facilities, and export assistance. Nonetheless, only a fraction of the production is economically viable, and the rest requires not only water [two-thirds of Israeli water consumption is for irrigated agriculture] but steady injections of cash subsidies.[40]

These seemingly illogical public policy decisions are due to the fact that food security is once again seen as not only something worth striving for, but a matter of national defense.[41] The reasoning behind this is simple: in a region as volatile as this one, no state feels comfortable relying on another for something as vital as food stuffs. As a result, each state works energetically to avoid a dependence on imports and a consequent loss of economic and political autonomy.[42] Indeed, in practically every country in the Middle East there is a remarkably close relationship between those public officials and leaders who strive for food security and those agricultural workers that enable

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[40]Stauffer, "The Price of Peace: The Spoils of War," p. 46.

[41]Angus Hindley, "A New Source of Conflict for the Region," Middle East Economic Digest (MEED), Vol. 35 (25 January 1991), p. 11; Strategic Survey 1991-1992, p. 221. From the Israeli perspective there is another driving impetus for large allocations of water to agriculture. This relates to the long held Zionist aspiration to "make the desert bloom." Indeed, agriculture carries important ideological weight as the "lifeblood" of the nation rooted to its land. Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," p. 132; Frey and Naff, "Water: An Emerging Issue in the Middle East?," pp. 75-76; Itzack Galnoor, "Water Policymaking in Israel," Policy Analysis, Vol. 4 (1978), pp. 339-365; Amin Hemedy, Militarization and Security in the Middle East: Its Impact on Development and Democracy (London: Pinter Publishers, 1989), p. 23; Miriam R. Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," International Security, Vol. 18 (Summer 1993), pp. 122-123; Stauffer, "The Price of Peace: The Spoils of War," p. 46. However, agriculture is also linked to the crucial issue of settlements - seen as "outposts" vital for national security. Naff and Matson, eds., Water in the Middle East: Conflict or Cooperation?, pp. 186-187.

[42]Natasha Beschorner, "The Problem of Regional Rivalry," MEED, Vol. 37 (29 January 1993), p. 12.

that goal to be realized.[43] Despite the importance with which agriculture is viewed, all three countries are net importers of food (see Table 4-2).

*Table 4-1*

Vital Statistics for Agriculture in (%), by Country

| | Israel | Jordan | Syria |
|---|---|---|---|
| Employment (1990) | 6 | 20 | 32 |
| Gross Domestic Product (1991) | 3 | 7 | 20 |
| Water (1992) Apportionment | 79 | 65 | 83 |

Sources: J.A. Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," GeoJournal, Vol. 28 (November 1992), p. 384; ; Mark S. Hoffman, ed., The World Book Almanac and Book of Facts, 1993 (New York: Pharo Books, 1992), pp. 766, 769, 802; Bruce A. Hurwitz, "The Water Crisis in the Middle East," Middle East Focus, Vol. 13 (Fall 1991), p. 4; The World Book Encyclopedia, Vols. 10, 19 (Chicago: World Book Inc, 1993), pp. 485, 1218; Allen J. Hammond, ed., Environmental Almanac 1993 (Boston: Houghton Mifflin Company, 1993), pp. 469, 473, 503.

*Table 4-2*

Balance of Food Trade in Billions of Dollars: 1991

| | Israel | Jordan | Syria |
|---|---|---|---|
| Surplus/Deficit | -0.30 | -0.30 | -0.50 |

Source: J.A. Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," GeoJournal, Vol. 28 (November 1992), p. 378.

Rapid population growth is also a significant stress on freshwater resources in this river basin.[44] The point at which a country passes into a position of water scarcity or stress is inherently related to population

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[43] Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," p. 377.

[44] Michael Elliott, "The Global Politics of Water," American Enterprise, Vol. 2 (September/October 1991), p. 30.

pressures.[45] The population growth rates of the three countries under review are among the highest in the world (see Table 4-3). In the case of Israel, for example, its growth rate from natural births is comparatively modest at 1.7 percent per annum; however, the huge influx of immigrants from the former Soviet Union adds another 1 percent on to that total making Israel's growth rate of 2.7 percent per annum a monumental strain on existing water stocks.[46]

In general, the current rate of population growth is driven primarily by high birth rates, in the case of Syria and Jordan, and immigration in the case of Israel (see Tables 4-3 and 4-4). Population expansion is proceeding at what one author has aptly termed an "insane pace" and suggests trouble ahead with regards to water supply unless significant attempts are made to bring it under control.[47]. Table 4-5, graphically underscores the problem of population pressures by drawing attention to the ratio of persons per one flow unit or 1 million cubic meters of water per year.[48]

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[45]Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," p. 19.

[46]U.S. Department of Commerce Economic and Statistics Administration, World Population Profile (Washington, D.C.: GPO, 1991), p. A10

[47]Helen Cordes, "The Drying Game," Utne Reader, No. 57 (May/June 1993), p. 75.

[48]Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," p. 19.

*Table 4-3*

Population Growth Rates, by Country (Average Annual Percentage Change): 1950-2010

| | Israel | Jordan | Syria |
|---|---|---|---|
| 1965-1975 | 2.8 | 3.0 | 3.1 |
| 1975-1980 | 2.1 | 3.3 | 3.4 |
| 1980-1985 | 2.0 | 1.5 | 3.0 |
| 1985-1990 | 1.7 | 4.0 | 3.7 |
| 1991 | 2.7 | 4.2* | 3.7 |

Sources: Stephen Lonergan and Barb Kavanagh, "Climate Change, Water Resources and Security in the Middle East," Global Environmental Change, Vol. 1 (September 1991), p. 282; U.S. Department of Commerce Economic and Statistics Administration, World Population Profile (Washington, D.C.: GPO, 1991), p. A5

*This figure does not include the influx of 300,000 Palestinians who arrived in Jordan after they fled or were expelled for the Gulf states following the PLO's support of Iraq during the Persian Gulf War. Alan Cowell, "Hurdle to Peace: Parting the Mideast's Waters," New York Times (10 October 1993), p. A6.

*Table 4-4*

Population, by Country (in thousands): 1950 to 2010

| | Israel | Jordan | Syria |
|---|---|---|---|
| 1950 | 1,286 | 561 | 3,495 |
| 1970 | 2,903 | 1,503 | 6,258 |
| 1990 | 4,436 | 3,273 | 12,484 |
| 2010 | 6,879 | 6,810 | 25,642 |

Sources: U.S. Department of Commerce, Economic and Statistics Administration, World Population Profile (Washington, D.C.: GPO, 1991), p. A5; Population Reference Bureau, World Population Data Sheet, 1992, (Washington, D.C.: Population Reference Bureau, Inc., 1992).

*Table 4-5*

Population Pressure and Water-Resource Problems:
Persons per Flow Unit (PFU)

| PFU | Situation | Example(s) |
|---|---|---|
| <100 | No Significant Problems | Brazil (20)<br>Former Soviet Union (60) |
| 100-600 | Quality and Dry Season Problems | Syria (350)<br>Turkey (420) |
| 600-1000 | Water Stress | Egypt (900) |
| 1000-2000 | Chronic Water Shortages | Kenya (1590) |
| >2000 | Extreme Scarcity | Israel (3070)<br>Jordan (3910)<br>West Bank (4000) |

Source: Malin Falkenmark and Carl Widstrand, "Population and Water Resources: A Delicate Balance," Population Bulletin Vol. 47 (November 1992), pp. 19-20, 31.

## III. Developments In the Jordan River Basin

> The necessity to use all possible sources and to develop new supplies is clearly recognized in the priority given to water policy by all the governments of the region. There is a high level of investment in water exploration, the construction of hydraulic structures and development of alternative supplies.[49]

All three countries have attempted to harness both surface and subterranean waters in the "parched" Jordan River Basin in order to sustain agricultural, industrial and population growth. Significantly, however, there are no major dams in this basin because: <1> the Jordan and Yarmuk Rivers are quite small; and, <2> political hostilities between the riparian states have prevented the construction of any major projects in the area that might

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[49] Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 85.

adversely affect their water supply while increasing their adversaries' supplies. In the absence of anything approaching consensus or cooperation, all three countries have moved ahead unilaterally with a variety of small to medium sized hydraulic projects. This has led to a situation where demand has passed the threshold of available supply. The objective of this section is to outline the projects that are most responsible for this growing and unequivocal predicament.

Even though Israel was not the original upstream state, through the course of four Arab-Israeli wars, Israel has moved from being downstream "on all important tributaries except the Dan to having a controlling position on all except the Yarmuk."[50] Therefore, this represents a logical place to begin this discussion. The development of Israel's water resources began in 1936 -- 12 years before the country formally came into existence.[51] The Mekorot water company, founded under the auspices of the Jewish Agency, coordinated the development and utilization of Israel's water resources before 1948.[52] Israel nationalized its water resources in 1949 and set up a separate company, Tahal in 1952. Tahal and Mekorot soon after jointly began work on the the National Water Carrier (NWC) which was seen as an absolutely crucial scheme in order to absorb future immigrants.[53]

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[50]Frey and Naff, "Water: An Emerging Issue in the Middle East?," p. 78; Strategic Survey, 1991-1992, p. 230.

[51]For a discussion of this point, see Galnoor, ""Water Policymaking in Israel," pp. 339-365.

[52]Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 536.

[53]Also referred to as the Kinneret-Negev Conduit. Perera, "Water Politics," p. 54.

The NWC was completed in 1964 and still represents the major hydrological development erected by the Israelis.[54] Located entirely within Israel's pre-1967 borders, the NWC is charged with the task of transporting an average of 500 mcm of water per annum in a series of canals, pipelines, and tunnels from the northern edge of Lake Tiberias -- Israel's only natural freshwater reservoir. From there, the NWC moves along the coastal plain toward Tel Aviv and then on to the Negev Desert and the Gaza Strip.[55] Between 240 mcm to 300 mcm are carried to the Negev to irrigate crops grown in the region.[56] Overall, the NWC irrigates about half of the 450,000 hectares currently under cultivation in Israel.[57]

The only other development that has the potential to rival the NWC in scope and importance is the Mediterranean-Dead Sea Canal -- an idea that goes back to the 1950s.[58] The 72 km long canal will reportedly be able to supply 725-750 mcm annually if and when it is constructed.[59] If the project gets the go

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[54]Anderson, "Water: The Next Strategic Resource," p. 8; Patrick Seale, Asad Of Syria: The Struggle for the Middle East, (London: I.B. Tauris and Co. Ltd., 1988), p. 119.

[55]Anderson, "Water: The Next Strategic Resource," p. 8; Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 534; Elliott, "The Global Politics of Water," p. 30; Hurwitz, "The Water Crisis in the Middle East," p. 4; Kolars, "The Course of Water in the Arab Middle East," p. 66; Kolars, Trickle of Hope," p. 20; Leslie Schmida, "Israeli Water Projects and their Repercussions on the Arab-Israeli Conflict," in Israel and Arab Water, eds. Abdel Majid Farid and Hussein Sirriyeh (London: Ithaca Press, 1985), p. 31; Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 46.

[56]Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 539.

[57]John K. Cooley, "The War Over Water," Foreign Policy No. 54 (Spring 1984), p. 8; Allen J. Hammond, ed., Environmental Almanac 1993 (Boston: Houghton Mifflin Company, 1993), p. 469.

[58]Garfinkle, Israel and Jordan in the Shadow of War, p. 80

[59]Anderson, "Water: The Next Strategic Resource," p. 8; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 25.

ahead, it would transport salt water to the Dead Sea to compensate for Israel's withdrawal from the upper Jordan River which has significantly depleted its level.[60] Furthermore, the saltwater conduit would use the drop of about 400 meters as the water flows east toward the Dead Sea to power salt-resistant electric turbines.[61]

Israel has also been involved in tapping aquifers, through natural springs, wells and boreholes.[62] The most significant of these developments is found on top of the Mountain aquifer. It has been contributing between 400-450 mcm a year since 1967 and presently provides half of Israel's drinking water. The other two aquifers under the West Bank supply an additional 220 mcm of water.[63] A plethora of other small streams[64] and aquifers furnish Israel with 500 mcm more of water.[65] Meanwhile, the Coastal aquifer in the Gaza Strip yields about 280-300 mcm per annum.

Contrary to what has been widely reported[66], there is no evidence to suggest that Israel has yet diverted the Litani's waters into the Hasbani River.

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[60]Falkenmark, "Freshwater as a Factor in Strategic Policy and Action," p. 92; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 25.

[61]Cooley, "The War Over Water," p. 5.

[62]Perera, "Water Politics," p. 54.

[63]The Western aquifer contains 155 mcm and the eastern aquifer contains about 65 mcm. Anderson, "Water: The Next Strategic Resource," p. 7; Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 534; Perera, "Water Politics," p. 54. It is important to note that Israel is completely in control of the withdrawal of water from the aquifers of the West Bank.

[64]The Yarmuk is the most significant: through a small diversion scheme, 15 percent of its flow is directed to Israel accounting for 3 percent of its total water stock. Strategic Survey, 1991-1992, p. 222.

[65]Kolars, "Trickle of Hope," p. 20.

[66]See for example, Alamah Ni'mat "Badran on Water Problems with Israel, Economy" (text), Amman Jordan Times in English (2 July 1990). Foreign Broadcast Information Service Daily Report - Near East and South Asia, 3 July 1990 (FBIS-NES-90-128, p. 31); Voice of the Mountain, "Arafat Views Israel's Aims in South Lebanon," (text), Lebanon Voice of the Mountain in Arabic (6 June 1991). Translation by Foreign Broadcast Information Service - Near East

However, it is believed to be technically possible to provide Israel with as much as 800 mcm of Litani water a year.[67] Its presence in southern Lebanon has given Israel tempting access to the lower reaches of the Litani and control over all the sources of the upper Jordan where it abstracts 400 mcm a year.[68] As for the the lower Jordan, which once contributed 200 mcm to Israel's water budget, it is now so saline that its use is prohibited to all.[69]

With regards to the Golan Heights, Israel has gained very little in direct terms of water resources. However, its position there does give it effective control over the entire Jordan Basin and is key to controlling at least 35

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and South Asia, FBIS Daily Report - Near East and South Asia 3 July 1990 (FBIS-NES-91-110, p. 1); Qol Yisra'el, "Claims of River Diversion Caused by Work on Pump," (text). Jerusalem Qol Yisra'el in Hebrew (7 September 1991). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 10 September 1991 (FBIS-NES-91-175, p. 19); Peter Kemp, "Water - As Precious as Oil is Plentiful," MEED, Vol. 37 (29 January 1993), p. 7. It has long been an Arab conviction that Israel has designs on the Litani. It hardly allayed Arab fears when in 1991 the Israeli government announced that it would leave south Lebanon only after a share of its waters were guaranteed to Israel. However, as Kolars reports, "[r]umors that the Israelis have built a secret tunnel in occupied southern Lebanon to take water from the Litani to the Hasbani - and then to the Sea of Tiberias via the upper Jordan - are unfounded; even the Lebanese government officially denies it." Kolars, "Trickle of Hope," p. 20; see also, Falkenmark, "Fresh Waters as a Fact in Strategic Policy and Action," p. 92; Thomas R. Stauffer, "Arab Waters in Israeli Calculations: The Benefits of War and the Costs of Peace, in Israel and Arab Water, eds. Abdel Majid Farid and Hussein Sirriyeh (London: Ithaca Press, 1985), pp. 75-83; Stauffer, "The Price of Peace: The Spoils of War," p. 43; Strategic Survey, 1991-1992, p. 225.

[67]Stauffer claims that the "basic engineering scheme for diverting the Litani was completed many years ago and involves a 100 km long chain of channels, short aqueducts, syphons, and tunnels along the eastern and southern walls of the Litani gorge, which would cut across southern Lebanon from Marjaoun into northern Israel near Beit Netofa. There it would connect with the existing Israeli irrigation system with little or no pumping." Indeed, there have been numerous studies sponsored by the Israeli government that suggest this is technically feasible. Stauffer, "The Price of Peace: The Spoils of War," pp. 50-53; see also, Anderson, "Water: The Next Strategic Resource," p. 9; Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," pp. 130-131; Strategic Survey, 1991-1992, p. 225.

[68]Abstract is a hydrological term meaning to remove. Falkenmark, "Freshwater as a Factor in Strategic Policy and Action," p. 92; Stauffer, "The Price of Peace: The Spoils of War," p. 46.

[69]Cooley, "Middle East Water: Power for Peace," p. 10.

percent of Israel's water supply.[70] In addition, the Israelis have built 6 retaining reservoirs in the area that are each capable of holding 3-5 mcm of water for local use.[71]

Finally, plans are now under way to expand Israel's program of recycled sewage and wastewater reclamation which currently supplies 220 mcm a year.[72] This water is of course only used to irrigate crops.[73] An extensive national desalination network is also under consideration. However, the enormous cost of a single plant is prohibitive as is the 1.05-2 dollar price tag for every cubic meter of seawater desalinated.[74]

Jordan is the only other country in the Jordan River Basin to make extensive use of its fresh waters. In 1959, the Jordan Development Board was created with the authority to sponsor and coordinate increases in the productivity of the fledging Hashemite Kingdom.[75] Soon after, the East Ghor (or King Abdallah) Canal was born.[76] Designed by a team of American and Jordanian water engineers, the first stage was completed in 1961. A second stage that saw the walls raised in order to carry more water was completed

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[70]Priit J. Vesilind, "Water - Critical Resource," National Geographic (May 1993), pp. 58-59.

[71]Anderson, "Water: The Next Strategic Resource," p. 9.

[72]Kolars, "Trickle of Hope," p. 20.

[73]Ibid.

[74]Hewedy, Militarization and Security in the Middle East: Its Impact on Development and Democracy; Hurwitz, "The Water Crisis in the Middle East," p. 7. Despite the opposition of the Finance Ministry because of its prohibitive costs, Israel announced in June of 1992 that a water desalination plant, the first of its kind in the region would be built in the Gaza Strip and supply 40 mcm per year to its inhabitants. Nurit Arad, Tel Aviv YEDI'OT AHARONOT in Hebrew (15 June 1992). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 15 June 1992 (FBIS-NES-92-116, pp. 17-18). However, nothing has been said about it since and it is possible that Labor's election victory in 1992 served to mothball the development for the time being.

[75]Sydney Nettleton Fischer and William Ochsenwald, The Middle East: A History 4ed.(New York: McGraw-Hill Publishing Company, 1990), p. 660.

[76]Cooley, "The War Over Water," p. 18.

later in that decade. By 1979, Jordan had completed an extension to the East Ghor Canal bringing its total length to 100 km of snaking concrete.

The East Ghor Canal, which runs from the Yarmuk River parallel to Jordan as it moves toward the Dead Sea, continues to be the main source of water for that country today.[77] Perhaps most importantly, it abstracts water from the Yarmuk in order to help irrigate the 375,000 hectares of cropland under cultivation on the east bank of the Jordan River.[78] This water is extremely important in light of the fact that only 5.7 percent of the land is cultivable.[79] Water is also pumped by pipeline to upland urban areas such as Amman for industrial and municipal purposes.[80] However, "the canal has not yet reached the Dead Sea, as originally planned."[81] A 47 km West Ghor Canal that was to service the West Bank was aborted by the Six Day War in 1967.[82]

Jordan also has one important dam; the King Talal Dam was erected across the Nahr az Zarqa, a tributary of the Jordan in 1972. Its primary function is to store water for irrigation purposes.[83] In the mid-1980s, Jordan

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[77]Kolars, "The Course of Water in the Arab Middle East," p. 66; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 27; Vesilind, "Water - Critical Resource," p. 59.

[78]Chenevert, ""Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 537; Fischer and Oschenwald, The Middle East: A History, p. 660; Hammond, Environmental Almanac 1993, p. 473.

[79]Frey and Naff, "Water: An Emerging Issue in the Middle East?," p. 68.

[80]Starr and Stoll, "Water for the Year 2000," p. 146.

[81]Anderson, "Water: The Next Strategic Resource," p. 8.

[82]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," p. 131; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 43.

[83]Chenevert, ""Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 539; Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 50.

raised the height of the dam by about 15 meters in order to increase its storage capacity.[84]

Furthermore, Jordan relies on three aquifers in order to service approximately 25 percent of its total needs. The Disi/Daq aquifer is particularly important in this respect. Amman and Zarqa, Jordan's two biggest cities, rely almost exclusively on its "fossil" water to service their needs despite the fact that it is located over 200 km to the south.[85]

Of the many potential projects said to be under consideration in Jordan, one would see a canal transporting 160 mcm from the Euphrates in Iraq over the mountains to the northern plateau in Jordan. An agreement was reportedly reached in principle[86] but the project is unlikely to be brought to fruition. As Taubenblatt notes, "[t]he long distance, difficult terrain, and high cost have raised questions as to the economic feasibility of the project." [87] In addition, Iraq, as was demonstrated in chapter 3, is increasingly unlikely to implement such a scheme given its own water scarcity problems. Finally, the

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[84]Adam Garfinkle, Israel and Jordan in the Shadow of War, p. 167; Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 48.

[85]Beschorner, "The Problem of Regional Rivalry," p. 12. There has also been some talk about placing pumping stations at the aquifer site to move 70 mcm water annually through a 280 km large pipeline to service all the major population centers in Jordan. Nabil Ghazzawi "Water Shortage Said Reaching 'Danger Stage,'" (text) Amman Al-DUSTUR in Arabic (15 September 1991). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 16 September 1991 (FBIS-NES-91-179, p. 40). There are also reports that indicate that Jordan has approached Saudi Arabia with the hope of reaching an accord with the latter on the joint exploitation of a large fossil aquifer underlying their shared border. Both countries are currently tapping this aquifer in a unilateral fashion when a joint effort would be less costly and more efficient. Alan Cowell, "Hurdle to Peace: Parting the Mideast's Waters," New York Times (10 October 1993), p. A6; Aaron Wolf, "The Jordan Watershed: Past Attempts at Cooperation and Lessons for the Future," Water International, Vol. 18 (May 1993), p. 12.

[86]Falkenmark, "Middle East Hydropolitics: Water Scarcity and Conflicts in the Middle East," p. 350.

