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Come Hell or High Water: A Water Regime for the Jordan River Basin

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NOTES

COME HELL OR HIGH WATER: A WATER REGIME FOR THE JORDAN RIVER BASIN

And the spirit of G-d hovered over the waters.

—Genesis 1:2

On the last day and greatest day of the festival, Jesus stood there and cried out:

“If any man is thirsty, let him come to me!”

Let the man come and drink who believes in me!’

As scripture says: From his breast shall flow fountains of living water.

—John 7:37-38

O ye who believe! Draw not near unto prayer when ye are drunken, till ye know that which ye utter, nor when ye are polluted, save when journeying upon the road, till ye have bathed . . . and [if] ye find not water, then go to high clean soil and rub your faces and your hands (therewith). Lo! Allah is Benign, Forgiving.

—Qu’ran, Surah IV 43¹

I. INTRODUCTION

Water flows through over 200 verses of the Hebrew Bible, over 100 verses of the Christian New Testament, and over 50 verses of the Koran.² In the Middle East, water is the essence of both spiritual and physical life. However, it is not plentiful; the water situation in the Middle East is of crisis proportions. The Jordan River Basin (“Basin”) is a primary water source for Israel, Jordan, the Palestinian Authority, Syria, and Lebanon. Population and industrial growth will deplete all available water in the Basin within fifteen

1. THE MEANING OF THE GLORIOUS KORAN 98 (Marmaduke Pickthall trans., 1992).

2. JOYCE SHIRA STARR, COVENANT OVER MIDDLE EASTERN WATERS 9 (1995) [hereinafter STARR, COVENANT]; Joyce Shira Starr, Address at the Jewish Community Centers Association Book Festival (Nov. 9, 1995) [hereinafter Starr, Address].

years.³

The Basin's water sources will be a core issue in all final peace negotiations among those dependent countries.⁴ However, the importance of water as an essential element of life often prevents calm and detached negotiations.⁵ In the early 1990s, negotiators of the Basin made significant progress toward peace.⁶ However, the negotiators did not discuss the water of the Basin on a comprehensive level. It is essential that once the groundwork for peace is in place,⁷ a comprehensive plan for managing the limited waters and resolving disputes that arise over those waters already exist.

This Note explores the legal background of the situation surrounding the waters of the Basin and recommends a legal regime to govern its future. Part II generally describes the physical environment of the region and specifically describes the environment of the riparian entities. Part III explains the principles and laws that govern international water management. Part IV explores the unsuccessful past attempts to use these principles to address the water situation in the Basin. Part V recommends a managerial system based on that organized between the United States and the United Kingdom in the Boundary Waters Treaty of 1909.

II. THE JORDAN RIVER BASIN AND THE RELATED COUNTRIES

A. *The Basin Generally*

The land surrounding the Basin includes Israel, Jordan, the West Bank (part of the Palestinian Authority), Syria, and Lebanon.⁸ The Basin drains

3. Starr, Address, *supra* note 2. For a comparison of populations, water supply, and water demand among the riparian states, see chart *infra* note 33.

4. See Julian Ozanne & David Gardner, *Middle East Peace Would Be a Mirage Without Water Deal*, FIN. TIMES, Aug. 8, 1995, at 3 (discussing the Israeli-Palestinian peace process and the effect of water on the plans).

5. See *id.* (discussing the level of citizens' attachment to the land and water sources). "In a country scarred by cyclical drought and built on a new spiritual attachment to the land and agriculture, any surrender of control over water sources provokes near hysteria." *Id.*

6. See *infra* Part IV.B (discussing the various peace treaties and agreements and their impact).

7. The peace negotiations of the 1990s have been a piece-meal process in which the most difficult issues, such as water and Jerusalem's status, are not addressed until the end of the negotiations. See *infra* notes 187-94 and accompanying text (discussing the process of peacemaking).

8. For further descriptions of the Basin, see Dante A. Caponera, *Legal Aspects of Transboundary River Basins in The Middle East: The Al Asi (Orontes), The Jordan and The Nile*, 33 NAT. RESOURCES J. 629, 635-38 (1993); Randal Deshazo & John W. Sutherlin, *Reassessing the Middle Eastern 'Peace Pipeline' in the Aftermath of the Gaza-Jericho Agreement* (1994) <gopher://inic.utexas.edu:70/11/menic/mebases/events/misc/water/peacepipeline>; and Peter H.

18,300 square kilometers⁹ and extends from Mount Hermon to the Dead Sea.¹⁰ The primary focal point of the Basin is the Jordan River ("River"). The River is fed by three main high-quality water sources: the Dan River, the Hasbani River, and the Banias Springs.¹¹ Fourteen kilometers from its beginning, the River drops 280 meters¹² and flows into Lake Tiberias.¹³ From the lake, the River takes a circuitous route of 100 kilometers to the Dead Sea.¹⁴ In its trip to the Dead Sea, the river valley rarely widens more than 6.4 kilometers.¹⁵

Several other sources contribute to the River's flow. One tributary,¹⁶ the Yarmuk River, flows into the Jordan River through both Syria and Jordan.¹⁷ Annually, approximately 400 million cubic meters ("mcm") per year of water flow from the Yarmuk into the Jordan River.¹⁸ The second primary tributary of the River is the Zerka. The Zerka's entire water flow of 94 mcm per year is

Gleick, *Water, War and Peace in the Middle East*, ENV'T, Apr. 1994, at 6.

9. Miriam R. Lowi, *Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water*, 18 INT'L SECURITY 113, 115 (1993).

10. Mount Hermon is in the northern tip of Israel. It lies outside the territory occupied after the 1948 War (also called the Israeli War of Independence). For a brief outline of Israeli history, see *infra* note 31.

The Dead Sea lies on the border between Israel and Jordan. The salinity of the Sea is ten times greater than normal sea water, Sarah Helm, *Mideast Water Wars*, WORLD PRESS REV., Jan. 1995, at 37 available in WESTLAW, MAGAZINE Database, and cannot support any form of life or be reclaimed for drinking water. The Dead Sea, however, is an extremely valuable resource to both Jordan and Israel. The minerals are harvested and used in the production of potash (an important ingredient in fertilizer) and beauty products. See Haim Shapiro, *Big Plans*, JERUSALEM POST, Oct. 18, 1995, at 5 (discussing the Ahava plant "which produces natural cosmetics using Dead Sea minerals").

11. "[T]he quality of water is excellent, with salinity less than 15-20 mg of chlorine per litre." MASAHIRO MURAKAMI, *MANAGING WATER FOR PEACE IN THE MIDDLE EAST: ALTERNATIVE STRATEGIES* 72 (1995); see also MIRIAM R. LOWI, *WATER AND POWER: THE POLITICS OF A SCARCE RESOURCE IN THE JORDAN RIVER BASIN* 23 (1993).

The Banias Springs were controlled by Syria until 1967 when Israel claimed them. Located in the upper northeast corner of Israel, the Springs are a major source of fresh water for the Basin. In the 1996 negotiations between Israel and Syria, a major issue was the return of the Banias Springs to Syria. If Israel returns the Banias, it will lose control of one of its major water supplies. For that reason alone, water is a crucial factor in that negotiation process. See, e.g., Lowi, *supra* note 9, at 115-16.

12. Caponera, *supra* note 8, at 635.

13. *Id.* Lake Tiberias is also called the Sea of Galilee and the Kinneret.

14. *Id.*

15. *Id.* The river widens in two small plains, the Beisan and the Jericho. *Id.*

16. A tributary is a "stream feeding a larger stream or lake." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 2441 (1986).

17. For a study of the tributaries of the Jordan River, see Caponera, *supra* note 8, at 635-38. For an in-depth study of Jordan's water sources, see Elias Salameh, *Jordan's Water Resources: Development and Future Prospects*, 33 AM. ARAB AFF. 69 (1990).

18. LOWI, *supra* note 11, at 28.

encompassed within the territory of Jordan.¹⁹ Rainfall and water run-off contribute to the River's size;²⁰ however, much of that water is lost to evaporation.²¹ Even with the great amount of water flowing into the River, the annual water flow is minuscule in comparison to the Nile, the Euphrates, or the Indus river basins.²²

The water stored in the underground aquifers forms a second element of the Basin system.²³ The Mountain Aquifer²⁴ is located primarily under the West Bank²⁵ between the Bet She'an Valley in the north and the Dead Sea in

19. Salameh, *supra* note 17, at 72.

20. Precipitation levels in the Basin are very low. The region lies in a semi-arid zone (i.e., between marine and desert climates). DANIEL HILLEL, *RIVERS OF EDEN: THE STRUGGLE FOR WATER AND THE QUEST FOR PEACE IN THE MIDDLE EAST* 22 (1994). The majority of the rain falls between November and March. Eyal Benvenisti & Haim Gvirtzman, *Harnessing International Law to Determine Israeli-Palestinian Water Rights: The Mountain Aquifer*, 33 NAT. RESOURCES J. 543, 550-52 (1993). Rain is very rare during the summer months of May through August. Total precipitation can range from as much as 1000 mm/year in the north to less than 50 mm/year in the south. Lowi, *supra* note 9, at 115.

21. In Jordan, the evaporation rate is extremely high. In the northwest, where precipitation averages 600 mm/year, evaporation can steal 1800 mm/year or three times the average annual precipitation. The situation is worse in the southeast where precipitation averages 30 mm/year annually and up to 4200 mm/year can evaporate. Salameh, *supra* note 17, at 69-70. With the 200 mm/year average rainfall occurring primarily in the winter, much of the water is lost in flood-like run-off or in evaporation before it can become part of the water system. Deshazo & Sutherlin, *supra* note 8 (citing Lowi, *supra* note 11, at 29). "[M]ost water evaporates. Only 25 to 30 percent of the rain enters groundwater systems, and about 5 percent runs on the land surface as floods." Benvenisti & Gvirtzman, *supra* note 20, at 552.

22. "[The Jordan River's] total discharge, of between 1,200 and 1,800 mcm . . . [of water] depending on the author, is equivalent to about 2 percent of the annual flow of the Nile, 6 percent of the Euphrates, less than 2 percent of the Indus, and less than 1 percent of the Congo." Lowi, *supra* note 11, at 28.

23. "The inclusion of underground water resources in the discussion of international river basins has generated extensive debate. The current positions of the United Nations' International Law Commission and the International Law Association incorporate groundwater into their work to codify non-navigational uses of international water basin systems. Compare Stephen C. McCaffrey, *The Law of the Non-Navigational Uses of International Watercourses*, [1991] 2 Y.B. INT'L L. COMM'N 45, 51-58, U.N. Doc. A/CN.4/SER.A/1991/Add.1 (Part 1) and *Rules on International Groundwaters*, 62 INT'L L. ASS'N 251 (1986) [hereinafter *Seoul Rules*] (codifying international laws concerning international groundwaters; codified in Seoul, Korea) and *Water Resources in the Middle East: Impact on Economics and Politics* (Edward M. Leigh, rep.) in AMERICAN SOCIETY OF INTERNATIONAL LAW PROCEEDINGS OF THE 80TH ANNUAL MEETING 249 (1986) [hereinafter *Water Resources*] (charting underground water supplies, discussing underground resources as affecting quantity and quality of available water, and addressing pollution and increased salinity of aquifers) with NURIT KLIOT, *WATER RESOURCES AND CONFLICT IN THE MIDDLE EAST* 274 (1994) (stating that the Mountain Aquifer is not part of the Basin).

24. The term "Mountain Aquifer" refers to all the various aquifer basins and layers beneath the Judea and Samaria Mountains. Benvenisti & Gvirtzman, *supra* note 20, at 552.

25. Ozanne & Gardner, *supra* note 4.

the south.²⁶ Supplying about 600 mcm per year to the people of the region,²⁷ the Mountain Aquifer provides water of the highest quality in the region²⁸ and thus its ownership is often contested.