[87]Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," p. 50.

relationship between Baghdad and Amman, solid as recently as the Gulf War, has deteriorated in recent months.[88]

A more important potential project would see a major cooperative effort with the Syrians in the form of the construction of the Unity Dam (also known as the Wahda or Maqarin Dam) on the Jordan-Syria border. Its location would be roughly 35 km east of the confluence of the upper Yarmuk and the Jordan and 10 km east of the Israeli border.[89] The 100 m high dam would create a reservoir to store winter rains with a holding capacity of 220 mcm.[90] It would also generate 46 million kilowatts of electricity which Syria would receive in a 3:1 division. Jordan, meanwhile, would get 80 percent of the dam's water which would be channelled from the dam site through a 24 km tunnel that would link up to the East Ghor Canal to service agricultural, industrial, and domestic needs.[91] As Starr and Stoll explain, the dam would contribute substantially to the more efficient use of the undeveloped river by preventing scarce water discharge into the Dead Sea.[92] Although the plan has

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[88]After being allies for more than a decade, King Hussein of Jordan broke with Iraq in May 1993. Signs of discord between Iraq and Jordan first came to light in October 1992 when the King called for more democratic government in Iraq that could help bring about national reconciliation. Throughout the first few months of 1992, Jordan's criticism sharpened, with denunciations of Iraq's brutal treatment of dissidents and its continued defiance of UN resolutions pertaining to disarmament. Iraq responded by cancelling denominations of Iraqi dinars held by Jordanian businessmen and banks bringing financial chaos to Jordan. Iraq also cut off free oil supplies to Jordan in payment for old debts which helped to fracture its relationship with Amman. Youssef Ibrahim, "Iraq Receives Harsh Criticism from Jordan's King Hussein," Globe and Mail (27 May 1993), A8.

[89]Richard Z. Chesnoff, "When Water Feeds Flames," U.S. News and World Report (21 November 1988), p. 48; Moffett, "Middle East's Cup Runneth Dry," p. 9; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 27.

[90]Hurwitz, "The Water Crisis in the Middle East," p. 6; Starr and Stoll, "Water in the Year 2000," p. 145.

[91]Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," p. 538; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 51; Strategic Survey, 1991-1992, p. 224.

[92]Starr and Stoll, "Water in the Year 2000," p. 153.

been in the works for four decades, has the strong backing of the United States, and has been ratified by Syria and Jordan in a formal agreement to jointly develop it as recently as 1987, efforts to obtain capital to help finance the expensive project have continually failed as bilateral and multilateral lenders have made funding contingent on the resolution of outstanding water issues with Israel.[93]

In the wake of this impasse, Syria has unilaterally begun to build a small number of diversionary rock, concrete and dirt dams on the headwaters of the Yarmuk which it controls.[94] By 1993, some 20 had been constructed.[95] These dams serve farms adjacent or near the Yarmuk.[96] A series of medium sized dams are also planned.[97] Currently, Syria uses about 40 percent of the Yarmuk waters.[98] Other than these schemes, Syria has no significant projects

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[93]A unilateral move to raise capital internally is not favored by Jordan which fears Israeli reprisals. Syria's position on such an action appears to be more equivocal. Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," pp. 538-539; Elliott, "The Global Politics of Water," p. 30; Randah Habib, "Israel Held Responsible for Stalling Dam Project," (text) Paris Radio Monte Carlo in Arabic (13 July 1990). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 16 July 1990 (FBIS-NES-90-136, p. 28), Jonathan C. Randal, "39 Years Later, U.S. Backed 'Unity Dam' Holds No Water, Little Hope," Washington Post (14 May 1992), p. A20. In this particular case, the Israelis are worried about the effect of water lost as a result of this scheme (i.e. how it would effect their 3 percent share of the river) in terms of meeting present and future demands. Starr, "Water Wars," p. 24.

[94]Cordes, "The Drying Game," p. 74; Kolars, "Trickle of Hope," p. 20; Economist, "Where Dams Can Cause Wars," Economist (18 July 1987), p. 37; Schiff, "Jordan Water Allocation Agreement Said Needed," p. 28.

[95]Vesilind, "Water - Critical Resource," p. 59. Although one article with a distinct Israeli bias pegged the figure at several hundred. Avino'am Bar-Yosef "U.S Envoy Reviews Al-Yarmuk Waters Dispute," (text) Tel Aviv MA'ARIV in Hebrew (18 July 1990). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 18 July 1990 (FBIS-NES-90-138, p. 27).

[96]Cooley, "Middle East Water: Power for Peace," p. 10.

[97]Starr and Stoll, "Water for the Year 2000," p. 145.

[98]Garfinkle, Israel and Jordan in the Shadow of the War, p. 165.

in the Jordan River Basin as its loss of the Golan Heights meant its effective forfeiture of control over any of the Jordan's headwaters and thus the potential to develop it.

## IV. History of the Jordan River System and its Effects on Riparian Relations

The scope and nature of these developments have seriously degraded the quality and the quantity of the waters in the Jordan River Basin. Moreover, they have increased antagonisms between the riparian states and in one instance -- the Six Day War of 1967[99] -- served as an important catalyst for acute interstate conflict. This section will explore the correlation between these developments and state behavior.

Significant competition for the Jordan River Basin's water began shortly after the creation of Israel in 1948. In an effort to head off a potential conflict over the scarce waters, several attempts were made between 1944-1967 by the United Nations, the Arab League and other multilateral organizations, as well as Israel, Jordan and the United States.[100] However much sense a common regional plan made for the Jordan River Basin -- because of its suitability to integrated development -- agreement always proved illusive. The reasons for this were simple: the intense political tensions among the riparian states -- particularly between Israel and its Arab neighbors but also because of Syrian-Jordanian enmity -- did not allow for such collaboration.[101] Indeed, the Jordan river system serves as an instructive and illuminating

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[99]Water was not considered a serious contributing factor to the Arab-Israeli conflicts of 1948, 1956 and 1973.

[100]The four attempts generally considered to be the most notable are: the Lowdermilk Plan (1944, USA), the Bunger Plan (1952, Jordan/USA), the Main Plan/Unified Plan (1953, UN), and the Johnston Plan (1955, USA).

[101]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 284; Starr, "Water Wars," p. 27.

example of the limits of cooperative and legal solutions under such conditions.[102]

The Johnston Plan of 1955, developed by President Eisenhower's special envoy, Eric Johnston, was the most comprehensive and the closest any water sharing plan got to ratification. Several dams were proposed for the Hasbani, Baniyas, Dan and Yarmuk Rivers. In addition, the proposal called for the reclamation of the Huleh marshes and a series of irrigation projects.[103] In terms of the yearly division of the Jordan River Basin's waters, Jordan was to receive 720 mcm, Israel 386 mcm, Syria 132 mcm and Lebanon 35 mcm.[104] However, all parties rejected the proposals primarily because they claimed that their allotted shares were too small.[105] As a consequence, each state proceeded with unilateral developments based solely on individual needs; in the process, they often thwarted each other's use of the river while exacerbating and fueling water related tensions.

The most contentious development in the early years was Israel's NWC. Although the carrier was built entirely within the "Green Line," the Arabs considered the diversion of 50 to 75 percent of the Jordan River waters (the low figure is Israeli, the high figure is Arab) an audacious act and a symbol of Israeli expansionism because 77 percent of the headwaters lay in Syria and Lebanon.[106] Thus, the Arabs saw the NWC as a blatant breach of

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[102]Frey and Naff, "Water: An Emerging Issue in the Middle East?," p. 68.
[103]Cooley, "The War Over Water," pp. 10-11.
[104]Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 42; Taubenblatt, "Jordan River Basin Water: A Challenge in the 1990s," pp. 45-46. It is important to note here that the Johnston Plan was designed to deal only with the apportionment of surface water and did not address the key question of the equitable distribution of groundwater. Despite the plans failure, Syria, Jordan and Israel all claim that they, and they alone, have honored its principles.
[105]Cooley, "Middle East Water: Power for Peace," p. 5.
[106]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation,", p. 129; Cooley, "Middle East Water: Power for Peace," pp. 4-5; Seale, Asad of Syria:

international law and, moreover, as a mechanism to transport "Arab water" to the center of Zionism.[107] The Israelis responded -- in a fashion reminiscent of Turkish arguments regarding the Euphrates -- that in the absence of a negotiated agreement, they had the unilateral right to manage and develop water resources within their own borders.[108]

The response to that Israeli assertion came from Syria. Beginning in 1953, Damascus tried to stop the NWC from being constructed by periodically shelling the construction and engineering sites for the next ten years.[109] Israel was soon forced to move the main pumping station. Despite occasional artillery exchanges, Israel was able to complete the project by 1964.[110]

As the NWC moved toward completion, Syria and especially Jordan became increasingly concerned that the preemption of the clean waters of northern Lake Tiberias would leave only diminished and degraded waters left in the Jordan River.[111] They pointed out that the only Israeli compensations for its abstractions would come in the form of irrigation runoff into the lower Jordan. Because lower Jordan water salinity was already a major dilemma, the prospect of a further worsening in its quality and quantity was looked upon most uneasily.

This unease translated into an emergency Arab League meeting in Cairo in January 1964. At the gathering, a resolution was passed to divert the

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The Struggle for the Middle East, p. 119; Vesilind, "Water - Critical Resource," p. 59.

[107]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation,", p. 129; Cooley, "Middle East Water: Power for Peace," pp. 4-5.

[108]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation,", p. 129.

[109]Cooley, "Middle East Water: Power for Peace," p. 5; Ritchie Ovendale, The Origins of the Arab-Israeli Wars, 2nd ed, (London: Longman Group Ltd., 1992), p. 163.

[110]Naff and Matson. Water in the Middle East: Conflict or Cooperation?, p. 35.

[111]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," p. 129.

salt free headwaters of the Jordan wholly through Arab territory and into the Yarmuk.[112] However, when earnest attempts were made to implement this Syrian led plan, Israel regarding this as a serious threat to its security, struck back with force. In 1965 and 1966, Israel and Syria spent several months in tank and artillery duels.[113] By April 1967 these attacks culminated when Israel launched air strikes deep inside Syria completely destroying the foundations of the diversion project as well as the machinery and equipment used to erect them.[114]

Harvard University political scientist, Nadav Safran, called the Syrian diversion project and the retaliatory Israeli attacks "a prolonged chain reaction of border violence that linked directly to the events that led to war" in June of 1967.[115] During the war, Israeli tanks and troops blocked the proposed diversion route by taking up positions across it.[116] At the end of the Six-Day War, Israeli commandos stormed the joint Jordanian-Syrian Maqarin dam project on the Yarmuk and shelled the 20 percent completed development into rubble.[117] As noted above, it was another twenty years before the dam project was revived.

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[112]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 92; Anderson, "Water: The Next Strategic Resource," p. 10.

[113]Economist, "Where Dams Can Cause Wars," p. 12; Fischer and Oschenwald, The Middle East: A History, p. 610.

[114]Clarke, Water: The International Crisis, p. 101; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 44; Riyadh, "Israel and the Arab Water in Historical Perspective," p. 14; Strategic Survey, 1991-1992, p. 223; Wolf, "The Jordan Watershed: Past Attempts at Cooperation and Lessons for the Future," p. 6.

[115]Quoted in Cooley, "Middle East Water: Power for Peace," p. 6.

[116]Schimda, "Israeli Water Projects and their Repercussions on the Arab Israeli Conflict," p. 28.

[117]Cordes, "The Drying Game," p. 74; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 44; Vesilind, "Water - Critical Resource," p. 59.

The war effectively gave Israel control over the vast majority of the Jordan Basin's water resources.[118] With the Golan Heights, West Bank and Gaza Strip under its auspices, Israel significantly improved its hydrostrategic position, while Syria's and especially Jordan's became much worse. The total volume of water captured as a result of the 1967 war was as much as 50 percent of Israel's pre-war reserves.[119] Moreover, control of the Golan Heights made further attempts at diverting the Jordan's headwaters next to impossible. Israel also gained complete control over the important groundwater reserves of the West Bank.[120] Furthermore, control of the West Bank meant that Jordan had to forgo plans to build a second canal to service the West Bank. Perhaps most important of all, since that time, the water question has been effectively militarized.[121]

The first act of Fatah, the Palestine Liberation Organization's (PLO) armed branch, was a badly botched attempt to destroy the NWC on December 31, 1964; however, between 1967-1969, Fatah had considerably more success attacking pumping stations on the Lower Jordan.[122] In retaliation (and because the Israelis believed the Jordanians were drawing too much water

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[118]Thomas F. Homer-Dixon, Jeffery H. Boutwell and George W. Rathjens, "Environmental Change and Violent Conflict," Scientific American, Vol. 268 (February 1993), p. 44.

[119]Stauffer, "The Price of Peace: The Spoils of War," p. 43. Most importantly this included three aquifers underneath the West Bank and the Coastal aquifer in the Gaza Strip.

[120]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 282, 288; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 44. Military order Number 92 concentrated total control of water resources in the occupied territories in the hands of Israel. Zarour and Issac, "Nature's Apportionment and the Open Market: A Promising Solution to the Arab-Israeli Water Conflict," p. 44.

[121]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 284.

[122]Cooley, "Middle East Water: Power for Peace," p. 8; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 45; Seale, Asad of Syria: The Struggle for the Middle East, p. 119.

into it) Israel launched repeated bombing raids upon the East Ghor Canal.[123] By 1969, most of the East Ghor Canal was out of commission causing severe economic dislocation to an already fragile economy that had lost well over half its agricultural land as result of the Six-Day War.[124] With Israeli technological and air superiority clearly established and an internal civil war to contend with, Jordan was in no position to escalate the confrontation and instead focussed on controlling the PLO.[125] After secret negotiations in 1969-1970, Jordan was allowed to repair the Canal; in exchange, Jordan pledged to terminate PLO activity from Jordan no later than 1971.[126]

Since 1970, the dispute over water resources has produced little in the way of military action, and the situation has remained relatively stable.[127] Another Arab-Israeli war followed in 1973 but it did not seriously impact on any of the three countries' existing water stocks.[128] The PLO has made occasional forays in the way of attacking Israeli pumping stations in the Lower Jordan and Israel has, by way of reprisal, sometimes hit a portion of the

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[123]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 92; Cooley, "The War Over Water," p. 18; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, pp. 50-51; Don Peretz, The Middle East Today 5 ed. (New York: Praegar Publishers, 1988), pp. 352-353; Strategic Survey, 1991-1992, p. 223.

[124]Anderson, "Water: The Next Strategic Resource," p. 10; Cooley, "Middle East Water: Power for Peace," p. 7; Fischer and Oschenwald, The Middle East: A History, pp. 680-681; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 45. Jordan lost 80 percent of its fruit growing land and 45 percent of its vegetable growing land - not to mention 50 percent of its population. Only the aid of Kuwait, Saudi Arabia and Libya saved Jordan from total economic collapse.

[125]Bickerton and Klausner, A Concise History of the Arab-Israeli Conflict, pp. 168-170; Ovendale, The Origins of the Arab-Israeli Wars, pp. 208-215.

[126]Fischer and Oschenwald, The Middle East: A History, p. 681.

[127]Starr, "Water Wars," p. 23; Strategic Survey, 1991-1992, p. 223. This is perhaps due to the fact that Israel's dominant military capability has served as formidable deterrent to any provactive action relating to water that might be undertaken by either Jordan or Israel.

[128]Falkenmark, "Fresh Waters as a Factor in Strategic Policy and Action," p. 92. The Sinai Peninsula is noted for its oil reserves - not its water supplies.

East Ghor Canal.[129] In 1982, there was much controversy over Israel's reported designs on the Litani waters when it invaded southern Lebanon. However, its action provoked little more than fiery rhetoric from its riparian neighbors and to this day there is no conclusive proof that Israel has ever tried to divert its waters.[130]

The only other significant skirmish that can be correlated with the relatively recent developments occurred in 1979 in the wake of a drought. Jordan mobilized its forces to the cease-fire line charging that the Israelis were intentionally blocking the mouth of the intake pipe by placing large rocks around a developing silt bar so very little water was being drawn in to the East Ghor Canal. Israel responded in kind by mobilizing its own forces in the area. As Naff and Matson point out, only urgent American mediation saved the day.[131]

## V. Present Consumption, Future Requirements, and the Potential for Acute Interstate Conflict in the Jordan River Basin

The situation in the Jordan River Basin is currently even worse than the sorry state of affairs along the Euphrates. Regardless of whether future developments manifest themselves, there are a plethora of contemporary water problems for each riparian state. As Kolars notes, the Jordan River Basin does not have enough water to meet present demands let alone those

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[129] Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 92.

[130] On this point see footnote 66. As for the claims made by some Arabs that Israel has an interest in the Euphrates "the notion is too absurd for serious discussion." Martin Sicker, Israel's Quest for Security (New York: Praegar Publishers, 1989), p. 6.

[131] Israel agreed to let the Jordanians to remove rocks around the silt bar but did not permit Jordan from removing the silt itself. Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 52.

forecast for the very near future (see Table 4-6).[132] Water stress is compounded by a chronic shortage of shared, reliable and unbiased hydrological data for the Jordan River Basin. Increasingly, this "tragedy of the commons"[133] has turned into a keenly competitive zero-sum game. As Anderson and Rashidian explain:

> In such an arid zone, [the capacity utilization of water resources] can be described as a zero-sum situation. Any gains by one side must result in equal losses by the other. Thus, small developments become critical and even climatic fluctuations can be suspect.[134]

*Table 4-6*

Water Deficit/Surplus in Cubic Kilometers by Country: 1990

| | Israel | Jordan | Syria |
|---|---|---|---|
| Deficit/Surplus | -0.20 | -0.10 | -0.15 |

Source: J. A. Allan, "Substitutes for Water are Being Found in the Middle East and North Africa," GeoJournal, Vol. 28 (November 1992), p. 378.

Jordan is the worst off as it has only 725 mcm of water available each year for agricultural, industrial and domestic use and its explosive population growth is emphasizing that finite amount.[135] With the highest rate of natural

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[132]Kolars, "The Course of Water in the Arab Middle East," p. 66.

[133]Garrett Hardin, "The Tragedy of the Commons," Science, Vol. 162 (13 December 1968), pp. 1243-1248. In his eminent piece, Hardin argued that in the medieval "commons," (unrestricted pasture land on which herders brought their livestock to graze), each individual herder, acting in conspicuous economic self-interest, maximized his or her use of the commons by bringing in as many additional cattle as possible. Sadly, as a consequence of the overgrazing of the commons, the herds starved. The immediate profits of additional grazing accrued to the individual herder but the costs were paid by the society at large.

[134]Anderson and Rashidian, Iraq and the Continuing Middle East Crisis, p. 92.

[135]Kolars, "Trickle of Hope," p. 20. This section will not discuss Syria's current water dilemmas as they have already been well documented in the previous chapter.

population increase in the world and the recent influx of some 300,000-350,000 Palestinians following the Gulf War, the nation's meager water sources are being severely taxed.[136] Currently, Jordan is said to be some 75 percent below the so-called water "poverty" line.[137] By the turn of the century, demand is expected to exceed supply by between 20 and 30 percent.[138]

Jordan's primary source, the East Ghor Canal, is increasingly blocked with silt and detritus at the intake tunnel. Efforts to remove these substances are regularly impeded or halted by Israeli actions.[139] Moreover, the Yarmuk, the lifeline of the East Ghor Canal, is under strain by Syrian dam development plans which may reduce the flow of the river by 40 percent and noticeably increase the pure water's salinity. Needless to say, this implies a threat to Jordan's future water supply.[140]

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[136]Dov Hoch, "The Middle East Water Crisis," Midstream, Vol. 39 (May 1993), p. 18; U.S. Department of Commerce Economic and Statistics Administration, World Population Profile, p. A12; Vesilind, "Water - Critical Resource," p. 58.

[137]Hurwitz, "The Water Crisis in the Middle East," p. 5; Jawad al-Umari "Minister Discusses Countering Water Shortages" (text) Amman Domestic Service in Arabic (17 December 1990). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 18 December 1990 (FBIS-NES-90-243, p. 47). The water poverty line is considered to be 1000 cubic meters (cm) per capita per annum. However, 500 cm are seen enough to sustain high socio-economic standards if sophisticated water management is used. Jordan has 250 cm per capita while Israel has 465 cm. Canada, by comparison, the most water rich country in the world, could supply 121,930 cm per head per year. Clarke, Water: The International Crisis, pp. 21-31.

[138]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 284.

[139]Kolars, "The Course of Water in the Arab Middle East," p. 66.

[140]Falkenmark, "Middle East Hydropolitics: Water Scarcity and Conflicts in the Middle East," p. 350; Starr and Stoll, "Water for the Year 2000," p. 144; Wolf, "The Jordan Watershed: Past Attempts at Cooperation and Lessons for the Future," p. 12. Garfinkle reports that since 80 percent of the Yarmuk's catchment lies in Syrian territory, aggressive unilateral development of the Yarmuk could reduce its flow eventually by as much four-fifths. Garfinkle, Israel and Jordan in the Shadow of the War, p. 165. Moreover, the former Israeli agricultural minister, believes that Syria and Jordan may engage in war against this backdrop. Ruti Heyman, "Eytan on Joint Desalination Plant with Jordan," (text) Tel Aviv HA'ARETZ in Hebrew (6 November 1991). Translation by Foreign

Jordan has few other sources of water that it can readily put to use. The Jordan river is already utilized to the limit. It is polluted from upstream discharges and is so saline from Israeli agricultural runoff that its lower end is said to be essentially useless; simultaneously, the reduction in its quantity from upstream hydraulic schemes has lead to a situation where the Dead Sea is steadily contracting.[141] Meanwhile, Jordan's aquifers are being mined so rapidly that they are becoming steadily more salinated and in some cases nearing depletion.[142]

Faced with an immediate 100-150 mcm annual shortfall, a projected minimum water deficit of 200 mcm per annum by the end of the decade, and requiring twice as much water as it uses now by the year 2010, Jordan has had to take drastic actions.[143] Amman's citizens only receive water 2 or 3 times a week, while other areas of the country only receive water every 2 to 3 weeks.[144] Lack of water has also led to draconian cuts of up to 50 percent to the agricultural sector in recent years.[145] Unfortunately, Jordan is relying largely on incremental solutions to meet growing water scarcity such as deeper

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Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 7 November 1991 (FBIS-NES-91-216, p. 27).

[141]Kolars, "The Course of Water in the Arab Middle East," p. 66; Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 283; Savage, "Middle East Water," p. 5.

[142]Cowell, "Hurdle to Peace: Parting the Mideast's Waters," p. A6; Hoch, "The Middle East Water Crisis," p. 18; Kolars, "Trickle of Hope," p. 20. As Lowi explains, "[w]hen the reserve of underground flow sinks below a certain level... the interface, or dividing line, between fresh and sea water is drawn upward and causes salination." Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 119.

[143]Hoch, "The Middle East Water Crisis," p. 18; Hurwitz, "The Water Crisis in the Middle East," p. 4; Starr and Stoll, "Water for the Year 2000," p. 145; Strategic Survey 1991-1992, p. 223

[144]Cowell, "Hurdle to Peace: Parting the Mideast's Waters," p. A6; Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 284; Ni'mat "Badran of Water Problems with Israel, Economy," p. 31; Vesilind, "Water - Critical Resource," p. 58.

[145]Vesilind, "Water - Critical Resource," p. 65.

drilling for groundwater sources.[146] Finally, it should be noted that even if the Unity dam is finally constructed, it is unlikely that the amount of water gained from such a development would buy Jordan more than a five year respite.[147] In the meantime, top Jordanian officials such as Mudar Badran, have little recourse except to make inflammatory remarks:

> Jordan is suffering severe water shortages... Israel is obstructing the project - using unrealistic and illogical excuses... [and thus] turning the page on peace forever and ever.[148]

However, Israel also faces forbidding water shortages. The annual average amount of fresh water available to Israel is approximately 1950 mcm.[149] In recent years, the average annual consumption has been between 2100 mcm and 2200 mcm making the shortfall as high as 250 mcm.[150] To date, the net deficit from those aquifers is equal to nearly a year's consumption of water.[151] To make up this difference, Israel has been mining its nonrenewable aquifers and overpumping its renewable aquifers at an alarming rate.[152] By the year 2000, Israel's water demands could outpace supply by 30 percent or 800 mcm a year as Jewish immigration from the former Soviet Union puts an increasingly burdensome strain on Israel's rapidly diminishing water

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[146]Starr, "Water Wars," p. 27.

[147]George D. Moffett III, "Frequent Water Cuts Leave Jordan Without Drop to Spare," Christian Science Monitor (8 March 1990), p. 11.

[148]Ni'mat "Badran on Water Problems with Israel, Economy" p. 31.

[149]Homer-Dixon, Boutwell, and Rathjens, "Environmental Change and Violent Conflict," p. 45; Kolars, "Trickle of Hope," p. 20.

[150]Kolars, "Trickle of Hope," p. 20.

[151]Hurwitz, "The Water Crisis in the Middle East," p. 3; Kolars, "Trickle of Hope," p. 20.

[152]Elliott, "The Global Politics of Water," p. 30; Homer-Dixon, Boutwell and Rathjens, "Environmental Change and Violent Conflict," p. 44; Kolars, "Trickle of Hope," p. 20.

supplies.[153] Meanwhile, across Israel the quality of its water is now reaching such a deplorable state that it may be irreparable. According to a recent study conducted by the Ministry of Environment: "ground water is polluted with salt, pesticides, heavy metals and sewage, while the sea water is polluted with sewage and oil."[154]

Significant advances in water technology such as recycling wastewater (which generates enough to irrigate 19,000 hectares) and, most notably, computerized drip irrigation[155] have not abated Israel's growing thirst for water nor lived up to expectations with regards to quality.[156] Despite doubling agricultural output in 30 years while using a constant amount of water, the Israeli government has had to repeatedly slash water allocations to the agricultural sector incurring the wrath of the powerful farming lobbies in the process.[157] In 1990 for example, 37 percent less was available for agricultural purposes compared to a year earlier. [158]

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[153]Hurwitz, "The Water Crisis in the Middle East," p. 4; Kolars, "The Course of Water in the Arab Middle East," p. 66; Starr and Stoll, "Water for the Year 2000," pp. 144-145. In 1990 for example, approximately 180,000 Jewish immigrants from the Former Soviet Union arrived. James W. Moore, "Immigration and the Demographic Balance in Israel and the Occupied Territory," Middle East Policy, Vol. 1, (Fall 1992), p. 88.

[154]Ziv Hellman and David Rudge "Comptroller Notes 'Catastrophic Water Shortage'" (text) Jerusalem The Jerusalem Post in English (3 January 1991). Foreign Broadcast Information Service Daily Report- Near East and South Asia, 4 January 1991 (FBIS-NES-91-003, p. 47); Hurwitz, "The Water Crisis in the Middle East," p. 4.

[155]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 10. Drip irrigation can be defined as the attempt to bring exactly the right amount of water to each plant through specially perforated holes in plastic hoses thus achieving maximum utilization of the water with minimum wastage. Vesilind, "Water - Critical Resource," p. 62.

[156]Cooley, "Middle East Water: Power for Peace," p. 9; Vesilind, "Water - Critical Resource," p. 62.

[157]Beschorner, "The Problem of Regional Rivalry," p. 12; Strategic Survey, 1991-1992, p. 225.

[158]Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 119.

In the Gaza Strip, overpumping of the Coastal aquifer -- which services all of the needs of one of the most densely populated areas in the world -- has encouraged seawater to intrude, imperiling the entire water supply and caking its walls with salt.[159] The heavy use of fertilizers and pesticides and the lack of sewage treatment facilities has further contaminated the aquifer. As a result, only 23 percent of the Coastal aquifer's yearly yield of 300 mcm is seen as fit for agricultural use -- to say nothing of domestic consumption.[160] If the present trends continue, by the year 2000, Gaza's water will be unusable.[161] As the former Water Commissioner of Israel recently remarked, "the Gaza Strip's aquifer... is close to disappearing."[162] Small wonder then that the Israelis were willing to give this land up to the Palestinians.[163]

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[159]Hayam Bi'or "Dwindling Level of Coastal Aquifer Viewed" (text) Tel Aviv Ha'aretz in Hebrew (30 October 1991). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 31 October 1991 (FBIS-NES-91-211, p. 42); Cowell, "Hurdle to Peace: Parting the Mideast's Waters," p. A6; Ann Mosely Lesch, Transition to Palestinian Self-Government: Practical Steps Toward Israeli-Palestinian Peace (Bloomington: Indiana University Press, 1992), p. 104; Kolars, "Trickle of Hope," p. 20; George D. Moffett III, "If Jordan Valley Wells Run Dry...," Christian Science Monitor (14 March 1990), p. 5; Moore, "Immigration and the Demographic Balance in Israel and the Occupied Territories," p. 103; Strategic Survey 1991-1992, p. 223; Starr and Stoll, "Water for the Year 2000," p. 146.

[160]Bi'or, "Dwindling Level of Coastal Aquifer Viewed," p. 42; Cooley, "Middle East Water: Power for Peace," p. 10; Lesch, Transition to Palestinian Self-Government: Practical Steps Toward Israeli-Palestinian Peace, p. 104.

[161]Cooley, "Middle East Water: Power for Peace," p. 9; Starr, "Water Wars," p. 26.

[162]Bi'or, "Dwindling Level of Coastal Aquifer Viewed," p. 42.

[163]It should also be noted that, Jericho is also one of the most water impoverished areas on the West Bank. There is little doubt that some of the $2 billion that has been pledged to help develop the West Bank and Gaza under Palestinian rule will be used to improve the quality of the Coastal aquifer. (Overall, the World Bank has suggested that about $500 million needs to be invested in water and waste water facilities in the Occupied Territories over the next 10 years). Edmund O'Sullivan, "Putting Palestine Back to Work," MEED, Vol. 37 (1 October 1993), p. 3; Reuters News Agency, "Israel-PLO Accord Prompts Cash Pledges," Globe and Mail (2 October 1993), p. A8. On the question of Jericho's water quality see Dillman, "Water Rights in the Occupied Territories," p. 58; Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 131.

The West Bank is in even worse shape where aquifers represent 80 to 90 percent of the usable water.[164] However, the situation is remarkably different depending on whether you are a Palestinian or an Israeli settler. Arab towns usually have no piped water while Israeli settlements almost always do.[165] No new wells are permitted for Arab agriculture -- while 30 new ones have been drilled for Jewish settlers. The Palestinian wells that do exist are largely dried up because of decades of overuse, drought, saltwater intrusion and the new Israeli wells which lower the water table and cause shallow Palestinian wells to become desiccated.[166] Moreover, Israel tightly controls the wells that Arabs are allowed to drill, the times at which they can irrigate, the amount they are allowed to pump, and in some cases, have tried to solve the problem by simply confiscating Palestinian agricultural land.[167]

The aquifers themselves have been overpumped 15-20 percent beyond their safe limit.[168] Palestinians are furious because they outnumber the Jewish settlers by a 10:1 ratio and yet Jewish settlers in the West Bank are allotted between 3 and 4 times more water per capita.[169] Furthermore, they point out

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[164]Joyce R. Starr, "Water Politics in the Middle East," Middle East Insight, Vol. 7 (No. 2/3 1990), p. 68.

[165]Elliott, "The Global Politics of Water," p. 31.

[166]Collins, "The Vanishing Waters of the Middle East" p. 66; Homer-Dixon, Boutwell and Rathjens, "Environmental Change and Violent Conflict," p. 45; Hurwitz, "The Water Crisis in the Middle East," p. 3; Lesch, Transition to Palestinian Self-Government: Practical Steps Toward Israeli-Palestinian Peace, p. 104; Vesilind, "Water - Critical Resource," p. 62. Palestinian wells rarely reach 100 meters in depth while Israeli wells are generally between 200 and 750 meters deep. Lowi "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 128.

[167]Homer-Dixon, Boutwell and Rathjens, "Environmental Change and Violent Conflict," p. 45. Only 4 percent of Arab-owned irrigated farms are in fact irrigated compared with 90 percent for the Jewish settlers. Cordes, "The Drying Game," p. 79; Lowi "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 128.

[168]Strategic Survey 1991-1992, p. 222.

[169]Cowell, "Hurdle to Peace: Parting the Mideast's Waters," p. A6; Homer-Dixon, Boutwell and Rathjens, "Environmental Change and Violent Conflict," p. 44; Kolars, "Trickle of Hope," p. 20; Moore, "Immigration and the Demographic

that these waters lie under the West Bank and are rightfully theirs. Israel replies that the aquifers flow westward towards its borders and therefore are their own -- all the while fearing that "if a new Palestinian state comes into existence on the West Bank, it might pursue a policy of deep, heavy pumping -- not just to use the water but to deprive Israel."[170]

In total, West Bank water is used in a ratio of 95.5 percent by Israelis and 4.5 percent by Palestinians.[171] Thus, Israel can ill afford to lose control of this region without facing a water -- not to mention economic -- catastrophe as the three aquifers under the West Bank provide Israel with as much as 40 percent of its water budget.[172] Seen in this light, the issue of water rights on the West Bank is a powerful reason for Israel not wanting to part with it and a formidable obstacle to any potential peace agreement [173] As Anderson points

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Balance in Israel and the Occupied Territories," p. 101; Stewart Reiser, "The Religious Parties as a Support System for the Peace Movement," in Israeli Politics in the 1990s: Key Domestic and Foreign Policy Factors, eds. Bernard Reich and Gershon R. Kieval (New York: Greenwood Press, 1991), p. 87. Indeed, Israel's 100,000 settlers (up from just 3000 in 1976) in the West Bank apparently have so much water that they use it liberally to water lawns, flower beds and fill swimming pools. Cordes, "The Drying Game," p. 79. Meanwhile, Palestinians who use more than their meager quota are heavily fined. Zarour and Issac, "Nature's Apportionment and the Open Market: A Promising Solution to the Arab-Israeli Water Conflict," p. 44. Since 1967 the Palestinian population on the West Bank has grown by 84 percent while the water alloted to domestic use has increased by only 20 percent with no increases for agriculture and industry. Lesch, Transition to Palestinian Self-Government: Practical Steps Toward Israeli-Palestinian Peace, p. 103.

[170]Vesilind, "Water - Critical Resource," p. 63.

[171]Much of that water is of course pumped to Israeli proper. Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 283; Starr and Stoll, "Water for the Year 2000," p. 146. For an excellent discussion of the inequitable treatment of Jews and Palestinians in the use of water resources, see Jeffrey D. Dillman, "Water Rights in the Occupied Territories," Journal of Palestinian Studies, Vol. 19 (Autumn 1989), pp. 53-58; see also Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," pp. 125-129.

[172]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 283; Strategic Survey 1991-1992, p. 222.

[173]Elliott, "The Global Politics of Water," p. 31; Chris Hellier, "Draining the Rivers Dry," Geographical Magazine, No. 62 (July 1990), p. 34; Hurwitz, "The Water Crisis in the Middle East," p. 4; Wolf, "The Jordan Watershed: Past

out, it could be argued that water considerations outweigh "other political and strategic factors."[174]

While the Golan Heights have little in the way of water riches (as discussed above), returning the Golan Heights to Syrian jurisdiction, could, in Israel's view, make the water system again vulnerable to Syrian artillery, as it was before 1967, unless the Heights were demilitarized under international controls or guarantees.[175] It is not surprising then that a number of prominent military analysts have called for at most a partial withdrawal and preferably none at all.[176]

Water problems in the Jordan River Basin are obviously serious; indeed, there can be little doubt that the nature of the antagonisms between

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Attempts at Cooperation and Lessons for the Future," p. 12. It should be noted here that multilateral talks regarding issues of equitable water allocations in the Jordan River Basin are running concurrently in the form of a subcommittee beside the broader ranging peace talks. The Palestinians have figured that they will need to have a minimum of 5-6 times the water presently made available to them to service their needs upon gaining a measure of autonomy due to the expected large influx of displaced people who are likely to return to the West Bank. On this point see, "Palestinian Working Paper on Water," pp. 5-7.

[174]Anderson, "Water: The Next Strategic Factor," p. 8. For all the euphoria surrounding the recent Israel-PLO Pact provided no evidence of a breakthrough on the difficult issue of water allocation. "Mideast Accord: The Document, New York Times (15 September 1993), p. A7.

[175]Cooley, "Middle East Water: Power for Peace," p. 9. For example, in the mid-1960s, Syrian gun posts on the Golan Heights regularly rained down bullets on Israeli settlements and farmers below. Bickerton and Klausner, A Concise History of the Arab-Israeli Conflict, pp. 146-148. On this question see also, Muhammad Muslih, "The Golan: Israel, Syria, and Strategic Calculations," Middle East Journal, Vol. 47 (Autumn 1993), especially pp. 628-629. One interesting method that Israel has used to enforce its rule over the 15,000 Arabs dispersed amongst five villages still living in the Golan Heights is the deliberate destruction of the water tanks that service "agitators" - sometimes this means entire villages. George Laumann, "Syria's Golan Heights Turning into Israeli 'Land Without People,'" The Washington Report on Middle East Affairs, Vol. 11 (October 1992), p. 24.

[176]Ron Ben-Yishay "Security Calls for a Partial Withdrawal Only" (text) Tel Aviv YEDI'OT AHARONOT in Hebrew (18 September 1992). Translation by Foreign Broadcast Information Service - Near East and South Asia,. FBIS Daily Report - Near East and South Asia 22 September 1992 (FBIS-NES-92-184, p. 25).

the riparian countries' make the current situation ripe for acute interstate conflict. As this next part will demonstrate, the political difficulties of the Jordan River Basin are immense not only dividing individual Arab states with vastly different plans and ideologies (e.g. Syria-Jordan), but also dividing the two Arab countries from Israel.[177] Moreover, the three states constitute the most involved players in the Arab-Israeli conflict.[178] Since all three riparian countries development are so closely associated with common water resources and the level of friction between them so high "it is only to be expected that further disputes and even conflict will result."[179]

### i. Israel and Jordan

Israeli-Jordanian relations are, in general, so shrouded with mutual and deliberate discretion that it is often difficult to ascertain the true nature of

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[177]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 285. The lines of division are numerous (ethnic, religious, territorial etc.), well known and have a long and problematic history. Of course these differences have been most keenly felt since the controversial creation of the Jewish state as refuge for that long persecuted group in Arab Palestine after World War II. This caused an enormous amount of dislocation for the latter and an enduring legacy of embitterment in the Arab world. Unless a wide ranging peace settlement is reached based on some manifestation of the oft recycled "land for peace" formula, these schisms that divide Arabs from the Israelis are unlikely to be resolved. For a discussion of the prospects of such an agreement see for example, Robert G. Neumann, "1992 - A Year of Stalemate in the Peace Process," Middle East Policy, Vol. 1 (Summer 1992), pp. 47-56; For an interesting discussion of the territorial disputes between the relevant actors, see G.H. Blake, "International Boundaries and Territorial Stability in the Middle East: An Assessment," GeoJournal, Vol. 28 (November 1992), pp. 365-373.

[178]Valerie Yorke, Domestic Politics and Regional Security: Jordan, Syria and Israel (Aldershot, England: Gower House Publishers for the International Institute for Strategic Studies, 1988), p. xi. Thus, any accord that holds the promise of bringing peace to the area would need the support of these three countries.

[179]Anderson, "Water: The Next Strategic Resource," p. 10. With reference to the four Arab-Israeli wars, details of the wars and their origins have been retold countless times and will not be repeated here.

their relationship.[180] There has, however, been a surprising degree of pragmatic cooperation between the two countries in local matters such as: air traffic control, mining, utilities management, commerce and banking, technical and scientific matters, navigation, intelligence, pollution control and even water issues.[181] In fact, Israel has probably had closer relations with Jordan than any other Arab state except Egypt and the two states recently signed a so-called "agenda" for peace negotiations.[182] However, as Garfinkle comments, it would be a serious mistake to believe the countries have anything approaching good relations.[183] While this relationship is certainly better than that between Syria and Israel, it is unpredictable, tense and fluid. Thus, in general, minimum contact is preferred and anything more is merely tolerated.[184]

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[180]Garfinkle, Israel and Jordan in the Shadow of War, p. xii.

[181]However, with reference to water, the nature of their de facto understanding is extremely limited as the two countries only monitor water levels jointly and apparently conduct an annual clean-up together. Expanded cooperation is contingent on a comprehensive solution to the Palestinian question. Chris Hedges, "Jordanians Ready to Begin Carrying Out Israel Accords," New York Times (15 September 1993), p. A6; Schiff, "Jordan Water Allocation Agreement Said Needed," p. 28. Rami Tal, "Paper Notes Details on Israel-Jordan Water Talks" (text) Tel Aviv YEDI'OT AHARONOT in Hebrew (30 April 1992). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 30 April 1992 (FBIS-NES-92-084, p. 7).

[182]Under the somewhat ambiguous guidelines, Israel has agreed to discuss Jordanian claims to water and land, the question of security and arms control (conventional and unconventional), and the difficult problem of the 1.5 million Palestinian refugees who currently make up approximately 60 percent of Jordan's population. Associated Press, "Israel and Jordan to Sign Deal," Globe and Mail (11 September 1993), p. A5; Simon Edge and Pam Dougherty, "Jordan Takes Stock of the Peace Deal," MEED, Vol. 37 (15 October 1993), pp. 2-3; Hedges, "Jordanians Ready to Begin Carrying Out Israel Accords," p. A6; Patrick Martin, "Palestinian Concerns Delay Agreement," Globe and Mail (2 September 1993), p. A 10; MEED, "Jordan: Bilateral Accord Initialled With Israel," MEED, Vol. 37 (24 September 1993), p.17.

[183]Garfinkle, Israel and Jordan in the Shadow of War, pp. 2, 44-45, 83.

[184]Ibid.

Several factors serve to chill the Israeli-Jordanian relationship of which the ongoing Arab-Israeli conflict is the most serious. The two states dueled on the battle field twice in the Arab-Israeli wars of 1948 and 1967; the latter war proved to be a total disaster for Jordan as it lost both the agricultural and population rich West Bank as well as the holy city of Jerusalem to its chief adversary.[185] Israel and Jordan have also had a number of smaller encounters, especially in the 1950s and 1960s, that have always demonstrated Israel's overwhelming military superiority.[186] As the logical gathering point for any Arab war coalition against Israel on its eastern front, Jordan is in a highly charged geostrategic position which acts as a constant source of concern for Israel's military planners.[187]

Moreover, with the largest Palestinian population in the world, Jordan serves as the lightening rod for the Palestinian question, having encouraged attacks by Palestinians on Israel and propagandizing its cause through the world press.[188] In Israel, the response has come in the form of a growing chorus of people who feel that "Jordan is Palestine" and that the Palestinian

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[185]James Lunt, Hussein of Jordan: A Political Biography (London: Macmillan Ltd., 1989), pp. 94-107.

[186]Yorke, Domestic Politics and Regional Security: Jordan, Syria and Israel Jordan did not participate in the 1956 war and sent but one armored brigade (4000 men and 150 tanks) in the 1973 war. Yezid Sayigh, "The Gulf Crisis: Why the Arab Regional Order Failed," International Affairs, Vol. 67 (July 1991), p. 491.

[187]Garfinkle, Israel and Jordan in the Shadow of War, p. 2.

[188]Jordan's large Palestinian population can be traced to its annexation of the West Bank in 1950 and the fact that it was the only Arab country to extend formal citizenship to the 720,000 Palestinians refugees of the first Arab-Israeli war. However, as Bickerton and Klausner report, "this was less out of altruism than a desire to legitimize the annexation of Arab Palestine and to utilize the talents of the Palestinian Arabs in a kingdom that had consisted of bedouin and peasant farmers." Bickerton and Klausner, A Concise History of the Arab-Israeli Conflict, pp. 97-107, 165; see also Ovendale, The Origins of the Arab-Israeli Wars, pp. 212-214, 249; Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, p. 35.

question can be solved at Jordan's expense.[189] Should the PLO-Israeli accord[190] break down, Jordanian leaders would certainly worry that this might provide a rationale for the mass expulsion or euphemistic "transfer" of Palestinians into the east bank.[191]

While the enormous pressure by Arab parties on Amman to limit relations with Jerusalem is a source of constant constraint, the increasingly

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[189]Garfinkle, Israel and Jordan in the Shadow of War, pp. 3, 147-148; Ovendale, The Origins of the Arab-Israeli Wars, p. 273; Sayigh, "The Gulf Crisis: Why the Arab Regional Order Failed," p. 498. Most commentators feel that the most likely scenario for eventual Palestinian statehood would be in the form of a Jordanian led confederation. While Yassir Arafat supports an independent Palestinian state confederating with Jordan, King Hussein is somewhat less enthusiastic about this option. The fear in Amman is that a confederation would reduce Jordan to role of being an annex to the Palestinian state, rather than the other way around. Alan Cowell, "Jordan's King is Now Facing a Difficult Future With Palestinians," New York Times (19 September 1993), p. A12; Dean Fischer, "Yassir Arafat: 'This is a Step Toward a Palestinian State,'" Time (27 September 1993), p. 20; Globe and Mail, "The Next Steps to Middle East Peace," Globe and Mail (16 September 1993), p. A18; Pinhas Inbari and Betzal'el Amiqam, "King Husayn Rejects Appeal for Early Confederation," (text) Tel Aviv 'AL HAMISHMAR in Hebrew (10 June 1993). Translation by Foreign Broadcast Information Service - Near East and South Asia, FBIS Daily Report - Near East and South Asia 18 December 1990 (FBIS-NES-93-110, p. 5). Bruce W. Nelan, "Can They Pass the Test?," Time (13 September 1993), p. 22.