Water from the eastern mountains of Israel percolates through the ground and fills the Mountain Aquifer.²⁹ The storage area where the vast majority of water pumping wells are located is under the plains at the base of the mountain range.³⁰ A large part of the storage area and a majority of the pumping wells are inside Israeli pre- and post-1967³¹ territory.³²

26. Benvenisti & Gvirtzman, *supra* note 20, at 550.

27. *Id.* at 552. The reported amount of the yearly withdrawal from the Mountain Aquifer varies, depending on the author. *See id.* at 552 n.35 (580-680 mcm/year); Ozanne & Gardner, *supra* note 4 (670 mcm/year); WATER IN THE MIDDLE EAST: CONFLICT OR COOPERATION? 47 (Thomas Naff & Ruth C. Matson eds., 1984) (560-670 mcm/year) [hereinafter *Naff & Matson*].

28. Benvenisti & Gvirtzman, *supra* note 20, at 552.

29. *Id.* at 553.

30. Most of the drilling and pumping is done from the storage area because the "pumping rate is stable and least expensive." *Id.* at 555.

31. This Note assumes the reader has general knowledge of the region's history. However, this footnote will briefly outline important events in the history of Israel and some present-day issues between Israel and its Arab neighbors.

1517 Ottoman Turks conquer Palestine. The population was primarily Arab with a small number of Jews.

1882 First Jews to return in the modern era arrive from Europe.

1913 Ottoman Empire sponsors Franghia Plan for water management of the Jordan River Basin.

1914-18 Ottoman Empire falls in World War I.

1917 British Government issues Balfour Declaration supporting a Jewish national home in Palestine.

1918 Great Britain occupies Palestine.

1922 League of Nations decides that Palestine should become a Mandated Territory controlled by Great Britain. Jewish immigration into Palestine continues at an ever-increasing rate.

1936-39 Period of intense fighting between Arabs and Jews in Palestine.

1939 British White Paper issued, reducing the number of legal immigrants to a trickle.

1939 World War II begins. During the war, Jewish refugees illegally immigrate into Palestine in disregard of the British restriction on the immigration of Jews.

1944 United States sponsors Lowdermilk Plan for water management in the Basin.

1945 World War II ends. Jewish refugees continue to illegally immigrate into Palestine.

1947 Newly created United Nations recommends partitioning Palestine into Jewish and Arab states. Jews accept the plan; Arabs do not.

May 14, 1948 British Mandate comes to an end; Israel proclaims statehood.

May 15, 1948 Arab neighbors including Egypt, Iraq, Lebanon, Syria, and Transjordan attack Israel. War ends in December of 1948. Jewish Arabs immigrate into Israel while non-Jewish Arabs (now known as Palestinians) flood into neighboring states.

1949 Israel signs armistices with each state. Arab states refuse to recognize Israel and continue

B. *Israel*

Israel is the largest per capita user of water in the Basin.³³ In 1990, the

to threaten to destroy Israel.

1953-56 United States sponsors formulation of Johnston Plan for water management in the Basin. Neither Arab states nor Israel ratify plan but implement many of the technical aspects.

1956 Israel invades and defeats Egypt to ensure use of Suez Canal. Great Britain and France fight with Israel. Israel occupies the Gaza Strip and the Sinai Peninsula.

1967 Israel destroys air forces of Egypt, Jordan, and Syria after increased regional tensions and the build up of armed forces in the area indicated that an attack on Israel was likely. The war ends in six days—the “Six Day War.” After the war, Israel occupies the Gaza Strip, the Sinai Peninsula, Jordan’s territory west of the Jordan River (now known as the West Bank), and Syria’s Golan Heights.

1973 Yom Kippur War. Egypt and Syria launch a surprise attack on Israel. War ends with a cease fire. Israel gains land, which it returns by agreement. Arabs realize a decisive military victory is impossible.

1974 U.N. General Assembly admits Yasser Arafat, head of the Palestine Liberation Organization.

1978 Anwar El-Sadat of Egypt and Menachem Begin of Israel sign the Camp David Peace Accords. The Sinai Peninsula is returned to Egypt.

September 13, 1993 Israel and the Palestine Liberation Organization sign Declaration of Principles on Interim Self-Government Arrangements.

September 14, 1993 Israel and Jordan agree to Common Agenda for the Bilateral Peace Negotiations.

August 29, 1994 Israel and the Palestinian Liberation Organization sign Agreement on Preparatory Powers and Responsibilities.

October 26, 1994 Israel and Jordan sign Treaty of Peace.

September 28, 1995 Israel and Palestine Liberation Organization sign Oslo II Accords.

Treaty of Peace, Oct. 26, 1994, Isr.-Jordan, 34 I.L.M. 43 [hereinafter Jordan Peace Treaty]; Agreement on Preparatory Powers and Responsibilities, Aug. 29, 1994, Isr.-P.L.O., 34 I.L.M. 455 [hereinafter P.L.O. Preparatory Agreement]; Declaration of Principles on Interim Self-Government Arrangements, Sept. 13, 1993, Isr.-P.L.O., 32 I.L.M. 1525 [hereinafter Declaration of Principles]; Common Agenda for the Bilateral Peace Negotiations, Sept. 14, 1993, Isr.-Jordan, 32 I.L.M. 1522 [hereinafter Common Agenda]; Framework for Peace in the Middle East Agreed at Camp David, Sept. 17, 1978, Isr.-Egypt, 17 I.L.M. 1466; Shmuel Ettinger, *The Consolidation of the State of Israel*, in A HISTORY OF THE JEWISH PEOPLE 1075, 1085 (H.H. Ben-Sasson ed., 1976); Yehuda H. Levin & Winfred E. Garrison, *Palestine*, in 15 FIELD ENTER. EDUC. CORP., THE WORLD BOOK ENCYCLOPEDIA 85, 86 (1970) [hereinafter THE WORLD BOOK]; Alexander Melamid & Ellis Rivkin, *Israel*, in 10 THE WORLD BOOK, *supra*, at 388, 392-93; T. Walter Wallbank, *World History*, in 20 THE WORLD BOOK, *supra*, at 352, 352-52a; David Horowitz, *Trusting Arafat*, THE JERUSALEM REP., Nov. 2, 1995, at 14-15; Mark Matthews, *Sharing This Good Earth*, BALTIMORE SUN, Sept. 29, 1995, at 1A.