[190]The accord includes provisions for a five year period of interim Palestinian self-rule in the Gaza Strip and the town of Jericho to begin sometime in the early part of 1994 with elections to follow no later than July 1994. Ultimate responsibility for security (e.g. borders) will remain with Israel although at the time of this writing no deal had been reached with respect to the redeployment of Israeli troops in the Gaza Strip and Jericho. The 130,000 Israeli settlers affected by the plan are allowed to remain and are under Israeli law and protected by Israeli forces. The plan also includes mutual recognition by the two parties of each other and the PLO's denunciation of terrorism. Two years after it is in place, the question of Jerusalem, the fate of Israeli settlements and the future of the other occupied territories will be negotiated. Lisa Beyer, "Bitter Medicine Israel has to Swallow," Time (13 September 1993), p. 24; David Butter, "The Unstoppable Peace Train," MEED, Vol. 37 (24 September 1993), p. 3; Patrick Martin, "Enemies Unite to Attack Peace," Globe and Mail (20 November 1993), p. A4; "Mideast Accord: The Document," New York Times (15 September 1993), pp. A6-A7; Nelan, "Can They Pass the Test?," p. 22.

[191]Garfinkle, Israel and Jordan in the Shadow of War, p. 3. The foremost proponent of this idea is Ariel Sharon, the former defense minister under Likud. See for example, Ariel Sharon, Warrior (New York: Simon and Schuster, 1989), pp. 244-247.

militant nature of Palestinian nationalism following the 1967 war has proved to be the most serious obstacle to an expanded relationship between the two countries.[192] Jordan can ill afford to ignore the aspirations and hopes of the Palestinians within its borders since it is largely Palestinian in every fashion except politically.[193] However, every time it has advanced the Palestinian position, Jordan's relationship with Israel has suffered correspondingly.[194]

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[192]Its origins can be traced to a number of interrelated factors, of which four are perhaps the most important: <1> after the war, there was a feeling among Palestinians that the old moderate PLO was discredited and the Arab governments were not really interested in tangibly championing their cause; <2> the victory of Menachim Begin and his right-wing Likud party in 1977 marked a watershed in Israel as it broke Labor's long standing hegemony over Israeli politics and brought with it a more militant, ideological, uncompromising and confrontational attitude toward the Palestinians (e.g. settlements in the Occupied Territories) and the Arab world in general - including Jordan; <3> the displacement of the PLO from Lebanon following Israel's invasion; and, <4> the apparent lack of will by the key actors to find a peaceful answer to the Palestinian question led to the *intifada* beginning in 1987 and the closing of the West Bank in the Spring of 1993 after a series of violent Arab attacks in Israel proper. Bickerton and Klausner, A Concise History of the Arab-Israeli Conflict, pp. 153, 164-170, 199-200, 222-229, 235-244; Garfinkle, Israel and Jordan in the Shadow of War, pp. 3, 7, 102-109, 137-138, 145-173; Fischer and Oschenwald, The Middle East: A History, pp. 672-673; Peter Mansfield, A History of the Middle East, (London: Penquin Books Ltd., 1992), p. 280; Peretz, The Middle East Today, p. 355; Gershon R. Kieval and Bernard Reich, "The Changing Center in Israeli Politics," in their Israel Politics in the 1990s: Key Domestic and Foreign Policy Factors (New York: Greenwood Press, 1991), pp. 12-14; Ovendale, Origins of the Arab-Israeli Wars, pp. 248-267; Seale, Asad of Syria: The Struggle for the Middle East, p. 494; Sicker, Israel's Quest for Security, p. 150; Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, pp. 169-173.

[193]Fischer and Oschenwald, The Middle East: A History, pp. 680-681. Garfinkle, Israel and Jordan in the Shadow of War, pp. 147-148; Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, p. 30. However, it is important to note that Jordan has always viewed Palestinian nationalism as a threat to Hashemite rule, blocking their ambitions west of Jordan and often claiming its territory to the east. Furthermore, Jordan has stubbornly opposed an independent Palestinian state. In fact, it has twice used force to stop one or a base for one, in 1948, on the western side of the river and during its civil war in 1970-1971, on the eastern side which ended with the PLO's expulsion from Jordan thus ending Israeli reprisals for Palestinian attacks from Jordanian territory. Since that time, Jordan has constantly competed with the PLO for the loyalty of West Bank Palestinians in order to block the PLO from acquiring a state there. In 1985, Jordan seemed to attain a desired outcome when it tentatively reached an agreement with the PLO to form a confederation that

These realities have served to create an atmosphere of continuous tension between the two states. The official rhetoric between the two countries reflects the antagonisms present and is especially hostile in crisis situations such as the Gulf War when Jordan supported Iraq. The media in particular provides a good indicator of the state of affairs between the two countries. For example, a typical article in a popular Jordanian newspaper equated Zionism with Nazism and then stated that "the Jews [should be thrown] into the sea, to be devoured by hungry Mediterranean fish."[195] In the end, despite the ongoing attempts to forge a peace between the two countries which has helped to bring the two countries closer together than at anytime

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would ensure Palestinian self-determination on the West Bank but under Jordanian auspices. As noted earlier, most analysts feel that this would be the most likely scenario for eventual Palestinian statehood.

[194]However, the Israeli-Palestinian agreement should at least help partially alleviate this source of friction

[195]Garfinkle, Israel and Jordan in the Shadow of War, p. 86.

since Israel's creation:

> "[i]t may well be that Israeli-Jordanian relations [are] about as good as they can get... given the depth of the hostility between Israelis and Palestinians, the inherent weakness of Jordan, and the absence of clear consensus on issues of war and peace within Israel."[196]

### ii. Syria and Israel

As for Syria and Israel, a number of pressures work to make this relationship a most venomous and complex one "full of genuine problems and mutual demonization."[197] During the past forty years Syria and Israel have waged full-fledged wars in the context of the Arab-Israeli conflict (1948, 1967, 1973), at least one limited one (1982), and have engaged in various other forms of violent and political conflict. In a variety of other instances, military conflict was narrowly avoided.

From 1949-1967, as noted above with reference to water, there was constant armed friction at the border of the two countries. Most of the conflict centered around the status of the post-1948 Demilitarized Zones -- one which

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[196]Ibid., p. 186; Clyde Haberman, "Rabin and Jordan's King Reported to Meet Secretly," New York Times (29 September 1993), p. A7. Any possible peace agreement between Jordan and Israel would almost certainly only be in the context of a wider Arab-Israeli understanding that included provisions for Palestinian sovereignty over all the territory they control in the West Bank and Gaza Strip and an Israeli-Syrian rapprochement which indicated the future status of the Golan Heights. The effect of Syria's potential isolation is particularly disconcerting as it could precipitate a Syrian effort to scuttle both the Syrian-PLO and Israeli-Jordanian deals in the wake of reduced bargaining leverage vis-a-vis Israel. King Hussein is aware of this, and it remains unclear at the time of this writing how far Jordan was willing to jump ahead of Syria, if at all. Beyer, "Bitter Medicine Israel has to Swallow," p. 24; Clyde Haberman, "King of Jordan Said to See Peres Over and Accord," New York Times (6 November 1993), pp. A1, A4; Hedges, "Jordanians Ready to Begin Carrying Out Israel Accords," p. A6; Thomas Friedman, "Courting the Israelis," New York Times (10 November 1993), p. A1, A6; Patrick Martin, "Breaking Down the Language Barrier," Globe and Mail (12 November 1993), pp. A1, A8.

[197]Rabinovich, "Israel, Syria and Lebanon," p. 530.

happened be right next to the NWC. Israel tried to annex the disputed territory by disguising soldiers as farmers who began to cultivate the land in question.[198] Fire and counterfire, raids and counterraids resulted throughout the 1950s.

By the mid-1960s, the two states were in a virtual state of war. Syrian gun posts on the Golan Heights fired regularly on Israeli settlements and "farmers" below. Moreover, Syria played an active role in providing armaments and other forms of aid to the fledging PLO -- a group Damascus would frequently use thereafter for the purposes of destabilizing Israel.[199]

The Six-Day War only served to reinforce the extraordinary antagonism between the two countries. The area Israel newly occupied was three times the size of Israel proper and included the Sinai, Gaza, the West Bank of the Jordan, and the Golan Heights.[200] Syria, deeply humiliated by its stunning loss at the hands of the technologically superior and better trained Israelis, has never been able to reconcile itself to the loss of the strategic Golan Heights. Indeed, it has become a most fundamental bone of contention between the two countries and threatens to jeopardize the most recent attempts at a settlement between Damascus and Jerusalem.[201]

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[198]Seale, Asad of Syria: The Struggle for the Middle East, pp. 119-28.

[199]Ibid; Sicker, Israel's Quest for Security, pp. 163-64.

[200]Bailey, Four Arab-Israeli Wars and the Peace Process, p. 240.

[201]For an discussion of the strategic importance of the Golan Heights see, Sicker, Israel's Quest for Security, pp. 186-187. The 11th round of Syrian-Israeli peace talks in September 1993 produced "nothing new" and "no progress" was made according to the Syrian Foreign Minister, Farouk Sharaa. Syria continues to demand full Israeli withdrawal from the Golan Heights while Israel has repeatedly stated that this is impossible without Syria spelling out clearly the kind of peace it envisions. For a perspective on the current status of the Syrian-Israeli component of the peace talks, see Associated Press, "Israeli Political Crisis Threatens Peace Talks," Globe and Mail (9 September 1993), p. A7; George J. Church, "All Together Now," Time (20 September 1993), p. 25; Graham Fraser, "Rabin Gives Priority to Deal with PLO," Globe and Mail (17 November 1993), p. A6; Patrick Martin, "Israeli Focus Turns Toward Deal With Syria," Globe and Mail (12 November 1993), pp. A1, A8; Patrick Martin, "Assad

From 1969-1970, these tensions manifested themselves in such a violent fashion that at least one author has said they were more or less at war with one another.[202] When Syrian tanks intervened in Jordan's civil war in the fall of 1970 on behalf of Palestinian guerillas, Israel, worrying about an unstable situation on its eastern front mobilized its forces. They narrowly avoided conflict when Syria, fearing escalation from a position of weakness, chose to back down.[203] However, by 1973, the two countries were at war again. Syria was a prominent actor in restoring Arab morale that October with an impressive effort that fell just short of regaining the Golan Heights -- an area Israel would officially annex by 1981. In the aftermath of the war, there was rarely a tranquil moment between the two countries especially in the Golan.[204]

In June of 1976, Syria intervened in Lebanon's brutal civil war on the pretense of restoring peace. In reality, however, a number of factors were behind its action: <1> a historic notion "that Lebanon's boundaries [were] artificial and that the country belongs to a concept known as 'Greater Syria'"; <2> Lebanon was seen as capable of providing a convenient buffer between itself and Israel; and, <3> its determination that the now Beirut based PLO activities would be controlled by Damascus in a way that did not conflict with

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Reshuffles the Deck," Globe and Mail (25 September 1993), p. A9; Patrick Martin, "Golan: Tackling Technicalities, then Politics," Globe and Mail (18 June 1993), A10; Rueters News Agency, "Peace by Peace Unlikely at Current Talks," Globe and Mail (7 September 1993), p. A7; Elane Sciolino, "Clinton Reassures Damascus Of U.S. Commitment to Mideast Peace," New York Times (16 November 1993): A4. On the strategic importance of the Golan, see Muslih, "The Golan: Israel, Syria, and Strategic Calculations," pp. 611-632.

[202]Rabinovich, "Israel, Syria and Lebanon," p. 530.

[203]Ovendale, The Origins of the Arab-Israeli Wars, p. 214; Seale, Asad of Syria: The Struggle for the Middle East, p. 160; Sicker, Israel's Quest for Security, p. 166.

[204]Ovendale, The Origins of the Arab-Israeli Wars, p. 240.

its own.[205] In response to Syrian intervention, the continuing instability on its borders and the growing frequency of PLO raids from southern Lebanon, Israel invaded Lebanon in June of 1982.[206] Within days both countries were at war with one another. While Israel's superior technology and weaponry again proved to be an asset in evicting 14,000 Palestinian guerillas from Lebanese soil and inflicting heavy damage on Syria, by 1983, they had begun

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[205]Marie Mckarzel, "The Middle East Since 1945," World Review, Vol. 30 (March 1991), p. 19; Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, p. 251; Avner Yaniv, "Syria and Israel: The Politics of Escalation," in Syria Under Assad: Domestic Constraints and Regional Risks, eds. Moshe Ma'oz and Avner Yaniv (London: Croom Helm Ltd., 1986), pp. 171-175. Assad has always been worried about the possibility that the PLO would come to terms with Israel in a way that would leave Syria's claims unaddressed. Thus, it has continually sought control over their activities which has made relations between Arafat and Assad full of hostility and distrust. Moreover, Syrians are determined to sabotage any agreement in which their concerns are not adequately addressed. Thus, not surprisingly, when the PLO-Israel deal was reached, the Syrians were said to be less than enthused and worried that Israel might not be so interested in giving up the Golan Heights in light of the breakthrough. Syria's state run media for example, has mounted a intense attack on the deal criticizing it for being "fragmented, distorted, partial" and inherently flawed. In addition, Syria continues to back the radical Palestinian opponent of the deal, the Popular Front for the Liberation of Palestine. At the time of writing, Assad was said to be deciding on whether or not to move toward peace with Israel. Associated Press, "PLO, Islamic Group Agree to Disagree," Globe and Mail (17 September 1993), A8. Associated Press, "Arafat Opponents Launch Offensive to Sabotage Pact," Globe and Mail (16 September 1993), p. A2; David Butter, "Asad Treads Cautiously," MEED, Vol. 37 (8 October 1993), p. 2; Church, "All Together Now," p. 25; Partick Martin, "Arabs Miffed Over Proposed PLO-Israel Deal," Globe and Mail (3 September 1993), p. A6; Thomas L. Friedman, "U.S. and Israel Ask Syrians to Silence Arafat Opponents," New York Times (16 September 1993), p. A4; MEED, "Time for Peace: The Next Steps," MEED, Vol. 37 (24 September 1993), p. 5; Robert G. Neumann, "The Middle East in the Next Decade," American-Arab Affairs, No. 25 (Summer 1988), p. 5; Rabinovich, "Israel, Syria and Lebanon," p. 534; Rueters News Agency, "Peace by Peace Unlikely at Current Talks," p. A7; William E. Schmidt, "Arab States Line up Behind Arafat," Vancouver Sun (7 September 1993), A1; William E. Schmidt, "Syria Criticizes Israelis, Breaking Silence on Pact," New York Times (17 September 1993), p. A4; William E. Schmidt, "Syrian Leader Plays a Waiting Game," New York Times (21 September 1993), p. A8; Sciolino, "Clinton Reassures Damascus of U.S. Commitment to Mideast Peace," p. A4.

[206]Fischer and Oschenwald, The Middle East: A History, pp. 599-604; Israel Shahak, "Israel Considers War with Syria as it Ponders 1982 Invasion with Lebanon," The Washington Report on Middle East Affairs, Vol. 11 (August/September 1992), pp. 23-24.

to retreat in the face of heavy losses having only partially achieved their goals.[207] Despite emerging as hegemon, Syria realized that it had to do better than its 1982 showing if was to do battle with Israel in the future and thus became determined "to acquire the ability to stand on its own, without Arab support, against Israel." [208] A decade later, both countries are still in Lebanon and neither wants to withdraw without assurances that the other will follow.[209]

After narrowly avoiding yet another confrontation in 1986 and fighting constantly throughout the decade to bring Jordan and Lebanon into each other's orbit,[210] the two countries appeared to be at last reaching a level of accommodation when for once they faced a common enemy in the Gulf War of 1991. Moreover, one of the positive outcomes of the Gulf Crisis was do get Syria and Israel engaged in the peace process. Although serious solutions have been presented along the lines of a trade of the Golan Heights in

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[207]Martin Indyk, "The Postwar Balance of Power in the Middle East," in After the Storm: Lessons from the Gulf War, eds., Joseph S. Nye and Roger K. Smith (Lanham, Maryland: Madison Books, 1992), p. 89; Moshe Ma'oz, Asad: the Sphinx of Damascus (London: Wiedenfeld and Nicolson, 1988), p. 166; Ovendale, The Origins of the Arab-Israeli Wars, p. 241; Seale, Asad of Syria: The Struggle for the Middle East, pp. 380-382, 418.

[208]Rabinovich, "Israel, Syria and Lebanon," p. 548; Shibley Telhami, "Israeli Foreign Policy: A Static Strategy in a Changing World," Middle East Journal, Vol. 44 (Summer 1990), p. 415.

[209]MEED, "Country Reports 1992. An A-Z Round up of the Middle East and Northern Africa," MEED, Vol. 36 (25 December 1992), p. 11. Syria still has some 40,000 troops in Lebanon and the guerillas it supports have recently been engaged in serious military exchanges with Israel. Yitzhak Rabin, Israel's Prime Minister, has repeatedly accused Syria of aiding and abetting the anti-Israel Hezbollah guerillas who operate from south Lebanon. Assad's continuing refusal to condemn the militant Islamic group has lent credibility to this accusation. Should Hezbollah launch a new offensive, it would seriously undermine hopes for a Syrian-Israeli peace treaty. Associated Press, "Israel Vows Retaliation for Guerilla Attacks in Lebanon," Globe and Mail (12 July 1993), A6; Peter Bakogeorge, "Syria Can't Be Trusted, Israeli PM Says," Vancouver Sun (17 September 1993), A10; Butter, "Asad treads Cautiously," p. 3; Martin, "Assad Reshuffles the Deck," p. A9.

[210]Seale, Asad of Syria: The Struggle for the Middle East, p. 493.

exchange for peace, the long history of Syrian-Israeli antagonisms, the strategic importance of the Golan Heights and, specifically, the Labor Party's opposition to reunification would seem to dampen optimism for a settlement.[211] In addition, the fact that Syria now has the largest active military service in the Arab world means that it has probably emerged as Israel's chief Arab adversary and competitor for regional superpower status in the wake of Iraq's neutralization -- something that does not bode well for the future stability of relations between them.[212]

### iii. Jordan and Syria

Both Syria and Jordan have many similarities which would seem to indicate some common ground on which to form an understanding. Most notably, both states are authoritarian (although there are vestiges of democracy for public consumption in both) with power largely residing in the hands of two charismatic, intelligent and highly skilled leaders.[213] Moreover, Arab solidarity has bound them together in the Arab-Israeli wars of 1948 and 1967. Beyond these congruences, however, there is a long history of inimical

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[211]Laumann, "Syria's Golan Heights Turning into Israeli 'Land Without People,'" p. 24.

[212]Peter Kemp, "MEED - Special Report of Defence: Cutting the Hype to Find the Facts, MEED, Vol. 36 (6 November 1992), pp. 6-7. With regards to the growing military parity between them, Syria has approximately 408,000 active armed soldiers and 400,000 reserves. It is estimated that the equivalent figures for Israel are 175,000 and 430,000 respectively. In addition Syria enjoys an advantage in total tanks at its disposal with 4,600 compared to Israel's 3,850. However, Israel has a significant advantage in the quality and quantity of combat ready aircraft. As for Jordan, alone it poses little military threat to either Syria or Israel with an active armed force numbering just 99,400, 30,000 reserves and inferior fighting equipment. International Institute for Strategic Studies in London, The Military Balance, 1992-1993 [as cited in Asia-Pacific Defence Reporter, Vol. 19 (December/ January 1992/1993)], pp. 133-134, p. 138. For more detail on the defense configurations of Israel, Jordan and Syria, see Appendix A.

[213]Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, pp. 239-241

relations between the two states that goes beyond the obvious ideological differences between the conservative Hashemite Kingdom and the leftist Ba'ath party of Syria.

Nevertheless, these ideological differences did provide an important initial catalyst for the development of antagonistic relations between the two states. From 1958-1960 various attempts were made on King Hussein's life from the short-lived United Arab Republic -- an amalgamation of both Nasser's Egypt and newly Ba'thist Syria -- which considered the Hashemite Kingdom to be a reactive force in an increasingly radical Arab world. Syria and Jordan almost came to war over these assassination plots in 1960.[214]

In the 1960s, relations between the two states completely atrophied. As Syria came under Soviet influence, Damascus escalated its rhetorical attacks on the Jordanian regime by constantly threatening its "dwarf king" and "stooge" of Western imperialism.[215] Meanwhile, as Amman tried to restrain the increasingly active Palestinian guerillas from operating on its territory, Syria gave them encouragement and support knowing this would invite Israeli reprisals on Jordanian soil and undermine political stability in the Hashemite Kingdom.[216] In one particularly violent Israeli retaliation, riots ensued and King Hussein's regime was almost toppled. By 1967, Jordan was plotting with Syrian renegades to overthrow the Ba'athist regime at a time when Syrian terrorists activities in Jordan prompted Amman to close its embassy in Damascus on the eve of the Six-Day War.[217]

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[214]Garfinkle, Israel and Jordan in the Shadow of War, p. 37.

[215]Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, pp. 243-246.

[216]Mansfield, A History of the Middle East, p. 273; Peretz, The Middle East Today, p. 351; Seale, Asad of Syria: The Struggle for the Middle East, p. 215; Sicker, Israel's Quest for Security, p. 95.

[217]Seale, Asad of Syria: The Struggle for the Middle East, pp. 115, 139.

While a temporary marriage of convenience prevailed, the disaster that followed ensured that the relationship would remain an acrimonious one. Jordan, in particular, was angry over what it saw as a weak effort by the Syrian side to prevent the West Bank from falling into enemy hands. By the fall of 1970, Syrian-Jordanian relations had reached a new low when Damascus intervened in Jordan's civil war to support the Palestinian guerillas (led by the notorious Popular Front for the Liberation of Palestine (PLFP)) opposed to the Hashemite Kingdom. The two countries engaged in fierce fighting before the threat of Israeli intervention on the side of Jordan convinced Syria to withdraw.[218]

The October War in 1973, however, saw a brief warming trend between the two states when Jordan sent an armored unit to defend Syria. This movement toward a detente would culminate with Amman being the lone Arab country to support Syria's adventurism in Lebanon in 1976 at a time when Egyptian-Israeli peace talks posed a common danger to both regimes.[219] Remarkably, for a passing moment they even contemplated union.

But the pattern of mutual revulsion proved to be too strong to overcome.[220] As the 1970s wore on, Syria stepped up efforts to keep the PLO from improving relations with Jordan while championing the idea of exclusive representation for the Palestinians on the West Bank -- an idea that infuriated Amman.[221] By the end of the decade, Jordan was covertly sheltering and encouraging the Muslim Brothers in Syria. In retaliation,

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[218]Lunt, Hussein of Jordan: A Political Biography, pp. 136-141.

[219]Seale, Asad of Syria: The Struggle for the Middle East, p. 462; Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, pp. 249-252.

[220]Joseph Nevo, "Syria and Jordan: The Politics of Subversion," in Syria Under Assad: Domestic Constraints and Regional Risks, eds. Moshe Ma'oz and Avner Yaniv (London: Croom Helm Ltd., 1986), pp. 140-157.

[221]Seale, Asad of Syria: The Struggle for the Middle East, p. 462; Sayigh, "The Gulf Crisis: Why the Arab Regional Order Failed," p. 497.

Damascus threatened invasion in 1980 and attempted to assassinate Jordan's Prime Minister, Mudar Badran.[222] In 1980, when the Arab League meeting was held in Amman, Syria not only boycotted it but massed troops along its border with Jordan.[223] The scene was repeated just a year later when Syria suspected that Jordan was about to join the Egyptian-Israeli peace process and threatened to move in if it did. As Rabinovich notes, King Hussein had no such plans but the lesson was not lost on him.[224]

The increasingly bitter confrontation escalated further as the Iran-Iraq War began to unfold. Syria supported Iran while Jordan strongly backed Iraq thereby gaining the enmity of Damascus.[225] By 1983, the two countries were virtually at war. Syria launched a series of assassination attempts and other terrorist activities aimed at Jordanian officials and property around the world. Amman was quick to undertake similar measures in retribution.[226]

After a minor thaw in the mid-1980s, which included an exchange of visits by the two heads of state, attempts by Hussein to broker a Syrian-Iraqi rapprochement, and an agreement to jointly build the Unity dam (see above), mutual hostility returned.[227] For example, during the Gulf War, Syria and Jordan stood on opposite sides with the former firmly allied against Iraq while the later supported Damascus' arch-enemy. In general, despite a few minor instances of rapprochement, the outstanding feature of the

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[222]Ibid, Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, pp. 261.
[223]Sayigh, "The Gulf Crisis: Why the Arab Regional Order Failed," p. 498.
[224]Rabinovich, "Israel, Syria and Lebanon," p. 550.
[225]Fischer and Oschenwald, The Middle East: A History, p. 685.
[226]Ma'oz, Asad: The Sphinx of Damascus, pp. 164-184; Seale, Asad of Syria: The Struggle for the Middle East, p. 464-465.
[227]Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, p. 281.

relationship has been antagonism.[228] In fact, Syrian-Jordanian divisions have been such that the prospect for even a relatively stable relationship seem remote.[229]

## VI. Conclusion

"If the people of the region are not clever enough to discuss mutual solutions to the problems of water supply, war is inevitable" (Meir Ben Meir, former Israeli Water Commissioner, 1990).[230]

Parched climatic conditions, unilateral hydrological developments, wasteful consumption patterns and exploding population growth rates have led to a situation where demand is beginning to outpace supply in the Jordan River Basin. Constant political and military tensions have exacerbated these factors making the exploitation of the shared waters of the Jordan River Basin a competitive and narrowly nationalistic affair.[231] The recent breakthroughs in the peace process should not obscure the fact that there has been a noticeable lack of substantive discussion on the equitable divisions of its waters between the relevant states.[232] The euphoria around the Israeli-Palestinian accord does not mean that these contentious water issues are going be made any easier to resolve. In fact, the Israeli and Palestinian delegations have made little or no progress on the subject.[233] The status of the West Bank aquifers is especially problematic and it is uncertain as to whether

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[228]Nevo, "Syria and Jordan: The Politics of Subversion," pp. 141, 154; Yorke, Domestic Politics and Regional Security: Jordan, Israel and Syria, p. 357.
[229]Ibid.
[230]Quoted in Hurwitz, "The Water Crisis in the Middle East," p. 8.
[231]Caelleigh, "Middle East Water: Vital Resource, Conflict and Cooperation," p. 133.
[232]Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 113.
[233]"Mideast Accord: The Document," New York Times, p.A6.

this contentious issue can be resolved to the satisfaction of both parties.[234] Israel and Jordan meanwhile have made cooperation contingent on a permanent solution to the Palestinian question although they appear to have worked out at least some of the details for a potential water sharing accord.[235] Nonetheless, as a prominent Jordanian hydrologist stated, "[i]f there's no peace agreement on water, there'll be no peace settlement."[236] As for Syria and Israel, the former refuses to discuss the issue until the latter agrees to restore lost territory. Israel, on the other hand, is firmly opposed to such measures without guarantees that its water supply will remain secure.[237] Thus, water remains one of the primary obstacles, if not the biggest one, to a comprehensive and lasting peace between Israel, its Arab neighbors and the Palestinians.[238]

Meanwhile the water situation in the Jordan River Basin continues to grow graver by the day threatening the stability of the region. If for example, Syria and Jordan were to move ahead with the the so-called Unity dam project along the Yarmuk without Israeli approval, the latter would consider this a serious threat to its security and would likely take action to make sure that such development was not realized. A Jordanian-Syrian engagement is also not out of the question given Syria's continuing drive to impound the

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[234]Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," pp. 124-125.

[235]Hedges, "Jordanians Ready to Begin Carrying Out Israel Accords," p. A6.

[236]Dr. Elias Salameh, quoted in Cowell, "Hurdle to Peace: Parting the Mideast's Waters," p. A6.

[237]Jordanian Press Team, "Interview With Syrian Information Minister," (text) Amman AL-DUSTUR in Arabic (19 November 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 24 November 1992 (FBIS-NES-92-227, pp. 44-45); Strategic Survey 1991-1992, p. 225.

[238]Cowell, "Hurdle to Peace: Parting the Mideast's Waters," p. A1, A6; George D, Moffett III, "If Jordan Wells Run Dry," Christian Science Monitor (14 March 1990), p. 4.

waters of the upper Yarmuk in light of its failures to reach an accord with Turkey and Iraq along the Euphrates; however, Jordan because of its relatively weaker strategic position would not initiate such a campaign without meaningful outside support. Should Damascus continue with this policy, an alignment pitting Jordan and Israel against Syria might be created -- as unlikely as it now seems given the current political climate. Suffice it to say, water remains one of the primary obstacles to a comprehensive and lasting peace between Israel, its Arab neighbors and the Palestinians. The general conclusion arising from the various considerations here is that water is likely to continue to be a source of tension in the region in the absence of a substantive understanding over water accompanied by an overall lessoning of frictions between the parties to the dispute.

*Chapter 5*

## Potential Solutions to the Water Crisis in the Euphrates and Jordan River Basins

The gravity of the current situation in the Euphrates and Jordan River Basins does not mean that interstate conflict is inevitable. Realistic and hopeful options do exist that could provide for a relatively stable equilibrium between those entities involved in the disputes over transboundary water supplies.

## I. Supply Management[1] Solutions: Grounds for Optimism?

At first glance, the most intriguing potential development being touted as a wide-ranging solution to water shortages in the region is the so-called Peace Pipeline. Proposed by Ankara in February 1987, the plan calls for two prestressed concrete cylinder pipes carrying water from Turkey's Seyhan and Ceyhan rivers across the desert to countries in need in the south.[2] The Gulf Pipeline would run about 3900 kilometers (km) long supplying 2.5 million cubic meters (mcm) per day of water to Kuwait, eastern Saudi Arabia, Bahrain, Qatar, United Arab Emirates, Oman and Iraq. The Western Pipeline, about 2700 km in length, would follow a course west of the first pipeline and carry 3.5 mcm of water to Syria, Jordan, and perhaps, Israel[3] and western Saudi Arabia.[4] The concrete conduits would run underground and would be

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[1]Supply management can be defined as the "modification of the natural system in order to increase the amount of water available and/or to improve the quality of the water to the point that it is fit for consumption." Terrence J. Downey and Bruce Mitchell, "Middle East Water: Acute or Chronic Problem?" Water International, Vol. 18 (March 1993), p. 3.

[2]Economist, "Where Dams Can Cause Wars," Economist (18 July 1987), p. 38; Joyce R. Starr, "Water Wars," Foreign Policy, No. 82 (Spring 1991), p. 28. The two rivers currently discharge uselessly into the Mediterranean.

[3]Israel does not appear in the initial blueprints although Israeli and American water experts have made contingency plans for a spur from Amman that would supply both Israel and a Palestinian state in the West Bank in the event of a comprehensive Arab-Israeli peace treaty. John K. Cooley, "Middle East Water: Power for Peace," Middle East Policy, Vol. 1 (Summer 1992), p. 13.

[4]Cooley, "Middle East Water: Power for Peace," p. 13; Cem Duna, "Turkey's Peace Pipeline," in The Politics of Scarcity: Water in the Middle East, eds. Joyce R.

3-4 meters in diameter.[5] Meanwhile, pumping stations would be located in geographically depressed areas to lift water over high terrain.[6]

In total as many as 15-18 million people could be served by the two pipelines.[7] The two largest recipients would be Damascus (600,000 cubic meters a day (cm/d)) and Amman (600,000 cm/d).[8] Initial cost estimates range between $16 and $40 billion -- expensive, but perhaps the price that has to be paid to avoid war over water in the region.[9] If it can be financed, it is expected that the joint schemes will take 8-15 years to construct because of the difficult logistics involved in such a massive undertaking.[10] According to Ankara, the price of the piped water would be about one-third to one-half that of water purified from the sea.[11]

However, the Arab beneficiaries of the scheme have been frosty to Turkey's initiative dismissing it as nothing but a clever propaganda and money-making ploy that would serve only the interests of that strongly westward leaning country. In addition, none of the Arab states have been

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Starr and Daniel C. Stoll (Boulder: Westview Press, 1988), pp. 119-120; Joseph R. Gregory, "Liquid Asset," World Monitor, No. 4 (November 1991), p. 30.

[5]Richard Z. Chesnoff, "When Water Feeds Flames," U.S. News and World Report (21 November 1988), p. 48; Robin Clarke, Water: The International Crisis (London: Earthscan Publications Ltd., 1991), p. 105; Malin Falkenmark, "Middle East Hydropolitics: Water Scarcity and Conflicts in the Middle East," Ambio, Vol. 13 (3) (1989), p. 352.

[6]Gregory, "Liquid Asset," p. 30.

[7]Clarke, Water: The International Crisis, p. 105; Gregory, "Liquid Asset," p. 30; John Kolars, "Trickle of Hope," The Sciences, Vol. 12 (November/December 1992), p. 21.

[8]Philip Robins, Turkey and the Middle East (London: Pinter Publishers, 1991), p. 97.

[9]Feasibility studies were carried out by the American consulting firm Brown and Root for $2.7 million. Starr, "Water Wars," p. 28.

[10]Duna, "Turkey's Peace Pipeline," p. 120; Michael Elliott, "The Global Politics of Water," The American Enterprise, Vol. 2 (September/October 1991), p. 31; Starr, "Water Wars," p. 9.

[11]Duna, "Turkey's Peace Pipeline," p. 121; Chris Hellier, "Draining the Rivers Dry." Geographical Magazine, No. 62 (July 1990), p. 34; Kolars, "Trickle of Hope," p. 21.

enthused with the notion that their strongest enemy, Israel, may be involved in the scheme.[12] The alleged savings that this plan would represent over potential desalination plants have also been cast into doubt.[13] Another serious concern is the vulnerability of the water lines to sabotage or attack.[14] One could easily imagine a strike by the Kurdish Workers' Party (PKK) or a radical Islamic group on some portion of the pipeline.

Moreover, Jordan, Israel and especially Syria and Iraq[15] are loath to have their hydrological fortunes even partially tied to Turkey. By way of analogy, the history of transboundary oil pipelines in the region suggests that in times of crisis, control over water pipelines could emerge as a powerful bargaining chip or method of extortion for upstream states over downstream states; for example, a state could suggest to another downstream that it might use the water flow to extract concessions.[16] With perhaps as many as 10 states involved in the scheme, some with very long histories of mutual

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[12]Muhammad Allam, "Water Dispute With Turkey Escalates," (text) London AL-HAYAH in Arabic (24 December 1992) Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 30 December 1992 (FBIS-NES-92-251, p. 44); Economist, "Survey of the Arab World," Economist (12 May 1990), p. 12; Christopher Savage, "Middle East Water," Asian Affairs, Vol. 22 (February 1991), p. 9; Strategic Survey, 1991-1992 (London: International Institute for Strategic Studies, 1992) [as cited in Brassey's (May 1992)], pp. 223, 230.

[13]Officials in Oman, for example, believe that desalination would be 80 percent cheaper than the price of water delivered by Turkey's pipeline scheme. However, most independent analysts seem to agree that this scheme would eventually represent a sizable saving over desalination alternatives after the initial capital outlays. Jonathan E. Cohen, "International Law and the Water Politics of the Euphrates," International Law and Politics Vol. 24 (Fall 1991), p. 538.

[14]Kolars, "Trickle of Hope," p. 21. Kolars suggests that the danger might be lessoned if the pipeline was to deliver water directly to depleted aquifers rather than straight to urban areas.

[15]It should be noted here that because of the route of the eastern pipeline, it is at best an academic question until the United Nations (UN) led economic embargo against Iraq is resolved.

[16]Cooley, "Middle East Water: Power for Peace," p. 14; Peter Kemp, "Water - As Precious as Oil is Powerful," Middle East Economic Digest (MEED), Vol. 37 (29 January 1993), p. 8.

antagonism, it is little wonder that cynics refer to the project as the "peace pipedream."[17]

Desalination[18] technology has greater potential to help alleviate water shortages along the Euphrates and in the Jordan River Basin. In recent years it has become technically possible to purify large volumes of both brackish and saltwater through desalination.[19] Saudi Arabia alone has 30 percent of the desalination units in existence -- some the size of small cities -- and the single largest plant in the world.[20] Overall, about two-thirds of the world's 7500 desalination plants are located in the Middle East.[21]

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[17]Gregory, "Liquid Asset," p. 32.

[18]Desalination can be defined as "the separation of water from dissolved impurities" through the use of heat, where the resulting steam condenses into freshwater (distillation), or pressure, where saltwater is forced through a screen that filters out solids (reverse osmosis). Leon Awerbuch, "Desalination Technology: An Overview," in The Politics of Scarcity: Water in the Middle East, eds. Joyce R. Starr and Daniel C. Stoll (Boulder: Westview Press, 1988), pp. 53-59; Allen J. Hammond ed., World Resources 1992-93: A Report by the World Resources Institute (New York: Oxford University Press, 1992), p. 164; Kolars, "Trickle of Hope," p. 19; Lawrence Tal, "On the Banks of the Stormy Jordan: The Coming Middle East Water Crisis," The Contemporary Review, Vol. 260 (April 1992), p. 173.

[19]Turning salt water into drinking water requires reducing the parts per million (ppm) of dissolved solids (80 percent of which is salt or sodium chloride) from 35,000 ppm to less than 500 ppm, a total reduction of 70 to 1. 95 percent of the world's desalination plants use some method of distillation for sea water while reverse osmosis is generally used for brackish water which contains up to 10,000 ppm of dissolved solids. Awerbuch, "Desalination Technology: An Overview," p. 54; Marcia Merry, "Desalination: An Advanced Solution for the Mideast," Executive Intelligence Review, Vol. 27 (September 1990), p. 34.

[20]Kemp, "Water: As Precious as Oil is Plentiful," p. 8; Starr, "Water Wars," p. 20.

[21]Ewan W. Anderson, "Water: The Next Strategic Resource," in The Politics of Scarcity: Water in the Middle East, eds., Joyce R. Starr and Daniel C. Stoll (Boulder: Westview Press, 1988), p. 4; Awerbuch, "Desalination Technology: An Overview," p. 53; Hammond, World Resources 1992-93: A Report by the World Resources Institute, p. 164; Kolars, "Trickle of Hope," p. 19. Thomas Stauffer, "Arab Waters in Israeli Calculations: The Benefits of War and the Costs of Peace," in Israel and Arab Water, eds. Abdel Majid Farid and Hussein Sirriyeh (London: Ithaca Press, 1985), p. 80.

However, the initial capital and operational costs are prohibitive for the countries under review. A large, new desalination plant can cost $2 billion or more.[22] For every cubic meter of desalinized water produced, prices range from a low of $0.30-0.60 (brackish water) to $1.05-2 (seawater) and to this the price of pumping the water from sea level to where it is used must also be factored in.[23] By the time it reachs a domestic consumer, the price can reach $5 for every cubic meter desalinated for drinking purposes.[24] A big part of the expense is due to the fact that the desalination process is extremely energy-intensive making up 40 percent of the operational outlay.[25] Desalting seawater is at least 3-4 times more costly than supplying water from

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[22]By a large plant I mean a desalting unit which is capable of 1 million cm/d. Bruce A. Hurwitz, "The Water Crisis in the Middle East," Middle East Focus, Vol. 13 (Fall 1991), p. 7; Stauffer, "Arab Waters in Israeli Calculations: The Benefits of War and the Costs of Peace," p. 80

[23]Awerbuch, "Desalination Technology: An Overview," p. 59; Ewan W. Anderson and Khalil H. Rashidian, Iraq and the Continuing Middle East Crisis (London: Pinter Publishers, 1991), p. 88; Hammond, World Resources 1992-93: A Report by the World Resources Institute, p. 164; Hurwitz, "The Water Crisis in the Middle East," p. 7; John Kolars, "The Course of Water in the Arab Middle East," American-Arab Affairs, Vol. 33 (Summer 1990), p. 63; Priit J. Vesilind, "Middle East Water - Critical Resource," National Geographic (May 1993), p. 57.

[24]Alan Cowell, "Hurdle to Peace: Parting the Mideast's Waters," New York Times (10 October 1993), p. A6.

[25]Cohen, "International Law and the Water Politics of the Euphrates," p. 536; Frederick W. Frey and Thomas Naff, "Water: An Emerging Issue in the Middle East?" The Annals of the American Academy, No. 482 (November 1985), p. 77; Thomas R. Stauffer, "The Price of Peace: The Spoils of War," American-Arab Affairs, Vol. 24 (Spring 1982), p. 53. With reference to the potential of nuclear desalination as a possible way round this predicament, it is also considered to be uneconomical and dangerous in geopolitical terms for obvious reasons. However, although of little import in the immediate future, within the next ten years or so, desalination through the use of solar power may prove to be a viable and safe solution costing perhaps 65-75 percent less than conventional methods. On this last point see, Anderson, "Water: The Next Strategic Resource," p. 5; Donald E. Osborn, Raymond Sierka, and Medhat Latif, "Water Problems, Solar Solutions: Applications of Solar Thermal Energy to Water Technologies," in The Politics of Scarcity: Water in the Middle East, eds. Joyce R. Starr and Daniel C. Stoll (Boulder: Westview Press, 1988), pp. 73-79; Savage, "Middle East Water," p. 5.

conventional sources.[26] Thus, the major problem with this method is that it requires a cheap, plentiful and readily accessible source of energy, effectively discounting all but the rich Arabian Gulf states.[27]

Even if the countries under review were to seriously contemplate an extensive program of desalination in the near future, they would have to contend with the steadily increasing pollution of the oceans which can debilitate the operational efficiency of a plant.[28] For example, Arab cities discharge 90 percent of their sewage untreated into the Mediterranean.[29] Moreover, reliance on desalination for water security carries significant strategic risks as the threat of acute interstate conflict and resource terrorism rises because of diminishing water supplies. For example, during the Gulf War Kuwait lost two of its six desalination plants which supply 100 percent of the water for its urban centers when retreating Iraqi soldiers destroyed them.[30] In short:

> One might say that desalination is to water as nuclear power is to electricity - the promise of unlimited supplies coupled with the curse of high costs, environmental problems, and megaproject fragility.[31]

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[26]Hammond, World Resources 1992-93: A Report by the World Resources Institute, p. 164.

[27]Tal, "On the Banks of the Stormy Jordan: The Coming Middle East Water Crisis," p. 169.

[28]In fact, the performance ratio is quite low for the countries already using desalination in the Middle East and only acceptable because of the low cost and readily accessible energy supplies. Merry, "Desalination: An Advanced Solution for the Mideast," p. 34.

[29]Ian Williams, "UN Expert: In Mideast's Future, Water More Inflammatory Than Oil," The Washington Report on Middle East Affairs, Vol. 10 (October 1991), p. 62.

[30]Kolars, "The Course of Water in the Arab Middle East," p. 64; Vesilind, "Middle East Water - Critical Resource," pp. 57, 68-69.

[31]David B. Brooks, "Adjusting the Flow: Two Comments on the Middle East Water Crisis," Water International, Vol. 18 (March 1993), p. 37.

Water brought by tanker, flexible plastic barges, giant balloons[32] or Medusa bags[33] from water rich to water poor countries are all legitimate ideas that could make important contributions in allaying the water quandary.[34] Several countries have been researching and developing these schemes, including Britain, Canada, France, Japan and especially Turkey.[35] Potable water brought to the Gulf in returning oil tankers is perhaps the conception

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[32]Sweet water is lighter than seawater and would thus presumably float. One experimental joint Canadian-Turkish project is testing the applicability of transported water from Turkey to Israel via the Mediterranean. Pazit Rabina, "Turkish Charge on on Gulf Situation, Water Issue," (text) Tel Aviv DAVAR in Hebrew (17 August 1990). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 17 August 1990 (FBIS-NES-90-165, p. 36).

[33]Medusa bags are enormous, sturdy plastic bags capable of holding up to 1.6 mcm of water and towed behind tugboats. Preliminary studies estimate the cost of importing water by Medusa bags to be between 10 and 20 percent of that of desalinating seawater. Dov Hoch, "The Middle East Water Crisis," Midstream, Vol. 39 (May 1993), p. 19; Kolars, "Trickle of Hope," p. 21.

[34]Although the method to be used was not specifically identified, in 1989 it was reported that Israel apparently had pursued this option and planned to import 250 mcm per annum at a cost of $0.35 per cubic meter from Turkey. However, in November 1990 Agricultural Minister Rafael Eitan said that Ankara's price was too high. In May 1991 a top Turkish official stated unequivocally that Israel would not buy water from Turkey. Negotiations continue but have been slowed by Arab protests and Israel's reluctance to depend on Turkey for its hydrological security. But in March of 1992 there was a major political breakthrough between the two countries when Turkey established full diplomatic ties with Israel which may pave the way for a water sale. However, even if an agreement is reached at some point in the near future, the cost of the associated infrastructure may run as high as $600 million which may detract from the utility of the project. Hurwitz, "The Water Crisis in the Middle East," pp. 6-7; Hayim Bi'or, "Dwindling Level of Coastal Aquifer Viewed" (text) Tel Aviv HA'ARETZ in Hebrew (30 October 1991). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 31 October 1991 (FBIS-NES-91-211, p. 42); MENA, "Turkish Envoy Denies Sales of Water to Israel" (text) Cairo MENA in Arabic (2 May 1991). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 7 May 1991 (FBIS-NES-91-087, p. 10); Savage, "Middle East Water," p. 6; Starr, "Water Wars," p. 27; Tal, "On the Banks of the Stormy Jordan: The Coming Middle East Water Crisis,"; Voice of the Islamic Republic of Iran, "Turkey's Upgraded Ties with Israel 'Unjustifiable,'" (text) Tehran Voice of the Islamic Republic of Iran in English Foreign Broadcast Information Service. Daily Report - Near East and South Asia, 10 March 1992 (FBIS-NES-92-047, p. 41).