32. See generally Benvenisti & Gvirtzman, *supra* note 20, at 555-56.

33. Dshazo & Sutherland, *supra* note 8 (citing Clyde Haberman, *Report Cites Way to Guard Water Assets*, N.Y. TIMES, Oct. 10, 1993, at A10). Israel’s water demand in 1993 was 536 mcm of water for household consumption, 106 mcm for industrial uses, and 1112 mcm for agricultural uses. Central Bureau of Statistics Jerusalem, STATISTICAL ABSTRACT OF ISRAEL 1994 (on file with author). A comparison of Israeli water consumption to the other riparian interests may provide a larger picture:

Israeli population of 4.6 million people consumed 2100 mcm of water.³⁴ Approximately 600 mcm, or almost one-third of the water consumed, is supplied from the Jordan River.³⁵ Israel consumed 150 mcm of water more than its sources could produce.³⁶ To satisfy the extra demand, the Israeli government permitted over-pumping of some of the underground aquifers, including aquifers in the Basin.³⁷ Removing water from an underground aquifer faster than it can be refilled poses two risks: pollution of the aquifer

	Israel	W. Bank	Syria	Jordan	Lebanon
Population					
1995	5.4 mil ^a	1.3 mil ^b	15.4 mil	4.1 mil	3.69 mil
2020	6.7 mil	4.7 mil		9.8 mil	
Pop. Growth Rate	1.40%	3.49%	3.71%	2.69%	2.15%
Water Supply					
1985	1950 mcm ^c	650 mcm		900 mcm	
Drought ^d	1600 mcm ^e	450-550	35,900 mcm	700-750	4980
2010	2060 mcm				mcm
Water Demand					
1987-91	2100 mcm ^a	125 mcm ^f	3.7-5.9 mcm ^g	800 mcm	854 mcm
2020	2800 mcm	530 mcm		1800 mcm	

Notes:

- a. Includes 122,000 Jewish settlers in the West Bank, 14,500 in the Israeli-occupied Golan Heights, 4800 in the Gaza Strip, and 149,000 in East Jerusalem.
- b. Arab population of West Bank in 1995.
- c. This figure includes about 520 mcm of groundwater originating in the West Bank.
- d. Average annual supply of water during drought conditions of 1980s.
- e. This figure includes some portion of groundwater originating in the West Bank.
- f. Demand for water by the Arab population of the West Bank alone.
- g. The Yarmuk River, Syria's main contribution to the Jordan River Basin, is used to provide only 5% of Syria's water demand (340 mcm).

Lowi, *supra* note 9, at 120; CENTRAL INTELLIGENCE AGENCY, THE WORLD FACTBOOK 1995, at 208, 220, 242, 408, 458 (1995); KLIOT, *supra* note 23, at 222-25.

34. Lowi, *supra* note 9, at 120.

35. Gleick, *supra* note 8, at 9. About one-third of Israel's water comes from the Mountain Aquifer. Benvenisti & Gvirtzman, *supra* note 20, at 543. Israel is the primary user of the Mountain Aquifer and takes about 80% of its yearly yield. Ozanne & Gardner, *supra* note 4. For decades Israel has been using this percentage. *Id.*; See also Steve Rodan, *Unsilent Partner: The U.S. Takes an Active Role on Water*, JERUSALEM POST, Sept. 8, 1995, at 11.

36. Lowi, *supra* note 9, at 120. Israel consumed 2100 mcm of water when its supply produced only 1950 mcm of water without damage to the environment. *Id.*; see *supra* note 33 for a comparison of water consumed and water supplied.

37. Lowi, *supra* note 9, at 119-20. From the second half of the 1980s until approximately 1991, drought plagued the riparian states. The Jordan River was greatly reduced in size and several of the states used more water than provided by their environment. See Peter H. Gleick, *Water and Conflict: Fresh Water Resources and International Security*, 18 INT'L SECURITY 79, 99-100 (1993) (comparing water use with water availability and showing Israel's and Jordan's use exceeding supply). For water usage during the drought, see chart, *supra* note 33.

and increased salinization of its contents.³⁸

The possibility of future additional damage to the underground aquifers increases as the population in Israel grows.³⁹ With a population growth rate of 1.4%,⁴⁰ Israel will deplete its current water resources within ten to fifteen years.⁴¹ If the state continues to over-pump its aquifers, the water will dissipate even faster because of the increased possibility of polluting the remaining resources. To compound the situation of Israel's diminishing water resources, Israel has agreed to reduce its share of the Jordan River Basin waters in order to fulfill its promise to Jordan made in the Jordanian-Israeli Peace Treaty of 1994 ("Jordan Peace Treaty").⁴²

The primary unilateral Israeli effort to manage its water resources resulted in the National Water Carrier ("Carrier").⁴³ The Carrier was fully operational beginning in 1964.⁴⁴ The Carrier brings water from the wetter north to the arid southern areas of Israel.⁴⁵ It begins by diverting water from the Jordan River above the northwest corner of Lake Tiberias.⁴⁶ The water is eventually

38. Lowi, *supra* note 9, at 119. Lowi describes the process of salt infiltration of an aquifer in the following manner:

Since in any given year the sustainable annual yield is a fixed quantity, excess withdrawals by over-pumping or depletion of under ground reserves constitute an overdraft that could cause irreversible damage. Over-pumping lowers the water table, increasing the danger of salt water infiltration. When the reserve of underground flow sinks below a certain level in the coastal aquifer, the interface, or dividing line, between fresh and sea water is drawn upward and causes salinization.

Id. (footnote omitted).

39. Increased population is likely to increase proportionally water demand; however, this assumes that states are currently operating at maximum water efficiency, which is highly unlikely.

40. CENTRAL INTELLIGENCE AGENCY, *supra* note 33, at 208 (1995 estimate). For a comparison of population growth rates in the region, see chart, *supra* note 33.

41. Starr, Address, *supra* note 2. Starr also predicted that in the next several years Israel will become more industrial and less agricultural. *Id.* During the drought of the late 1980s to 1991, agricultural uses of water claimed 73% of the water available and 5% was consumed by industrial uses. Aaron Wolf, *Water for Peace in the Jordan River Watershed*, 33 NAT. RESOURCES J. 797, 799 (1993). Although a reduced agricultural water demand would increase the amount of available water, that available water would likely be proportionally re-channeled into industrial uses.

42. Ozanne & Gardner, *supra* note 4; Jordan Peace Treaty, *supra* note 31, art. 6, annex II. The document stipulates that Israel will help to increase Jordan's water supply by 150 mcm per year. *Id.*; Ozanne & Gardner, *supra* note 4. The water is to come from a reduction of Israel's usage and "joint construction of new dams and desalination plants." *Id.* According to Joyce Starr, that amount is only guaranteed for two years. Starr, Address, *supra* note 2.

43. MURAKAMI, *supra* note 11, at 174; Naff & Matson, *supra* note 27, at 43.

44. Naff & Matson, *supra* note 27, at 43; Jehoshua Schwarz, *Israeli Water Sector Review: Past Achievements, Current Problems, and Future Options*, in WORLD BANK TECHNICAL PAPER NO. 175: COUNTRY EXPERIENCES WITH WATER RESOURCES MANAGEMENT 129 (Guy Le Moigne et al. eds., 1992) [hereinafter COUNTRY EXPERIENCES].

45. Schwarz, *supra* note 44, at 130.

46. KLIOT, *supra* note 23, at 212. The Carrier was designed to "produce electric power in the

pumped from the 213 meters below sea level of Lake Tiberias to heights of over 150 meters above sea level.⁴⁷ The Carrier includes 200 kilometers of "open canals, tunnels and pipes."⁴⁸ Although planned to carry 320 mcm of water, the Carrier transported between 420 and 450 mcm of water each year in the 1980s.⁴⁹ The Carrier is a vital managerial system in Israel and is interconnected with several other regional water management plans.⁵⁰

C. Jordan

Jordan's water problems are fairly similar to those of Israel. Jordan is an extremely arid country. Only six percent of the land receives enough water naturally to support agriculture.⁵¹ In supplying water to its population of 4.1 million,⁵² Jordan, like Israel, has entered into a water deficit (water demand exceeds water found naturally in the environment).⁵³ For example, in 1995 Jordan's water demand was 890 mcm of water while it had only 862 mcm of water available naturally.⁵⁴ With the deficit, each year Jordan must either take water unsafely from the environment⁵⁵ or buy it from other countries.

Jordan's primary source of fresh water is the Yarmuk, the largest tributary of the Jordan River.⁵⁶ Under normal conditions, Jordan is entitled to 200 mcm of water of the 438 mcm per year produced by the Yarmuk.⁵⁷ In years of

process of [the water's] descent." *Id.* at 214 (citations omitted).

47. *Id.* at 212-14. Israel uses 8% of its annual electricity production to pump the water.

48. *Id.* at 214.

49. *Id.*

50. *Id.*

51. Salameh, *supra* note 17, at 69-70. "The fact that only 6 percent of the total area of Jordan (89,000 square kilometers) receives an average annual rainfall of more than 300 mm, the minimum needed to grow wheat, may be more illustrative of the scarcity of [water]." *Id.* at 70.

52. CENTRAL INTELLIGENCE AGENCY, *supra* note 33, at 220.

53. A study of the water supply and demand in the state of Jordan shows the following growth of Jordan's water deficit:

Kingdom of Jordan: projected water deficit, 1990-2005 (mcm)				
	1990	1995	2000	2005
Water demand	740	890	1,045	1,200
Water supply	730	862	862	862
Net annual deficit	10	28	284	338

LOWI, *supra* note 11, at 159 (citation omitted).

54. *See supra* note 53.

55. *See supra* note 38 and accompanying text (discussing the dangers of overpumping aquifers).

56. LOWI, *supra* note 11, at 154; Gleick, *supra* note 8, at 9.

57. Syria receives the other 238 mcm per year of water from the Yarmuk. LOWI, *supra* note 11, at 154; Salameh, *supra* note 17, at 70. In 1987, Jordan and Syria agreed to divide the water of the Yarmuk, which flows through both states and divides them. Alistair Lyon, *Jordan Pins Irrigation*

drought, Jordan has only 342 mcm per year of groundwater on which to depend—barely half of its demand in 1990.⁵⁸ However, Israel eased Jordan's water situation in the Jordan Peace Treaty by agreeing to increase Jordan's share of the Jordan River Basin waters by 150 mcm of water per year.⁵⁹

Jordan's primary unilateral effort to manage its water sources resulted in the East Ghor Canal ("Canal"), now known as the King Abdullah Canal.⁶⁰ The Canal was planned as a part of the much grander program entitled the Great Yarmuk Project ("Project"); however, the Project was never fully implemented because of the geopolitical situation.⁶¹ The Canal runs along the eastern bank of the Jordan River.⁶² The Canal is 110 kilometers long and irrigates 172,000 dunums.⁶³ In 1987, all water systems in Jordan were placed under the authority of the Ministry of Water and Irrigation.⁶⁴ Under the Minister of Water and Irrigation, the Jordan Valley Authority ("JVA") regulates the irrigation of the Jordan Valley and the Water Authority of Jordan ("WAJ") monitors groundwater and municipal uses of water.⁶⁵

D. Palestinian Authority

The Palestinian Authority's control over parts of the West Bank⁶⁶ includes up to one million Palestinians and over 120,000 Israeli settlers.⁶⁷ The

Hopes on Long-Postponed "Unity" Dam, REUTER LIBR. REP., Sept. 29, 1987, available in LEXIS, News Library, Wires File; Salameh, *supra* note 17, at 70. Jordan currently takes 120 to 140 mcm per year. Salameh, *supra* note 17, at 70.