[35]Anderson, "Water: The Next Strategic Resource," p. 5; Hurwitz, "The Middle East Water Crisis," p. 6.

with the widest number of advocates. While a logical idea, the source of the water is important and in some cases the distance might be such that the cost and logistics of such an operation would outweigh the benefits accrued.[36] In addition, even a minute trace of chemical content in the water could be detected by the human palate and might be of unacceptable composition for domestic or agricultural purposes.[37] Finally, the strategic vulnerability associated with long-term reliance "upon a foreign source for such a vital commodity as water seems, to say the least, unwise."[38]

There are also other interesting proposals with varying degrees of potential. These include the dramatic possibility of towing icebergs from Arctic zones. Unfortunately, while technically feasible, practicalities such as the distribution of water and control of melting have not been adequately addressed.[39] At least half the iceberg would melt before arriving in the Middle East and the transport costs, while probably considerably cheaper than desalination, are likely to be formidable.[40] Furthermore, moving the iceberg would require extremely precise navigation because the strong currents in Antarctica are such that the transport ship could easily be thrown off course, thus jeopardizing the utility of its cargo.[41]

Finally, both the Turks and Israelis have experimented with cloud seeding[42] but the dry air of the Middle East does not lend itself well to this

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[36]Clarke, Water: The International Crisis, p. 116.
[37]Savage, "Middle East Water," p. 8.
[38]Anderson, "Water: The Next Strategic Resource," p. 5
[39]Ibid.
[40]Clarke, Water: The International Crisis, p. 117; Tal, "On the Banks of the Stormy Jordan: The Coming Middle East Water Crisis," p. 173.
[41]Frey and Naff, "Water: An Emerging Issue in the Middle East?," p. 65.
[42]This process involves sending aircraft skyward to seed clouds with silver iodine and propane gas which in theory, will produce precipitation. Jim Bodgner, "Turkey: A Centuries Old Quest for Water," MEED, Vol. 35 (25 January 1991), p. 11.

kind of effort.[43] A few isolated experiments do seem to produce short, intense showers but its effects are difficult to chart and impossible to predict.[44] In addition, it is unlikely that these capital-intensive experiments will receive anything more than short shrift given the growing global concern about maintaining the planet's structural integrity.[45]

## II. Demand Management[46] Solutions: Making the Most of A Finite Supply

While these high-tech schemes are certainly provocative and worth exploring through further research and development, none of them is likely to have a major impact in the short term. Of the many problems accompanying the approaches above, the capital expenditures involved are the most important drawback. Demand management approaches, on the other hand, are typically cheaper, easier to implement and ecologically less damaging than supply side alternatives and for these reasons hold more promise.[47]

Water recycling, for example, is a cheaper, more secure and more efficient alternative to desalination.[48] It has important applications in both industry and agriculture. Already, Israel treats about 70 percent of its sewage

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[43]Kolars, "The Course of Water in the Arab Middle East," p. 59.

[44]Leslie Schmida, "Israeli Water Projects and their Repercussions on the Arab-Israeli Conflict," in Israel and Arab Water, eds. Abdel Majid Farid and Hussein Sirriyeh (London: Ithaca Press, 1985), p. 29.

[45]Clarke, Water: The International Crisis, p. 117; Strategic Survey 1991-1992, p. 225.

[46]Demand management can be defined as the modification of human behavior in such a fashion that "water is used more efficiently, or so that less water is consumed." Downey and Mitchell, "Middle East Water: Acute or Chronic Problem?" p. 3.

[47]Brooks, "Adjusting the Flow: Two Comments on the Middle East Water Crisis," pp. 35-39.

[48]P.A. Banks, "Wastewater Reuse Case Studies in the Middle East," Water Science Technology, Vol. 23 (1991), pp. 2141-2148.

which adds some 25 percent to total irrigation supplies; the treated water is then used to irrigate about 19,000 hectares of agricultural land -- the most ambitious program of its kind in the world.[49] Jordan also has a smaller and less technologically advanced program. What makes this development so exciting is that a typical farmer spends considerable amounts of capital purchasing chemical fertilizers that contain nitrogen, phosphorus and potassium which are all necessary ingredients to yield bountiful crops -- something that domestic wastewater already contains in high amounts.[50]

Industrial water recycling is also a promising development. Unlike agriculture, only a small portion of the water is actually consumed; cooling and processing, for example, may pollute or heat the water but they do not actually use it up.[51] Thus, a factory may recycle its own water and get more output from each cubic meter utilized. While it makes good environmental and economic sense, it has not been widely applied outside developed countries because there are few government induced incentives to adopt more efficient water practices.[52] Moreover, Jordan, Syria and Iraq do not have the necessary industrial infrastructure to realize big savings in this area. Again, Israel is the only country in the region (with the possible exception of Egypt and Saudi Arabia[53]) with anything approaching a comprehensive

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[49]Stephen Lonergan and Barb Kavanagh, "Climate Change, Water Resources and Security in the Middle East," Global Environmental Change, Vol. 1 (September 1991), p. 281.

[50]Sandra Postel, "Facing Water Scarcity," in State of the World, 1993: A Worldwatch Institute Report on Progress Toward a Sustainable Society, ed. Lester R. Brown (Washington, D.C.: World Resources Institute, 1993), p. 31; Williams, "UN Expert: In Mideast's Future, Water More Inflammatory Than Oil," p. 63.

[51]Postel, "Facing Water Scarcity," p. 32.

[52]Ibid., p. 35.

[53]Kolars, "Trickle of Hope," p. 21.

program of industrial water recycling owing to its technological supremacy and relatively more developed status.

The artificial recharge of aquifers has also received some attention. Israel, for example, stores two-thirds of the water transported by its National Water Carrier (NWC) underground to be used to meet high summer demands and serve as a reliable source during dry years.[54] This method not only helps to balance underground water tables but prevents large losses of water though evaporation -- the essential problem with surface reservoirs.[55] Meanwhile, Jordan has been damming wadis (dry washes or valleys) to trap rainfall in order to recharge underground water supplies "while municipal wastewater is being stored in others for use in agriculture."[56]

Fundamental structural changes in the allocation of water would also bring big savings. Most importantly, water clearly needs to be reallocated to municipal and industrial sectors and away from the agricultural sector. In the countries under investigation in this essay, the mean apportionment of water to the agricultural sector represents 75 percent of total water supplies while the median economic return from that sector as a percentage of Gross Domestic Product (GDP) averages only 10 percent. The marginal value-added of water in agriculture is thus clearly low compared to other sectors and, in general, represents a most inefficient use of a valuable commodity.[57] For

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[54]Donald J. Chenevert, Jr., "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," Emory International Law Review, Vol. 6 (Fall 1992), pp. 495-575; Clarke, Water: The International Crisis, p. 88; Sandra Postel, "Water: Rethinking Management in an Age of Scarcity," Worldwatch Paper No. 62 (December 1984), p. 38.

[55]Postel, Water: Rethinking Management in an Age of Scarcity, p. 36.

[56]Williams, "UN Expert: In Mideast's Future, Water More Inflammatory Than Oil," p. 62.

[57]Natasha Beschorner, "The Problem of Regional Rivalry," MEED, Vol. 37 (29 January 1993), p. 12.

example, light industry yields about 3000 percent more input to Gross National Product (GNP) than agriculture per unit of water used.[58] It has also been estimated that agriculture in arid areas, such as the Middle East, uses ten times as much water as industry for each dollar of income created.[59]

However the difficulty of such a transition should not be underestimated -- despite these blunt statistics.[60] The ideological and cultural importance of agriculture based on the long and celebrated history of irrigation in the region is one force at work. Animated protest from the negatively effected parties such as the farmers/agricultural lobbies can be expected as water outlays to the agricultural sector are reduced.[61] This action also runs contrary to notions of food security in the form of self-sufficiency seen as necessary for security reasons.[62] Indeed, in every country there is an almost organic alliance between those public officials and leaders who strive for food security and those agricultural workers that can enable the realization of that goal.[63]

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[58]Thomas Naff and Ruth C. Matson, eds., Water in the Middle East: Conflict or Cooperation? (Boulder: Westview Press, 1984), p. 195.

[59]Strategic Survey 1991-1992, p. 221.

[60]Allan, "Substitutes for Water are Being Fond in the Middle East and North Africa," p. 377.

[61]Aaron Wolf, "The Jordan Watershed: Past Attempts at Cooperation and Lessons for the Future," Water International, Vol. 18 (March 1993), p. 14. This is especially the case in Israel because of Zionist ideology which stresses the importance to the Jewish people of tilling the soil of the land of Israel (see chapter 4, fn 41). Schmida, "Israeli Water Projects and their Repercussions on the Arab-Israeli Conflict," p. 29; Stauffer, "Arab Waters in Israeli Calculations: The Benefits of War and the Costs of Peace," p. 77; Tal, "On the Banks of the Stormy Jordan," p. 173.

[62]Downey and Mitchell, "Middle East Water: Acute or Chronic Problem?" p. 2. This belief was buttressed in the 1970s, when a number of American politicians recommended using food as a weapon against the Arabs, just as the Arabs were using oil as a weapon against the West. J.A. Allan, "Substitutes for Water are Being Fond in the Middle East and North Africa," GeoJournal, Vol. 28 (November 1991), p. 376; Economist, "The Survey of the Arab World," p. 12.

[63]Beschorner, "The Problem of Regional Rivalry," p. 12; Strategic Survey, 1991-1992, p. 225.

Israel is the lone state to thus far make significant strides in this area reducing its agricultural water quotas by 10 percent in 1986 and by an additional 37 percent in 1990.[64] A further reduction of 30 percent is planned by the year 2000.[65] Syria and Jordan have talked about it but done little in the way of concrete action. Iraq uses more water for agriculture on a per capita basis than any other country in the world and thus has the potential to realize enormous savings in this area; however, in the short-term its continuing ability to hold out against the UN food embargo which underscores the importance of local agricultural production will prevent a substantial reduction in water to that sector.[66]

Other controversial, but important, ways to curb the use of water and make its use more efficient involve the following techniques: ending water-based subsidies to agriculture, phasing out the production of water-intensive crops (e.g. tomatoes, lettuce, bananas and cotton),[67] pricing or regulating the use of water through meters, tariffs, and efficiency standards for common household items (e.g. showerheads, toilets, dishwashers, washing machines), restricting water use on non-essential uses (e.g. car-washing, filling of private swimming pools, lawns, gardens, parks),[68] and encouraging Xeriscape landscaping.[69]

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[64]Miriam R. Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," International Security, Vol. 18 (Summer 1993), p. 119.

[65]Hoch, "The Middle East Water Crisis," p. 18,

[66]Angus Hindley, "A New Source of Conflict for the Region," MEED, Vol. 35 (25 January 1991), p. 10.

[67]Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 138.

[68]A complete ban on the watering of gardens, lawns and public parks in Israel would bring about a 10 percent savings. Israel is apparently considering such a measure. Hurwitz, "The Water Crisis in the Middle East," p. 7.

[69]Widely practiced in the dry regions of the United States, Xeriscape landscaping draws on a variety of appealing indigenous and drought-tolerant plants, shrubs, and ground cover to replace thirsty green lawns. Indeed, a

Although Jordan, Turkey and Israel have all instituted tariffs for industrial, municipal and irrigation uses of water, the tariffs do not come close to reflecting the maintenance of such systems and costs of operation.[70] A much larger investment in infrastructure such as water meters; a system of accounts and penalties; and most importantly a tangible reduction of subsidized water to agriculture is needed in order to bring about significant savings.[71] In Jordan for example, water supplies to farmers are still so heavily subsidized that farmers pay less than $0.03 a cubic meter while the estimated cost of supply is about $0.35 a cubic meter.[72]

The glaring inefficiency of water delivery systems is another area that if rectified could greatly increase the disposable water available. For example, Amman loses 50 percent and Damascus 30 percent of their respective water budgets through archaic networks of leaky pipes.[73] Meanwhile, cracks in Israel's national water system account for 25 percent of its water deficit.[74] Moreover, in the agricultural sector of Iraq, Syria and Turkey, unlined, open irrigation canals and flood irrigation[75] predominate with 50-70 percent of the

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Xeriscape yard usually requires up to 80 percent less water than a conventional one. Postel, "Facing Water Scarcity," p. 38. The term Xeriscape is derived from the word xeric which means a habitat or plant characterized by or requiring a small amount of moisture.

[70]Starr, "Water Wars," p. 18. The capital and operating costs are extremely expensive in the region - especially in Jordan and Israel where about 20 percent of their respective electricity is used to pump water.

[71]Allan, "Substitutes for Water are Being Fond in the Middle East and North Africa," p. 378; Berschorner, "The Problem of Regional Rivalry," p. 12.

[72]Beschorner, "The Problem of Regional Rivalry," p. 12.

[73]Beschorner, "The Problem of Regional Rivalry," p. 12; Kolars, "Trickle of Hope," p. 21; Joyce R. Starr, "The Quest for Water from Biblical Times to the Present," Environmental Science and Technology, Vol. 27 (July 1993), p. 1266. It would apparently cost $40 million to refurbish Amman's water lines. Hoch, "The Middle East Water Crisis," p. 18.

[74]Hurwitz, "The Middle East Water Crisis," p. 4. $105 million in expenditures is required to repair the problem.

[75]These systems are inexpensive to install - hence their popularity - and use the flow of gravity to distribute water through unlined ditches or siphons. Postel, "Water: Rethinking Management in an Age of Scarcity," p. 39.

water supplied lost through seepage or evaporation before even reaching the crop's root zone.[76] Lining canals, while expensive in the short-term are likely to prove cost-effective in the long run preventing water loss while also reducing soil salination and waterlogging. This problem is now only slowly being addressed; Syria, for example, is allocating 75 percent of its 1990-1994 agricultural budget to line irrigation canals with plastic in order to reduce seepage.[77]

Although Saddam Hussein has ordered farmers to "improve their irrigation methods"[78], only in Jordan and Israel are the expensive,[79] but highly efficient, drip and low-energy precision application (LEPA) sprinkler irrigation systems used extensively; savings ranging from 10 to 50 percent have been realized as a consequence.[80] Israel has recently pioneered automated irrigation which charges computers with regulating the water flow, detecting leaks, optimizing fertilizer use and adjusting automatically to soil and weather conditions; the result is that farmers have more than

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[76]Beschorner, "The Problem of Regional Rivalry," p. 12; Clarke, Water: The International Crisis, p. 27; Malin Falkenmark, "Fresh Waters as a Factor in Strategic Policy and Action," in Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, ed. Arthur H. Westing (Oxford: Oxford University Press, 1986), p. 87; Postel, "Water: Rethinking Management in an Age of Scarcity," p. 41.

[77]Beschorner, "The Problem of Regional Rivalry," p. 12.

[78]Saddam Hussein, "Saddam Husayn on Water Problems with Turkey," (text), (8 July 1990) Baghdad INA in English Foreign Broadcast Information Service Daily Report - Near East and South Asia, 10 July 1990 (FBIS-NES-90-132, p. 12). Allen J. Hammond, ed., Environmental Almanac, 1993 (Boston: Houghton Mifflin Company, 1993), p. 342.

[79]The initial outlay runs between $1,500-3,000 per hectare and therefore these systems are generally used only for fruit and vegetables with a high return. Postel, "Facing Water Scarcity," pp. 29-30.

[80]Clarke, Water: The International Crisis, p, 165; Postel, "Facing Water Scarcity," pp. 27-28. Low-energy sprinklers designs work to deliver the water closer to the crops by means of small tubes that extend vertically from the sprinkler. Sandra Postel, "Saving Water for Agriculture," in State of the World, 1990: A Worldwatch Institute Report on Progress Toward a Sustainable Society, ed. Lester R. Brown (Washington, D.C.: World Resources Institute, 1993), pp. 54-55.

doubled their output in the past two decades despite using a constant amount of water.[81] In Jordan, meanwhile, the government is offering low-cost loans to farmers that make the switch to drip irrigation. According to minister of irrigation and water resources, Dawud Khalaf, "[r]educing the waste incurred in irrigation offers the greatest reduction of water demand in many areas."[82] In fact, even a marginal improvement in irrigation efficiency would save impressive quantities of water for industrial and municipal use.[83]

Nonetheless, most irrigation experts agree that the actual efficiency of water use obtained in the field depends as much on the way the irrigation system is managed as the type used.[84] In Syria, for example, technicians and engineers generally lack the expertise and basic skills required to operate complex machinery and monitor sophisticated processes.[85] Indeed, all the countries examined here suffer from poorly maintained and inadequately operated infrastructure facilities. Even when money is available for training programs or maintenance, the construction of additional facilities seems to be the typical response.[86]

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[81]Postel, "Facing Water Scarcity," p. 28; Postel, "Water: Rethinking Management in an Age of Scarcity," p. 41; Vesilind, "Middle East Water - Critical Resource," p. 62.

[82]Jawad al-Umari, "Minister Discusses Countering Water Shortages," Amman Domestic Service in Arabic (17 December 1990). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 18 December 1990 (FBIS-NES-90-243, p. 47). See also, Malin Falkenmark and Carl Widstrand, "Population and Water Resources: A Delicate Balance," Population Bulletin, Vol. 47 (November 1992), p. 31; Vesilind, "Middle East Water - Critical Resource," pp. 64-65.

[83]Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," p. 31.

[84]Postel, "Water: Rethinking Management in an Age of Scarcity," p. 40.

[85]Joyce R. Starr and Daniel C. Stoll, "Water for the Year 2000" in their The Politics of Scarcity: Water in the Middle East (Boulder: Westview Press, 1988), p. 151.

[86]Ibid.

With reference to the well-known fantasy of greening the desert with seawater, while it has been tried repeatedly, classic food plants still wither and die at salinities far lower than that contained in the ocean.[87] Nevertheless, impressive strides have been made in this area in recent years. Israel leads the way in the development of salt resistant/tolerant crops.[88] Certain types of halophytes[89] have been found to have amazing characteristics including the ability to produce a high yield, high quality vegetable oil.[90] On an experimental farm in the Negev, brackish water is being used to grow fruits and vegetables, while salt-water is currently being tested on 150 species of plants at Ben Gurion University.[91] If initial germination and growth occur in freshwater, it is believed to be possible to grow wheat on saline land with seawater.[92] Perhaps most impressively, limited amounts of salt have been found to raise cotton yields by as much as 20 percent.[93] As exciting as some of these projects are, it is important to note that most of these ideas are in the testing state and "much more research must be done in this area before desalinized seawater can hope to replace well water as an enduring source for agriculture."[94]

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[87]Carl N. Hodges, Wayne L. Collins and James J. Riley, "Direct Seawater Irrigation as a Major Food Production Technology for the Middle East," in The Politics of Scarcity: Water in the Middle East, eds. Joyce R. Starr and Daniel C. Stoll (Boulder: Westview Press, 1988), p. 110.

[88]Clarke, Water: The International Crisis, pp. 154-155; Kolars, "Trickle of Hope," p. 21.

[89]Halophytes can be defined as "[t]errestrial plants that tolerate various degrees of salt in the water." Hodges, Collins and Riley, "Direct Seawater Irrigation as a Major Food Production Technology for the Middle East," p. 110.

[90]Ibid., p. 111.

[91]Hurwitz, "The Middle East Water Crisis," p. 7.

[92]Savage, "Middle East Water," p. 4.

[93]Clarke, Water: The International Crisis, p. 155.

[94]Kolars, "The Course of Water in the Arab Middle East," p. 64. Reusing runoff from irrigation systems; rainwater harvesting; growing more crops in the winter when there is less evaporation; and utilizing less water-intensive crops/plants all also schemes that deserve further exploration but also require

In the Middle East the notion is widespread that water is a national strategic prize to be monopolized.[95] In a more cooperative and less competitive environment, the other states under consideration could benefit from the transfer of the low-water-use technology in which Israel leads the world.[96] In the interim, "[p]artial solutions, no matter how small or how unlikely, must be attempted."[97] Nonetheless, even a comprehensive program to develop new sources and increase the efficient use of existing stocks can only be seen as an important but not sufficient action to ameliorate the current water crisis.[98] In the long term, the policies undertaken to determine the impact of population growth will spell the difference between a highly stressed water environment and one that can reasonably provide for its people.

### III. Water and Population Growth: A Volatile Mix

In chapters three and four evidence was presented as to how arid environmental conditions, consumption patterns and human induced alterations of the natural water systems serve to limit water availability. It was also demonstrated how population size plays a vital role in the amount of water available on a per capita basis. Indeed, there can be little doubt that current demographic trends in the countries reviewed are playing a most

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more research before they can play large roles in ameliorating the water predicament in the Middle East. Clarke, Water: The International Crisis, pp. 130-168; Helen Cordes, "Cistern Savvy: Collecting Rainwater Nets Free, Clean Water," Utne Reader, No. 57 (May/June 1993), pp. 78-79; Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," p. 15; George D. Moffett III, "Pouring Oil on Troubled Middle East Water," Christian Science Monitor (16 March 1990), p. 5; Vesilind, "Middle East Water - Critical Resource," pp. 51, 70.

[95]Strategic Survey 1991-1992, p. 230.

[96]Elliott, "The Global Politics of Water," p. 31.

[97]Kolars, "The Course of Water in the Arab Middle East," p. 68.

[98]Downey and Mitchell, "Middle East Water: Acute or Chronic Problem?" p. 4.

fundamental role in the water crisis. No amount of water technology or conservation measures will prove sufficient unless the population spiral is brought under control (see Table 5-1).[99]

Immunization campaigns, antibiotics, insecticides, improved sanitation and nutrition and a variety of other health technologies have led to a decline in death and infant mortality rates which have served to fuel natural population growth in Jordan, Turkey, Syria and Iraq. Decades of high growth rates have skewed the age structure sharply toward the young which in turn creates tremendous momentum for further growth as that group moves into child bearing age.[100] Meanwhile, the collapse of the Soviet Union has seen an unprecedented surge in migration of Jews to Israel accounting in large part for its rapid population growth.[101] As Falkenmark and Widstrand comment, "[i]n the Middle East, already suffering from severe water stress, the specter of continuous waves of new people paint an especially bleak picture."[102]

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[99]Moffett III, "Pouring Oil on Troubled Middle East Water," p. 5; Kolars, "The Course of Water in the Arab Middle East," p. 67.

[100]Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," p. 20; Marcel Leroy, "Human Population as a Factor in Strategic Policy and Action," in Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, ed. Arthur H. Westing (Oxford: Oxford University Press, 1986), p. 176.