58. Salameh, *supra* note 17, at 72; see also charts *supra* notes 33, 53 (projected water demand of Jordan).

59. See *supra* note 42 and accompanying text.

60. Salameh, *supra* note 17, at 73.

61. KLIOT, *supra* note 23, at 217. For an idea of the tensions in the region, see *supra* note 31, which gives a brief outline of Israel's history.

62. Salameh, *supra* note 17, at 73.

63. *Id.* A dunum equals 1000 square meters. Sharif S. Elmusa, *Dividing the Common Palestinian-Israeli Waters*, 22 J. PALESTINIAN STUD. 57, 65 (1993).

64. Maher F. Abu-Taleb et al., *Water Resources Planning and Development in Jordan: Problems, Future Scenarios, and Recommendations*, in COUNTRY EXPERIENCES, *supra* note 44, at 119, 124.

65. *Id.*

66. The West Bank refers to the western bank of the Jordan River. Controlled until 1967 by Jordan, the West Bank fell to the Israelis during the Six Day War. For a brief historical sketch of Israeli and regional history, see *supra* note 31. In the Declaration of Principles of 1993, Israel agreed to withdraw from certain portions of the West Bank and Gaza. Declaration of Principles, *supra* note 31, art. XIII. In the ongoing negotiations between Israel and the Palestinian Authority, the boundaries change which changes the size of the population in each entity as well as control over water resources.

67. *Palestinian National Authority*, in THE MIDDLE EAST AND SOUTH ASIA 184, 184 (Malcom B.

population of Palestinians on the West Bank is growing at one of the world's fastest rates, 3.49%.⁶⁸ The rate insures that the future water demand will become a problem for this entity even faster than for most of the countries in the Basin.⁶⁹

Much of the water of the West Bank is expensive, of inferior quality, polluted with nitrates, and of a high salinity level.⁷⁰ Additionally, the water is limited by Israel because the water resources in the West Bank are largely interdependent with Israeli water sources.⁷¹ Specifically, Israel limited total Arab water consumption to 125 mcm per year.⁷² The limits on water consumption and Palestinian drilling existed until the Israeli-PLO Agreement on Preparatory Powers and Responsibilities of 1994 ("PLO Preparatory Agreement").⁷³

Prior to the PLO Preparatory Agreement, the Palestinians were limited in their ability to drill wells to increase their water supply.⁷⁴ Since the agreement, the Palestinian Authority has eased restrictions and the number of wells has increased dramatically.⁷⁵ Additionally, the Authority leaves the wells largely unregulated.⁷⁶ The additional wells, along with the unregulated pumping of existing aquifers, increases the potential for damage to existing fresh water resources.⁷⁷

E. Syria and Lebanon

Both Syria and Lebanon make little use of the waters of the Jordan River

Russell, ed. 1995).

68. CENTRAL INTELLIGENCE AGENCY, *supra* note 33, at 458. For a comparison of population growth rates, see chart, *supra* note 33.

69. See *supra* note 39 and accompanying text (discussing the relationship between population and water requirements).

70. Elmusa, *supra* note 63, at 63.

71. Harold Dichter, Comment, *The Legal Status of Israel's Water Policies in the Occupied Territories*, 35 HARV. INT'L L.J. 565, 570 (1994).

72. *Id.* at 569.

73. P.L.O. Preparatory Agreement, *supra* note 31.

74. Starr, Address, *supra* note 2; Lowi, *supra* note 9, at 126-27; Dichter, *supra* note 71, at 570-72; *Water Resources*, *supra* note 23, at 264; see generally Elmusa, *supra* note 63, at 60-64. Israel could pump more water from the Mountain Aquifer. Although the Mountain Aquifer is the largest aquifer in the Basin, see *supra* note 24 and accompanying text, the amount that can be removed from the aquifer is limited by the speed of its natural replenishment. See *supra* notes 35, 38 and accompanying text.

75. Starr, Address, *supra* note 2; see *supra* notes 35, 38, 74 and accompanying text.

76. Starr, Address, *supra* note 2.

77. Starr, Address, *supra* note 2; see *supra* notes 35, 38, 74 and accompanying text.

Basin. Syria's use of the Yarmuk for irrigation is limited to the southern part of the country.⁷⁸ The country's main fresh water source is the Euphrates River, and any water received from the Basin is minuscule in comparison.⁷⁹ The Yarmuk provides less than seven percent of Syria's water supply but about five percent of the demand is generated by the population living in the Yarmuk basin.⁸⁰ Although Syria fulfills its primary water needs from the Euphrates River, its control over some of the sources of the Jordan River—the Yarmuk River and the Banias Springs—has become a political weapon.⁸¹ Repeatedly, Syria has exercised its control and vetoed several water plans.⁸² The control of the water as upstream riparian (the entity through which a water source passes before passing to or through another entity) makes Syria essential in the development of a functioning managerial water regime.⁸³

Like Syria, Lebanon receives the majority of its water from sources other than the Jordan River Basin.⁸⁴ Lebanon takes the majority of its water from the Litani River system.⁸⁵ The system produces such a great quantity of water that it may be exported to more arid states in the Middle East.⁸⁶ The Hasbani River represents Lebanon's limited draw from the Jordan River system.⁸⁷ The Hasbani River is one of the three original sources of the Jordan River.⁸⁸ Thus, like Syria, Lebanon has political power as an upstream riparian. With plenty of water and the political power that comes with being an upstream riparian, Lebanon's primary interest in the Jordan River Basin is the water's strategic

78. LOWI, *supra* note 11, at 108.

79. *Id.*

80. KLIOT, *supra* note 23, at 223. For a comparison of water demands in the countries in the Basin, see chart *supra* note 33.

81. See KLIOT, *supra* note 23, at 174; LOWI, *supra* note 11, at 108, 195-96. Syria controlled the Banias Springs until 1967, when Israel conquered the Golan Heights. A heated issue in any peace negotiations between Israel and Syria is the control of the Golan Heights and the Banias Springs. A transfer of control would give Syria the ability to control one of the water sources on which Israel depends.

82. LOWI, *supra* note 11, at 195-96. A prominent example of Syria's exercise of control was its veto of the Maqarin Dam project. The project focused on the building of a dam to create hydroelectric power and form a storage area for irrigation water. Although Syria would receive the majority of the generated power, it refused to cooperate with Israel or to place a dam within artillery range of Israel. Syria vetoed the plan. *Id.* at 172, 174, 177.

83. Rodan, *supra* note 35.

84. LOWI, *supra* note 11, at 108.

85. *Id.*

86. ELISHA KALLY, WATER AND PEACE: WATER RESOURCES AND THE ARAB-ISRAELI PEACE PROCESS 47 (1993).

87. LOWI, *supra* note 11, at 108.

88. See text accompanying note 11 (listing sources of Jordan River).

value.⁸⁹

III. GENERAL PRINCIPLES AND LAWS THAT GOVERN INTERNATIONAL WATER MANAGEMENT

Any Jordan River Basin managerial system will be based on international water law. However, international water law, as a branch of international law, does not have any clear mandates. No international congress creates laws that bind all states. Standards of conduct develop from several sources, including the states' customary practice, actions of international tribunals, and writings of various legal institutions.⁹⁰ However, those standards are binding upon states only if they have been accepted by those states or if a practice is regarded as general customary law. Additionally, if an injured state is unwilling or unable to bring a case for a violation of such a standard of conduct, and assuming that no other state can or will bring the claim, the standard of conduct can be, and often is, violated with impunity.

This Part briefly discusses some standards of conduct that have developed concerning international water law. Those standards have developed through actions by the Permanent Court of Justice of the League of Nations, various conventions, and various states. Past actions of other states, even though generally nonbinding on an uninvolved state, can provide a basic framework for the development of an international water managerial system in the Jordan River Basin.⁹¹ As an example, the managerial system in the Columbia River Basin shows how two states are dealing with the problems of shared international water resources. A case study of that system made in this Part will be used as a basis for the Jordan River Basin regime proposed in Part IV.

A. *The Development of the Equitable Utilization Principle*

As water use has grown, the international law governing the underlying principles of water law has grown.⁹² Although several principles exist, the

89. LOWI, *supra* note 11, at 108.

90. See Statute of the International Court of Justice, June 26, 1945, art. 38, 59 Stat. 1055.

91. See LOUIS HENKIN ET AL., INTERNATIONAL LAW 1354 (3d ed. 1993).

92. The four primary principles of water management are (1) absolute territorial sovereignty, (2) absolute territorial integrity, (3) common jurisdiction, and (4) equitable jurisdiction. For a comprehensive examination of these and related principles and categories, see AARON T. WOLF, HYDROPOLITICS ALONG THE JORDAN RIVER: SCARCE WATER AND ITS IMPACT ON THE ARAB-ISRAELI CONFLICT at 96-99 (1995); HILLEL, *supra* note 20, at 270-78; KLIOT, *supra* note 23, at 5-7; Julio Barberis, *The Development of International Law of Transboundary Groundwater*, 31 NAT.

principle of equitable utilization is the one most frequently found in international agreements and conventions. Equitable utilization permits a waterway's water to be used by any riparian to the extent that its use does not harm other riparian countries.⁹³ The principle has been interpreted to require all sides of a dispute to be flexible and base water requests on population and the needs and development of their societies and economies.⁹⁴

The principle of equitable utilization began developing in the 1950s with the Lake Lanoux arbitration between France and Spain.⁹⁵ Although the arbitrator refused to allow one riparian to object when the water's flow was merely altered, the arbitrator protected each party's right to equitable use of the water system.⁹⁶

RESOURCES J. 167 (1991); Joseph W. Dellapenna, *Treaties as Instruments for Managing Internationally—Shared Water Resources: Restricted Sovereignty vs. Community of Property*, 26 CASE W. RES. J. INT'L L. 27, 33-38 (1994); Ludwik A. Teclaff, *Fiat or Custom: The Checkered Development of International Water Law*, 31 NAT. RESOURCES J. 45, 67-72 (1991); Wolf, *supra* note 41, at 822-26; and Dichter, *supra* note 71, at 571.

The principle of absolute territorial sovereignty sanctions a state's use of the water contained within it without regard for any other state. HILLEL, *supra* note 20, at 270; KLIOT, *supra* note 23, at 5. The United States asserted absolute territorial sovereignty over the Rio Grande in the 1890s. The U.S. policy, known as the Harmon Doctrine, claimed that the U.S. could do what it pleased with the Rio Grande in total disregard of downstream repercussions. After almost universal condemnation, and after finding itself a downstream riparian of the Columbia River, which begins in Canada, the United States abandoned that position. *Id.* Today, the principle has little application in international law. KLIOT, *supra* note 23, at 5.

The second principle, absolute territorial integrity, protects the water claims of the downstream riparian. Under this principle, no action may be taken by any riparian which would damage the territory of another. *Id.* Absolute territorial integrity is often tied to past appropriations, and thus maintains the status quo. *Id.* The perpetuation of the status quo may be the basis for the principle's modern disuse.

The third principle, common jurisdiction, requires the cooperation of all the riparians in the management of the entire international river system. *Id.* at 6. This type of regime grants ownership in common of the entire river to all of the parties, allows only for mutual development, and requires consultation of all parties on all water-use projects. *Id.*

The fourth principle, equitable utilization, is discussed in the text.

93. KLIOT, *supra* note 23, at 6, 9; Benvenisti & Gvirtzman, *supra* note 20, at 546 ("The principle of equitable apportionment calls for a balancing of the needs of the community that share the common resource.").