[101]Starr, "Water Wars," p. 26.

[102]Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," p. 29.

*Table 5-1*

Demographic Data for Selected Countries: 1992

| | Population (thousands) | Doubling Time (years) | Total Fertility Rate* | Under Age 15 (%) |
|---|---|---|---|---|
| Iraq | 18,223 | 19 | 7.0 | 45 |
| Israel | 5,233 | 45** | 2.9 | 31 |
| Jordan | 3,557 | 20 | 5.6 | 48 |
| Syria | 13,730 | 18 | 7.1 | 49 |
| Turkey | 59,245 | 32 | 3.6 | 35 |

Source: Population Reference Bureau, World Population Data Sheet, 1992 (Washington, D.C.: Population Reference Bureau, Inc., 1992); United Nations, Global Review and Inventory of Population Policies, 1991 (New York: United Nations, 1992).
*Total Fertility Rate = average lifetime births per woman under current growth rates
**Figure is calibrated on the basis of the rate of natural increase; with immigration taken into account, the doubling rate for Israel would be between 25-35 years depending on the intensity of migration.

Setting target birth rates, death rates and total fertility rates (TFR -- the average total number of children born per woman under current growth rates) are positive first steps that states can take in an effort to bring population growth under control. Governments could also play a more active role in increasing the level of education and the number of job opportunities outside the home made available to women since they appear to have a strong correlation to reduced fertility rates.[103] Moreover, a growing body of evidence seems to indicate that government sponsored "user-friendly" family planning clinics are a highly effective mechanism in reaching what demographers call replacement level fertility or a two-child family average.[104]

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[103]Sharon L. Camp, "Population: The Critical Decade," Foreign Policy, No. 90 (Spring 1993), pp. 134-135; Peter J. Donaldson and Amy Ong Tsui, "The International Planning Movement," Population Bulletin, Vol. 45 (November 1990), p. 3; The Middle East, "Population: Children, Burden or Blessing," The Middle East, No. 224 (June 1993), p. 24.

[104]For these clinics to work effectively they must have affordable services; a wide array of cheap contraceptives; and quality personal counseling. Camp, "Population: The Critical Decade," p. 140. See also, Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," pp. 28-29. Robert J. Lapham and W. Parker Maudlin, "The Effects of Family Planning on Fertility

Studies have indicated that their most important contribution is in improving the availability and access to contraceptive services.[105]

However, though access to family planning units and contraception matters, so do attitudes and cultural values. For example, many Muslim women feel that their religion denies them the right to control the size of their families despite the fact that authoritative research has concluded just the opposite.[106] Cultural mores also frequently work to restrict a Muslim woman's access to educational opportunities. In addition, large families are considered a means of insurance against old age and an important status symbol throughout the Arab world.[107] This is evident in an age old Arab saying -- "El aouled met donia" (children are the wealth of the world). Islamic law encourages the realization of large families by allowing men to take up to four wives.[108]

Moreover, in geopolitical terms, demographic factors have an impact on the capability of states in that they are an indication of its present and future potential economic and military capability.[109] Thus, some of the countries reviewed in this thesis actually favor continuous population growth in the hopes of outnumbering their political enemies (see Table 5-

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Research Findings," in Organizing Effective Family Planning, eds., Robert J. Lapham and George B. Simmons (Washington, D.C.: National Academy Press, 1987), pp. 90-147. For a history of family planning see, Donaldson and Tsui, "The International Planning Movement," pp. 3-38.

[105]Donaldson and Tsui, "The International Planning Movement," pp. 20-25.

[106]See for example, Frances Mitsuka, "Islam and Birth Control: Not a Moral Conflict," The Middle East, No. 224 (June 1993), pp. 25-26.

[107]The Middle East, "Population: Children, Burden or Blessing," p. 24.

[108]Issam Hamza, "Home Life in Syria Tough for Women," Globe and Mail (21 August 1993), p. A9.

[109]Leroy, "Human Population as a Factor in Strategic Policy and Action," pp. 165-166.

2).[110] For example, Iraq is one of only six countries in the world that still restricts access to modern birth control methods.[111] Baghdad also offers generous incentives to Iraqi mothers willing to bear numerous babies including: liberal child allowances; greater access to rationed goods; and a multitude of tax breaks. On the arrival of a fourth child, families receive interest-free housing loans and mothers are entitled to a year's maternity leave with full pay.[112]

Israel's population policy is little better not only expressly encouraging higher fertility but also immigration. As de Sherbinin explains, Jerusalem actively encourages demographic growth through:

> incentives to increase fertility [such as] free medical services for pregnant women, one-time birth grants, child allowances, special allowances for third and higher parity children, and tax exemptions for working mothers. In addition, immigration law guarantee the rights of any Jew to immigrate to Israel and to receive government assistance for settlement.[113]

This last point is seen as especially important for Jerusalem because Arab birthrates within Israel and the Occupied Territories are 1.75-2 times higher than Jewish birthrates making immigration the great equalizer.[114]

On the more positive side, Turkey and, just recently, Jordan subsidize family services and have publicly run health clinics which distribute

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[110]Neville Brown, "Ecology and World Security," World Today (March 1992), p. 54; Falkenmark and Widstrand, "Population and Water Resources: A Delicate Balance," p. 2.

[111]Donaldson and Tsui, "The International Planning Movement," p. 24.

[112]Economist, "Survey of the Arab World," p. 5; Nazi Roudi, "Population Policies Vary in Middle East," Population Today, Vol. 21 (April 1993), p. 10.

[113]Alex de Sherbinin, "Spotlight on Israel," Population Today, Vol. 19 (April 1991), p. 12.

[114]de Sherbinin, "Spotlight on Israel," p. 12; James W. Moore, "Immigration and the Demographic Balance in Israel and the Occupied Territories," Middle East Policy, Vol. 1 (Fall 1992), p. 102.

contraceptives.[115] The case of Turkey is particularly instructive as to the beneficial impact which such actions can bring. After becoming the first Middle Eastern country to adopt family planning in 1965, the results were impressive as fertility rates plummeted from 5.0 between 1970 and 1975 to an expected average of 3.3 for the years 1990 to 1995; equally important, the number of married women using contraceptives doubled between 1974-1988.[116]

*Table 5-2*

Government View and Policy on Fertility Rates, Selected Countries

| | Government View | Government Policy | Government Policy (Access to Contraceptives) |
|---|---|---|---|
| Iraq | Too Low | Raise | Little or No Support |
| Israel | Too Low | Raise | Direct Support |
| Jordan | Too High | Lower | Direct Support |
| Syria | Satisfactory | No Intervention | Direct Support |
| Turkey | Too High | Lower | Direct Support |

Source: Nazi Roudi, "Population Policies Vary in Middle East," Population Today, Vol. 21 (April 1993), p. 3.

## IV. The Tepid Response to the Water Crisis

> "Yes, water problems are very interesting. But we're dealing with global warming this year." (Senior State Department official for the United States)[117]

With unique expertise on water management issues and projects for every imaginable purpose, the United States (US) is an excellent position to

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[115]Roudi, "Population Policies Vary in Middle East," p. 10.

[116]Donaldson and Tsui, "The International Planning Movement," pp. 22-23; Hammond, World Resources 1992-93: A Report by the World Resources Institute, p. 249.

[117]Quoted in Starr, "Water Wars," p. 35.

play a constructive role in responding to the emerging water crisis.[118] The US also has a long history of trying to broker an "even-handed" deal on Mideast water that began in 1948 when President Truman first proposed a conference on the joint use of the Jordan River Basin.[119] Indeed, the Johnston Plan of 1955[120] indicated "what might be done with great skill under appropriate conditions."[121] Moreover, as the only remaining superpower, only the US can persuade the states in question to return to the ideas of joint water development and planned water sharing.[122] Yet, there are few resources available for some of the most immediate priorities: improved data collection in the field; accelerated training programs for indigenous Middle Eastern water specialists; coordination between US government bodies and other

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[118]Starr, "Water Wars," pp. 31-32; Joyce R. Starr and Daniel C. Stoll, "U.S. Government Policy Structure," in their The Politics of Scarcity: Water in the Middle East (Boulder: Westview Press, 1988), pp. 125-137. At one time or another, the following federal agencies have been involved in water issues in the Middle East: Department of State (including the Bureau for Near Eastern and South Asian Affairs (NEA), Bureau of Intelligence and Research, and the embassy staffs in the relevant countries); The Bureau of Oceans and International Environmental and Scientific Affairs (OES); The United States Agency for International Development (USAID) (including its Bureau for Asia and Near East, The Office of Project Development, Office of Technical Resources, the desks for the pertinent countries are also involved in the process; The Bureau for Science and Technology which in turn oversees the work of the Water for Sanitation and Health Project (WASH)); United States Geological Survey (USGS); Bureau of Reclamation through its Division of Foreign Activities; United States Department of Agriculture (USDA) (including its Office of International Cooperation and Development (OCID), the Soil Conservation Service (SCS), and the Agriculture Research Service (ARS)); United States Department of Defense (including The Water Resources Management Action Group (WARMAG), the Defense Intelligence Agency (DIA), the United States Army Corps of Engineers); and the United States Environmental Protection Agency (EPA). The US also participates in the U.S.-Israel Binational Agricultural Research and Development Fund (BARD) and U.S.-Israel Binational Science Foundation (BSF).

[119]Cooley, "Middle East Water: Power for Peace," p. 2; Hoch "The Middle East Water Crisis," p. 17.

[120]See chapter 4, p. 25 and fn. 104.

[121]Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 196.

[122]Cooley, "Middle East Water: Power for Peace," p. 15; Cooley, "The War Over Water," p. 25.

donor governments and institutions; and investment in leading edge technologies. Sadly, the US government does not appear to have the desire to demonstrate significant global leadership on the water issue.[123] As a result, the American response has been ad-hoc, piecemeal and sorely lacking in a clearly articulated vision.[124]

Unfortunately, when the US does focus on strategic resources in the Middle East it thinks not of water but oil. In fact, an entire cottage industry of policy-makers, newsletters, seminars and think tanks have grown up around this resource in an effort to protect against all possible scenarios which might jeopardize its vital flow east.[125] But oil, for all its important functions, does not sustain life, especially in an exceptionally arid region where rainfall is scarce, rivers are scant and water, unlike oil, is shared.[126] According to Edward Badalto, former deputy assistance secretary for energy emergencies in the US Department of Energy, his government "is doing nothing" to prepare for possible water wars in the Middle East : "We haven't focused on the water problem. We're barely capable of focusing on oil."[127]

Multilateral organizations have shown little more interest and in contrast to the United States, have generally worked on the periphery of

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[123]Joyce R. Starr, "Water Politics in the Middle East," Middle East Insight, Vol. 7 (No. 2/3 1990), p. 64; Starr, "Water Wars," p. 32.

[124]Cooley, "Middle East Water: Power for Peace," p. 15; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 196; Starr, "The Quest for Water from Biblical Times to the Present," p. 1267.

[125]Elliott, "The Global Politics of Water," p. 27; Kolars, "Trickle of Hope," p. 17.

[126]Addeane S. Caelleigh, "Middle East Water: Vital Resource, Conflict, and Cooperation," in A Shared Destiny: Near East Regional Development and Cooperation, eds., Joyce R. Starr and Addeane S. Caelleigh (New York: Praegar Publishers, 1983), p. 121; Tal, "On the Banks of the Stormy Jordan: The Coming Middle East Water Crisis," p. 169.

[127]As quoted in Starr, "The Quest for Water from Biblical Times to the Present," p. 1267.

water disputes.[128] For starters not a single global agency has responsibility for water resource issues.[129] Hopes were raised that the United Nations (UN) might fill this void when it declared the 1980s to be the International Drinking Water Supply and Sanitation Decade. While billions were spent on water installations and sanitary facilities, almost no attention was focussed on the problem of diminishing water supplies and water conflict. Perhaps this was because neither the UN nor any other multilateral organization for that matter "has the effective political mandate or the charter to negotiate water controversies between countries unless specifically requested."[130] Even in the highly unlikely event that the UN was asked to intervene in the Euphrates or Jordan disputes, there is no internationally recognized legal regime for the exploitation and equitable sharing of surface or ground water by multiple states in which to base such intervention on.[131]

Various international law bodies such as the International Law Commission (ILC) of the UN and the International Law Association (ILA), have produced little on transboundary water supplies[132] other than proposed guidelines on the principles of "good neighborliness." After two decades of research and consultation, the ILC did manage to come up with a series of "draft articles" in 1991 on the non-navigable use of international water-

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[128]John E. Priest, "International Competition for Water and Motivations for Dispute Resolution," Agricultural Water Management, Vol. 21 (1992), p. 8.

[129]Clarke, Water: The International Crisis, p. 173.

[130]Starr, "Water Wars," p. 33. If approached, the UN has established the Environmentally Sound Management of Inland Water Resources (EMINWA) to "help countries sharing a river basin to develop their water resources in a sustainable manner and without conflict" through the development of new legal and institutional arrangements. Clarke, Water: The International Crisis, p. 107.

[131]Berschorner, "The Problem of Regional Rivalry," p. 12.

[132]As far as laws on international aquifers goes, they are virtually nonexistent. Robert D. Hayton, "The Law of International Aquifers," Natural Resources Journal, Vol. 22 (January 1982), pp. 71-93; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, pp. 5-6, 197.

systems which attempted to balance the competing demands of upstream and downstream countries. The thrust of the proposals were as follows: <1> upstream states should not divert rivers in a fashion that would cause appreciable harm to their downstream neighbors and that these matters should be subject to prior consultation between the appropriate parties; <2> each riparian state should utilize the water in a reasonable and equitable fashion.[133]

Such ambiguous utilitarian language serves only to create intractable conflict over terminology while doing little to facilitate conflict resolution.[134] At the same time, its open-ended nature provides an opportunity for each state to interpret it as it pleases either to justify or rationalize its appropriation of the waters in question or to serve its own rhetorical ends. Most importantly, there are absolutely no procedures to enforce these proposals.[135] As one international law professor states, "[t]he major problems are the law itself and particularly the lack of mechanisms to enforce the law."[136]

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[133]Berschorner, "The Problem of Regional Rivalry," p. 12; Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," pp. 501-518; Cohen, "International Law and the Water Politics of the Euphrates," pp. 518-528; Gretta Goldenmann, "Adapting to Climate Change: A Study of International Rivers and Their Legal Arrangements," Ecology Law Quarterly, Vol. 17 (Winter 1990), pp. 770-783; Hammond, World Resources 1992-93: A Report by the World Resources Institute, p. 174.

[134]Chenevert, "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," pp. 573-574; Hisham Zarour and Jad Isaac, "Nature's Apportionment and the Open Market: A Promising Solution to the Arab-Israeli Water Conflict," Water International, Vol. 18 (March 1993), pp. 44-49.

[135]Cohen, "International Law and the Water Politics of the Euphrates," p. 553. However, non-compliance can affect funding decisions by international donors such as the World Bank. Berschorner, "The Problem of Regional Rivalry," p. 12.

[136]Cohen, "International Law and the Water Politics of the Euphrates," p. 528. See also Clarke, Water: The International Crisis, p. 106.

Those countries that have effective, stable agreements over shared water systems generally have as a minimum civil relations (e.g. Canada-US). Hostile political and military relations, state self-interest and the dichotomy of interests and incentives for upstream and downstream states appear to be the most formidable barriers to dispute resolution.

## V. Conclusion

Urgent action is needed to ameliorate the impending water catastrophe. Highlighting water resource management as fundamental to regional security and stability is an integral first step that can be taken by the US and other relevant parties.[137] A tangible show of support in the form of increased funding directed to water research and development programs must be made despite the current global economic malaises because the probable alternative, the unacceptable specter of war over water, would prove to be far more costly. American technical and monetary assistance is key to making this a reality.[138] A particularly helpful response from the United States would be to reverse its historically low level of funds for solar research and development given its especially important applications to desalination.[139] At the regional level, a water-sharing conference bringing together technical experts, national decision-makers, key donor agency officials and the international financial community might be organized by the United States.[140] At the global level, an international program aimed at

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[137]Starr, "Water Wars," p. 34.
[138]Cohen, "International Law and the Water Politics of the Euphrates," p. 555.
[139]Osborn, Sierka, and Latif, "Water Problems, Solar Solutions: Applications of Solar Thermal Energy to Water Technologies," p. 89.
[140]Starr, "Water Politics in the Middle East," p. 69.

developing a medley of supply and demand management solutions, similar in style and creativity to the US Manhattan and Apollo projects, is required.[141]

In addition, there must be a better level of integration and planning among the donors. For the US this means developing long-term policy goals and much more coordination among its agencies dealing with water resources.[142] A new interagency committee to coordinate and formulate these efforts would be helpful as would the creation of a centralized data base on water projects to reduce duplication and in order to share information and expertise.[143] A regional hydrological data bank under the auspices of the UN would also be useful and help to mollify the disputes over the validity, interpretation and implications of the information.[144] At the global level an international agency dealing exclusively with water resource issues should be formed. Finally, future water related assistance directed to donor countries must be made contingent on the "determined efforts to institute appropriate pricing and management policies."[145]

Ultimately, however, a wide-ranging political settlement is desirable because without it, binding multilateral agreements over water use or the establishment of international water commissions to adjudicate disputes will never be realized.[146] A reasonable question to ask at this point is whether the issue of water scarcity might serve as the catalyst for a comprehensive peace just as easily as it might precipitate violent conflict. In fact, it has been argued that cooperation, however fleeting, may arise on occasions when self-

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[141]Kolars, "Trickle of Hope," p. 21; Naff and Matson, Water in the Middle East: Conflict or Cooperation?, p. 197.

[142]Starr and Stoll, "U.S. Government Policy Structure," pp. 136-137.

[143]Ibid., p. 137; Tal, "On the Banks of the Stormy Jordan: The Coming Middle East Water Crisis," p. 174.

[144]Downey and Mitchell, "Middle East Water: Acute or Chronic Problem?" p. 4.

[145]Starr, "Water Wars," p. 34.

[146]Strategic Survey 1991-1992, p. 221.

interested states are faced with a common threat. As Starr has suggested, a creative, cooperative response to the current water conflict in the Middle East could expedite the path to a broader peace.[147]

In a particularly relevant study, Stein states that when actors are faced with a common self-interest (i.e. water security) in avoiding a particular outcome (i.e. water scarcity), the stage is set for the formation of a regime.[148] The rationale behind this is that states will seek collaborative means if only to ensure the avoidance of a particular outcome brought about by the independent decision making of each actor. Under such conditions, state self-interest might be achieved only by eschewing autonomous decision making in favor of regime formation in order to avoid outcomes that are mutually undesirable or better to achieve the most desired outcome.[149]

In the Euphrates and Jordan River Basins the individual use of the waters by the states in question has clearly led to an undesirable outcome. This is because all of the parties involved have shown little or no restraint in their exploitation of the available water leading to the serious depletion of that valuable resource. Each state would prefer to be the only user of the

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[147]Starr, "Water Wars," p. 36; see also Savage, "Middle East Water," p. 10.

[148]Arthur A. Stein, "Coordination and Collaboration: Regimes in an Anarchic World" in International Regimes, ed. Stephen D. Krasner (Ithaca: Cornell University Press, 1983), pp. 115-140. Regimes can be understood as a set of "implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations." Regimes are seen by its proponents as vehicles by which common interests can be attained and/or differences can be accommodated. Robert O Keohane, International Institutions and State Power (Boulder: Westview Press, 1989); Stephen D. Krasner, "Structural Causes and Regime Consequences: Regimes as Intervening Variables," in his International Regimes (Ithaca: Cornell University Press, 1983), p. 2; Paul R. Viotti and Mark V. Kauppi, International Relations Theory: Realism, Pluralism, Globalism (New York: Macmillan Publishing Co., 1987), p. 210.

[149]Arthur A. Stein, Why Nations Cooperate: Circumstance and Choice in International Relations (Ithaca: Cornell University Press, 1990), pp. 22, 185.

water, but since that is not possible, the result is the joint unrestrained use of the water and a suboptimal outcome for all involved. As Stein explains:

> Each actor would rather share in such use of the resource that leads to to the depletion than to see its own restraint allow either the continued existence of the resource for others' use or the disappearance of the resource because the others show no restraint. The actors have a common interest in moving from their suboptimal (but not least preferred) outcome to one in which they exercise mutual restraint by collaboratively managing the resource."[150]

Thus perhaps out of this common interest, water might produce "convergent cooperation" in the Middle East rather than conflict. Indeed, the current US sponsored Middle East peace process shows signs that water is finally being treated as it deserves to be: a seminal issue that has the importance to make or break peace negotiations. According to Kolars, who was a special consultant to the participants of the subcommittee on water issues, all the negotiators recognize that water is a most decisive element in forging a peace between the parties to the conference.[151] In fact, there is little question that the only lasting solution to the crisis is an agreement, in the context of a peace settlement, which regulates the use of the Jordan River Basin's waters.[152]

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[150]Stein, "Coordination and Collaboration: Regimes in an Anarchic World" p. 129.

[151]Kolars, "Trickle of Hope," p. 17.

[152]Tal, "On the Banks of the Stormy Jordan: The Coming Middle East Water Crisis," p. 174; Zarour and Isaac, "Nature's Apportionment and the Open Market: A Promising Solution to the Arab-Israeli Water Conflict," p. 52. As the head of the Palestine Liberation Organization remarked, the question of water rights is inseparable from the political conflict. Voice of the Mountain, "Arafat Views Israel's Aims in South Lebanon" (text) Voice of the Mountain in Arabic to Lebanon (6 June 1991). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 7 June 1990 (FBIS-NES-91-110, p. 1).

Despite the recognition that water is a crucial element at the talks, so far there has been a noticeable lack of substantive discussion; instead procedural haggling has carried the day. As Lowi explains:

> The discussions have not gone far beyond agreement on the obvious: that there is not enough water in the region, that consumption demand is growing, that water quality has been deteriorating rapidly.[153]

As was alluded to in chapter four, the Israeli and Palestinian delegations have made depressingly little progress on the subject,[154] while Jordan and Israel have made cooperation contingent on solution to the Palestinian question.[155]

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[153]Lowi, "Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water," p. 113.

[154]"Mideast Accord: The Document," New York Times (15 September 1993), p. A7. Any future Israeli-Palestinian agreement will clearly limit the water quotas of the Palestinians and will have to guarantee Israeli supervision over water sources. It has been suggested that if Israel concedes territory on the West Bank it might retain authority over a 2-6km band of land on the hill ridge overseeing the West Bank to safeguard its supplies from the Yarkon-Taninim [or Mountain] aquifer. However, this is something the Palestinians find unacceptable; instead they feel they should have unilateral control over what they regard as their natural resource in accordance with the principles of self-determination. Lisa Beyer, "Bitter Medicine Israel has to Swallow," Time (13 September 1993), p. 24; Clyde Haberman, "Water and Concessions Can Mix, Israeli Study Says," New York Times (10 October 1993), p. A6; Kolars, "The Course of Water in the Arab Middle East," p. 67; "Palestinian Working Paper on Water," (text) Algiers Voice of Palestine in Arabic (17 September 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 21 September (FBIS-NES-92-183, pp. 5-7); Strategic Survey 1991-1992, p. 225.

[155]Although the two sides have agreed to discuss the issue following the signing of the so-called "agenda" for peace negotiations. Associated Press, "Israel and Jordan to Sign Deal," Globe and Mail (11 September 1993), p. A5; Chris Hedges, "Jordanians Ready to Begin Carrying Out Israel Accords," New York Times (15 September 1993), p. A6. Jordan and Israel have reportedly been discussing proposals for a joint hydroelectric power station and a desalination unit on the Mediterranean with a canal linking to Jordan pending a settlement to the political conflict is arrived at. Israel has also apparently expressed a willingness to approve the building of Jordanian-Syrian Wahda dam if: <1> a peace plan between the Arab states and Israel is reached; and <2> a water distribution strategy is agreed to within that framework. AL-BAYAN, "Jordan, Israel Reportedly Agree on Dam Project" (text) Dubayy AL-BAYAN in Arabic (30 April 1992). Translation by the Foreign Broadcast Information Service.

Worse, Syria has refused to discuss the water issue until Israel agrees to return the Golan Heights to Syrian sovereignty. Israel, on the other hand, has repeatedly stated that it will not contemplate "territorial concessions without guarantees that its water supply will be safeguarded."[156] Perhaps the recent Israeli-PLO Pact lends the most hope for a future breakthrough on this front if the momentum generated from that historic agreement can be successfully exploited.

As far as the problems along the Euphrates River go, the evidence presented in chapter three indicated that Turkey has continually expressed no interest in negotiating any accords concerning the sharing of the waters with Iraq and Syria. The Syrian-Iraqi-Turkish technical committee on water talks have now met almost 20 times and have produced no tangible results except some exchanges of information relating to climatic and hydrological conditions as well as a few sporadic technical details with respect to new dam

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FBIS Daily Report - Near East and South Asia, 4 May 1992 (FBIS-NES-92-086, p. 2); Nurit Arad, "Desalination Plant Planned for Gaza, South Israel," (text) Tel Aviv YEDI'OT AHARONOT in Hebrew (15 June 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 16 June 1992 (FBIS-NES-92-116, pp. 17-18); Jerusalem Israel Television Network, "European Firm to Check Possible Canal," (text) Jerusalem Israel Television Network in Hebrew (1 November 1992) Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 6 November 1992 (FBIS-NES-92-216, p. 33); Hemi Shalev, "Israel, Jordan Said Ready to Sign Water Accord" (text) Tel Aviv DAVAR in Hebrew (10 December 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 10 December 1992 (FBIS-NES-92-238, p. 1); Rami Tal, "Ultra-Orthodox Jews Join Palestinian Delegation" Tel Aviv YEDI'OT AHARONOT in Hebrew (29 April 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 30 April 1992 (FBIS-NES-92-084, p. 7).

[156]Jordanian Press Team, "Interview With Syrian Information Minister," (text) Amman AL-DUSTUR in Arabic (19 November 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 24 November 1992 (FBIS-NES-92-227, pp. 44-45); Strategic Survey 1991-1992, p. 225.

developments.[157] Turkey's continued intransigence does not bode well for the future at a time when Syria and Iraq are moving to an increasingly militant stance which links their general relations with Ankara to a water resolution.[158] Perhaps the best hope here would be a European led initiative to allow Turkey slow or even partial entry into the European Community, something it has continually sought, in return for producing a water-sharing treaty with its downstream riparian states. Europe would also benefit in that its actions would go a long way to ensuring the stability of a region (and hence oil supply) on its back door.[159]

In the unlikely event that a plan on water allocation was reached, it would have to include the United Nations because there is no regional organization to act as enforcer in the area.[160] Such an agreement would also need the support of the US because "[a]bsent the power and the will of the U.S. behind it... the U.N. becomes like a judge issuing sentences and decrees he cannot enforce."[161] Clear sanctions and punishment to deter violations must also be spelled out. Furthermore, any treaty should include the following provisions at a minimum: <1> water allocations including a minimum river flow regardless of weather conditions; <2> water quality standards that would ensure a minimum quality level; <3> dispute

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[157]INA, "Turkey Urged to Consult on New Euphrates Data Project" (text) Baghdad INA in Arabic (24 January 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 26 January 1993 (FBIS-NES-93-051, p. 31).

[158]Muhammad Allam, "Water Dispute with Turkey Escalates," (text) London AL-HAYAH in Arabic (24 December 1992). Translation by the Foreign Broadcast Information Service. FBIS Daily Report - Near East and South Asia, 30 December 1992 (FBIS-NES-92-251, p. 44).

[159]Cohen, "International Law and the Water Politics of the Euphrates," p. 549; Bruce R. Kuniholm, "Turkey and the West," Foreign Affairs Vol. 70 (Spring 1991), pp. 34-35.

[160]Cohen, "International Law and the Water Politics of the Euphrates," p. 554.

[161]Richard Gywn, "A Reborn U.N.: If Offers New Hope for World Security," Toronto Star (17 November 1990), D1.

resolution procedures with teeth; and <4> a shared, central data bank with hydrological information preferably under international auspices.

With respect to the important question as to whether interstate water problems can be resolved before the larger political questions in the Euphrates and Jordan River Basins are addressed, one thing is certain: an apathetic approach to water problems in the Middle East will doom any peace initiative. Nonetheless, any innovative initative faces the particularly formidable barrier to cooperation of reconciling the dichotomy of interests and incentives for upstream and downstream states. Moreover, the fruitlessness of negotiations over shared water resources in the two areas reviewed suggest that under conditions of water scarcity, cooperation becomes less probable, not more probable. Unfortunately, in a world characterized by conflict, competition and uncertainty, states "often fail to cooperate even in the face of common interests."[162] As Naff and Matson argue, as a state moves into a position of full utilization and shortage, national positions tend to become considerably more rigid, adding to the probability of discord, conflict and the propensity of the states to calculate their interests in a zero-sum or negative-sum fashion with regard to water issues.[163] Indeed, in the absence of political understanding between the relevant countries or a sudden change in current demographic patterns, perhaps the most important and realistic hope for the immediate future of the region is technological improvement along with more efficient management of the resource.[164]

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[162]Joseph M. Grieco, "Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism," International Organization, Vol. 42 (Summer 1988), pp. 487-488.

[163]Naff and Matson, eds., Water in the Middle East: Conflict or Cooperation?, p. 227.

[164]Lonergan and Kavanagh, "Climate Change, Water Resources and Security in the Middle East," p. 285.

# *Chapter 6*

# Conclusion

In the Middle East, where water rarely coincides with international borders, arid climatic conditions, unilateral hydrological developments, questionable consumption patterns and exploding populations have inadvertently joined forces to produce a situation where demand is beginning to outpace supply. While the total amount of water is not insignificant, its erratic distribution and the dependent nature of downstream states on upstream riparian states for their water security create considerable problems particularly in light of the fact that this is a region where political and military hostilities are rampant. The last point has helped to ensure that a comprehensive water-sharing agreement in the Euphrates and Jordan River Basins will remain unlikely.

Conversely, war over scarce water resources must be seen as a real possibility given the evidence presented in this thesis. In fact, water plays an integral role in shaping the politics of the region. Iraq, Israel, Jordan, Syria, and Turkey all view water as a crucial strategic asset and a powerful political weapon with the potential to act as a destabilizing influence on the regional balance of power. The large concentration of sophisticated weaponry which coincides with a plethora of historical, cultural, ideological, ethnic, religious and territorial disputes further exacerbates water related tensions. Thus, the region is ripe for renewed conflict if the present endemic water scarcity continues to deteriorate.

## Review of the Thesis Material

While chapter one served as an introduction, in chapter two, several propositions were advanced with respect to the relationship between acute interstate conflict and a declining resource base. The competing spurious and deterministic approaches to understanding the relationship between

environmental change and conflict were shown to have serious limitations and shortcomings.[1] The former seemed to be overly optimistic, naive and fly in the face of available evidence. The latter, on the other hand, was too simplistic and did not account for the many intervening variables likely to be at work ruling out a strictly deterministic correlation. Thus, it was advanced that the best way to view environmental degradation is as a contributing cause to conflict -- notwithstanding the fact that environmental issues are extraordinarily complex and do not lend themselves well to concise analysis.

It was then put forward that those resources likely to be most contested would be ones that are: <1> necessary for human existence; <2> transboundary in nature; <3> in demand beyond available supply; and <4> capable of being physically seized and commanded. It was suggested that these could be termed supersalient resources because of their vital nature. In light of the importance of supersalient resources, it was argued that such resources might serve as a catalyst for acute interstate conflict -- defined as a hostile encounter between two or more states involving a high probability of violence including war -- if acrimonious relationships between the relevant states were severe. Indeed, under such conditions it was expected that cooperation would be highly improbable, if not impossible.

In chapters three and four the validity of these propositions was tested through the analysis of water as a supersalient resource in the Euphrates and Jordan River Basins. First, water was shown to be necessary for human existence because of the multitude of important functions it serves.

Second, the division of surface water that overlapped national territories is the central problem in both instances. Turkey, Syria and Iraq

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[1]The spurious approach rejects the connection between environmental decay and conflict while the deterministic approach sees environmental decline, in some cases, as the sole cause of conflict.

share the waters of the Euphrates while Israel (including the Occupied Territories), Syria and Jordan compete for the waters of the Jordan River Basin which include the Jordan, the Yarmuk and substantial subsurface stocks. In each instance, the alternative sources of supply for Turkey, Syria, Iraq, Israel and Jordan are limited or nonexistent.

Third, the evidence does seem to indicate that demand is rapidly exceeding, if not beyond, available supply in the case studies reviewed. The factors most responsible for this state of affairs are: <1> rapid population growth rates which are among the highest in the world; <2> wasteful consumption patterns -- especially the large allocation given to the water "greedy" agricultural sector <3> unilateral hydrological developments which restrict the flow of water flowing downstream; and, <4> the presence of unfavorable climatic conditions. Only Turkey has relatively abundant supplies while the situation in Jordan and Israel is rapidly approaching catastrophic proportions. Iraq and Syria also face grave shortages and could have water deficits approaching what is currently being experienced in Jordan and Israel within a decade.

Finally, the example of the Six-Day War reveals that water is capable of being seized and transferred from the sovereignty of one country to another. The total volume captured as a result of the 1967 war was as much as 50 percent of Israel's pre-war reserves. The long history of conflict between the relevant parties suggests that if violent confrontation were to erupt again in the future, water seizure might be an important war aim. Water might also serve as an offensive instrument or target of war. Upstream countries, for example, could seek to restrict the flow of water moving across their borders in times of conflict. Meanwhile, there are plenty of instances in which water related projects have been targets. Most recently, during the 1991 Persian Gulf

War, both sides inflicted considerable damage on each other's respective water systems. While Baghdad's modern water supply and sanitation system was destroyed, Kuwait lost two of its six desalination plants which supply 100 percent of the water for its urban centers. In general, dams and other large-scale hydrological installations tend to be highly vulnerable to enemy attack.

The fruitlessness of negotiations over shared water resources in the two case studies reviewed highlights the fact that under conditions of water scarcity cooperation becomes less probable as a constant set of actors (i.e. states) competes for a diminishing share of the pie (i.e. water). Conversely, the atmosphere of political and military friction that was demonstrated in chapter three between Turkey, Syria and Iraq on the one hand, and in chapter four between Israel, Syria and Jordan on the other, appears to ratchet up water-related tensions and add to the probability of discord, conflict and the propensity of the states to calculate their interests in a zero-sum or negative-sum fashion with respect to water issues. As Naff and Matson comment, as a state moves into a position of full utilization and shortage, national positions tend to become considerably more rigid.[2] Thus water provides fuel to political and military hostilities and vice versa.

Given such conditions, the probability of equitably dividing and sustainably managing the contested water resources within the context of political cooperation must be seen as highly unlikely for either river basin in the immediate future. Sadly, a more plausible scenario would see water acting as a trigger for acute interstate conflict.

In the Euphrates River Basin, Turkey as the highest riparian has pursued an extensive and ambitious development program of hydrological

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[2]Thomas Naff and Ruth C. Matson, eds., Water in the Middle East: Conflict or Cooperation? (Boulder: Westview Press, 1984), p. 227.

works. The continuing reduction in the quantity and quality of the flow of the waters as it moves downstream suggest that in spite of the markedly bad relations between Syria and Iraq, a "marriage of convenience" against a militarily weaker Turkey is the alignment most conducive to conflict over the Euphrates. Two other scenarios are also plausible. A unilateral attack by either downstream nation against Turkey would be strategically more dangerous but could occur if either Syria or Iraq felt so outraged by continuing Turkish diversions of Euphrates water that it felt that military action was the only solution. A conflict pitting Syria against Iraq might also occur given the especially intense antagonism between the two regional rivals and Syria's ability to influence the quantity and quality of water flowing from its borders to Iraq. However, the relative military parity between the two countries in question indicates that this is the least likely of three scenarios presented here. While such outcomes may seem implausible in the short term, the overall prospect is gloomy and one can expect a steadily rising potential for water conflict in this river basin in the continuing absence of a water-sharing agreement.

The Jordan River Basin meanwhile has historically witnessed more severe international conflict over water than any other river catchment area in the region. The water situation in the Jordan River Basin is so grave that one could easily see this area continuing to be a flashpoint for water related conflicts. Despite some recent advances by the parties to the peace process, it is not inconceivable to imagine acute interstate conflict over the Yarmuk. If for example, Syria and Jordan were to move ahead with the the so-called Unity dam project along the Yarmuk without Israeli approval, the latter would consider this a serious threat to its security and would likely take action to make sure that such development was not realized. A Jordanian-Syrian

engagement is also not out of the question given Syria's continuing drive to impound the waters of the upper Yarmuk in light of its failures to reach an accord with Turkey and Iraq along the Euphrates; however, Jordan, because of its relatively weaker strategic position, would not initiate such a campaign without meaningful outside support. Should Damascus continue with this policy, an alignment pitting Jordan and Israel against Syria might be created -- as unlikely as it now seems given the current political climate. Suffice it to say, water remains one of the primary obstacles to a comprehensive and lasting peace between Israel, its Arab neighbors and the Palestinians. The general conclusion arising from the various considerations here is that water is likely to continue to be a source of tension in the region in the absence of a substantive understanding over water accompanied by an overall lessoning of frictions between the parties to the dispute.

Despite the gravity of the current situation, acute interstate conflict is not necessarily an inevitable outcome. In chapter five a number of supply and demand management solutions were presented and evaluated. It was determined that demand management solutions, those that modify human behavior in a fashion commensurate with water use efficiency (e.g. improved irrigation methods), held more promise because they are cheaper, easier to implement and ecologically less damaging than supply side alternatives -- those developments that actually increase the amount of water available for use (e.g. desalination). The demographic trends in the respective countries were also discussed as were a number of proposals that might serve to bring about a reduction in the staggering population growth rates. In addition, the tepid response to the water crisis by government and non-governmental actors was indicated as well as the lack of an internationally accepted legal regime. In the concluding section a number of conflict resolution measures

were suggested with a special emphasis on the positive role the United States and other multilateral organizations could play in helping to avert the growing water predicament. In addition, it was suggested that while technological solutions are important, they are not sufficient for any of the entities involved. This is because:

> the problems are the result of the people, culture, history, and politics and technology does not address these... [while] technology extends the range of the possible, it does not necessarily resolve the problem.[3]

Thus, ultimately a wide-ranging political settlement was considered desirable, though not probable in the near future.

Indeed, despite intensive discussions there has yet to be anything approaching a comprehensive settlement on water resource issues. In the Euphrates River Basin, countless meetings under the auspices of the tripartite ministerial and technical committees charged with finding a solution to the problem of water sharing have produced no tangible results. More worryingly, in recent months, Ankara has moved to an increasingly intransigent position at a time when Syria and Iraq are beginning to link general relations with Turkey to a water resolution. One important observation that can be drawn here is that upstream riparian states appear to have far less natural incentive to negotiate than downstream riparian states. In other words, the better a country's hydrostrategic position, the less interest it has in reaching an agreement over shared waters.[4]

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[3]Quote from participant to a conference on *The Middle East Water Crisis: Creative Perspectives and Solutions* in Terrence J. Downey and Bruce Mitchell, "Middle East Water: Acute or Chronic Problem?," Water International, Vol. 18 (March 1993), p. 4.

[4]Aaron Wolf, "The Jordan Watershed: Past Attempts at Cooperation and Lessons for the Future," Water International, Vol. 18 (March 1993), p. 8.

In the Jordan River Basin, the recent breakthroughs in the peace process should not obscure the fact that there has been a noticeable lack of substantive discussion on the equitable divisions of its waters between the relevant states. The euphoria around the Israeli-Palestinian accord does not mean that these contentious water issues are going be made any easier to resolve. In fact, the Israeli and Palestinian delegations have made little or no progress on the subject. The status of the West Bank aquifers is especially problematic and it is uncertain as to whether this contentious issue can be resolved to the satisfaction of both parties. Israel and Jordan meanwhile have made cooperation contingent on a permanent solution to the Palestinian question although they appear to have worked out at least some of the details for a potential water sharing accord. As for Syria and Israel, the former refuses to discuss the issue until the latter agrees to restoring lost territory. Israel, on the other hand, is firmly opposed to such measures without guarantees that its water supply will remain secure. Thus, as noted earlier, water remains one of the primary obstacles to a broad-based and lasting peace between Israel, its Arab neighbors and the Palestinians.

In an effort to maintain and better their standard of living, states and individuals are competing for an ever decreasing amount of water in the Middle East.[5] Disputes over the control and use of shared water supplies is the fundamental issue in the clash over the waters of the Euphrates and Jordan River Basins. Each state has attempted to maximize its own use to the detriment of others which has precluded the optimal utilization of the waters through a comprehensive water-sharing treaty. Such an agreement is

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[5]Donald J. Chenevert, Jr. "Application of the Draft Articles on the Non-Navigational Uses of International Watercourses to the Water Disputes Involving the Nile River and the Jordan River," Emory International Law Review, Vol. 6 (Fall 1992), p. 575.

required in the end because water systems are ignorant of political boundaries and thus such problems can not be solved unilaterally. Political and military friction between the riparian states also exacerbates this predicament and contributes to the difficult of reaching an accord.

Meanwhile water shortages in the two river basins are rapidly becoming issues of life and death as water problems continue to grow. At best, the provincial viewpoints of each of the entities to the dispute will succumb to the greatest possible good to produce a framework of peace in which the equitable division of water is a key component. At worst, the Middle East will be visited again with the specter of war, a war likely to be far more violent and costly then anything in recent memory.

Thus, the world community can ill afford to do nothing. In fact, the role of external powers in catalyzing a regional water-sharing agreement through some sort of wide-ranging conference bringing together technical experts, national decision-makers, key donor agency officials and the international financial community, could prove to be the difference between peace and war. Ultimately, of course, the end of the conflict over water must be desired by the combatants themselves. Let us hope then that the desire to reach a new *Pax Aquaram* in the Middle East is stronger than the temptation to war.

## *Appendix A*

### Defence Configuration: Selected Countries, 1992

| | Turkey | Iraq | Syria |
|---|---|---|---|
| Population | 58,103,600 | 18,400,000 | 13,186,600 |
| Gross Domestic Product | $115.32bn* (1991) | $40.78bn (1990) | $13.89bn (1991) |
| Defence Budget | $4.18bn (1992) | $8.61bn (1990) | $1.13bn (1991) |
| Strategic Capability | None | None | None |
| Active Armed Forces | 560,300 | 382,500 | 408,000 |
| Reserves | 1,107,000 | 650,000 | 400,000 |
| *Army* | 450,000 | 350,000 | 300,000 |
| Main Battle Tanks | 4,042 | 2,300 | 4,600 |
| Armored Personnel Carriers | 3,860 | 2,000 | 1,500 |
| Total Artillery | 4,235 | Insufficient Data | 3,128 |
| Air Defence Guns | 1,285 | 5,500 | 1,985 |
| Surface to Air Missiles | 12 Rapier, Stinger Redeye 150 | SA-2/-3/-6/-7/-8/-9/-13/-14/-16, Roland | SA-7/-9, 20 SA |
| *Navy* | 52,300 | 1,000 | 8,000 |
| Submarines | 12 | 0 | 3 |
| Destroyers and Frigates | 20 | 1 | 2 |
| Patrol and Coastal Combatants | 47 | 10 | 30 |
| *Air Force* | 58,000 | 30,000 | 40,000 |
| Combat Aircraft | 540 | 336 | 639 |
| Armed Helicopters | 45 | 120 | 100 |

| | Syria | Israel | Jordan |
|---|---|---|---|
| Population | 13,186,600 | 5,090,000 | 4,410,000 |
| Gross Domestic Product | $13.89bn (1991) | $58.43bn (1991) | $4.11bn (1991) |
| Defence Budget | $1.13bn (1991) | $6.76bn (1992) | $0.508bn (1992) |
| Strategic Capability | None | Nuclear (± 100) | None |
| Active Armed Forces | 408,000 | 175,000 | 99,400 |
| Reserves | 400,000 | 430,000 | 35,000 |
| *Army* | 300,000 | 134,000 | 85,000 |
| Main Battle Tanks | 4,600 | 3,890 | 1,131 |
| Armored Personnel Carriers | 1,500 | 5,000 | 1,100 |
| Total Artillery | 3,128 | 7,020 | 650 |
| Air Defence Guns | 1,985 | 850 | 360 |
| Surface to Air Missiles | SA-7/-9, 20 SA | Stinger, Redeye | SA-7B2/-8/-13/-14/-16, Redeye |
| *Navy* | 8,000 | 10,000 | 400 |
| Submarines | 3 | 3 | 0 |
| Destroyers and Frigates | 2 | 0 | 0 |
| Patrol and Coastal Combatants | 30 | 61 | 3 |
| *Air Force* | 40,000 | 32,000 | 14,000 |
| Combat Aircraft | 639 | 662 | 113 |
| Armed Helicopters | 100 | 93 | 24 |

Source: The Military Balance, 1992-1993 [as cited in Asia-Pacific Defence Reporter, Vol. 19 (Dec. 1992/Jan. 1993)], pp. 110-111, 132-134, 138-139.
*All figures in US dollars.

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