94. Rodan, *supra* note 35.

95. *France v. Spain*, 24 I.L.R. 101 (1957).

96. *Id.*; Bilder, *The Settlement of Disputes in the Fields of the International Law of the Environment*, 144 REC. DES COURS 139, 167-79 (1975), reprinted in Barry E. Carter & Phillip R. Trimble, INTERNATIONAL LAW 1193 (1991).

Lake Lanoux is located wholly within France and fed by French streams, but drains into a series of rivers which eventually flow into Spain. The common water system between the two countries has since 1866 been governed by the Treaty of Bayonne and an Additional Act to that treaty. The Act provided, *inter alia*: that the interests of both parties should be safeguarded; for

The first codified use of the principle of equitable utilization occurred with the Helsinki Rules.⁹⁷ The Helsinki Rules were adopted in 1966 by the International Law Association (“ILA”). Supplemented in 1986 with the Seoul Rules⁹⁸ concerning international groundwater resources,⁹⁹ the Helsinki Rules form the basis for most modern negotiations on nonnavigational uses of international waterways.¹⁰⁰ Article IV of the Helsinki Rules, “Equitable Utilization of the Waters of an International Drainage Basin,” clearly states the idea of equitable utilization: “Each basin state is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of waters of an international drainage basin.”¹⁰¹ Article V lists the factors to consider under an equitable utilization analysis.¹⁰² Furthermore, the supplemental

notice of works which might change the regime or volume of a watercourse; that there should be no interference with the natural flow of watercourses capable of harming the lower riparian; and that the authorities of the two countries should act in concert to set up regulations for the general interest.

Id. The idea that the water interests of both parties are protected rests in the concept of equitable utilization. In the 1950s, France wanted to divert some of the waters of the lake for electricity but Spain objected from fear that the diversion would damage its water resources. The situation was resolved by a tribunal. *Id.*

97. KLIOT, *supra* note 23, at 6; *The Helsinki Rules*, 52 INT’L L. ASS’N 484-533 (1966) [hereinafter *Helsinki Rules*] (codifying international laws on waters of international rivers); *see id.* at 499, cmt. (b) (equitable utilization).

The Helsinki Rules and the ILC’s draft articles, *see infra* text accompanying notes 96-120, have been examined in the context of the Basin. Niva Telerant, Comment, *Riparian Rights Under International Law: A Study of the Israeli-Jordanian Peace Treaty*, 18 LOY. L.A. INT’L & COMP. L.J. 175 (1995). This Note does not focus on the Helsinki Rules or the draft articles as does Telerant’s Comment. This Note looks at the two as possible sources for a total water management regime.

98. *Seoul Rules*, *supra* note 23.

99. Benvenisti & Gvirtzman, *supra* note 20, at 545.

100. KLIOT, *supra* note 23, at 6.

101. *Helsinki Rules*, *supra* note 97, at 486.

102. Article V of the Helsinki Rules states:

(1) What is a reasonable and equitable share within the meaning of Article IV is to be determined in the light of all the relevant factors in each particular case.

(2) Relevant factors which are to be considered include, but are not limited to:

- (a) the geography of the basin, including in particular the extent of the drainage area in the territory of each basin State;
- (b) the hydrology of the basin, including in particular the contribution of water by each basin State;
- (c) the climate affecting the basin;
- (d) the past utilization of the waters of the basin, including in particular existing utilization;
- (e) the economic and social needs of each basin State;
- (f) the population dependent on the waters of the basin in each basin State;
- (g) the comparative costs of alternative means of satisfying the economic and social needs of each basin State;

articles of the Seoul Rules maintain the principle of equitable utilization by imposing a duty to refrain from activities that would cause substantial injury to other states.¹⁰³

A corresponding emphasis on equitable utilization is found in Articles 6 through 10 of the ILC Rules.¹⁰⁴ The rules, adopted in 1971 by the International Law Commission (“ILC”), also concern nonnavigational uses of international watercourses.¹⁰⁵ Article 6 mandates the application of equitable utilization¹⁰⁶ while Article 7 lists the factors necessary for its implementation.¹⁰⁷

- (h) the availability of other resources;
- (i) the avoidance of unnecessary waste in the utilization of waters of the basin;
- (j) the practicability of compensation to one or more of the co-basin States as a means of adjusting conflicts among uses; and
- (k) the degree to which the needs of a basin State may be satisfied, without causing substantial injury to a co-basin State;

(3) The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable share, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.

Id. at 488.

103. *Seoul Rules*, *supra* note 23, at 278-83.

104. *The Law of the Non-Navigational Uses of International Watercourses*, [1990] 2 Y.B. INT’L L. COMM’N 46, 54-55, U.N. Doc. A/CN.4/SER.A/1990/Add.1 (Part 2) [hereinafter *ILC Rules 1990*].

105. Benvenisti & Gvirtzman, *supra* note 20, at 545. Benvenisti and Gvirtzman give the history of the ILC rules as follows: “On July 19, 1991, the ILC [provisionally] adopted a text consisting of 32 draft articles which it sent to governments of member states for comments.” *Id.* at 545 (citations omitted). The ILC received many comments from member states and continues to develop its laws and commentaries. See *The Law of the Non-Navigational Uses of International Watercourses*, [1993] 2 Y.B. INT’L L. COMM’N 84, U.N. Doc. A/CN.4/SER.A/1993/Add.1 (Part 2) [hereinafter *ILC Rules 1993*].

106. *ILC Rules 1990*, *supra* note 104, at 54-55.

Article 6. Equitable and reasonable utilization and participation

1. Watercourse States shall in their respective territories utilize an international watercourse [system] in an equitable and reasonable manner. In particular, an international watercourse [system] shall be used and developed by watercourse States with a view to attaining optimum utilization thereof and benefits therefrom consistent with adequate protection of the international watercourse [system].

2. Watercourse States shall participate in the use development and protection of an international watercourse [system] in an equitable and reasonable manner. Such participation includes both the right to utilize the international watercourse [system] as provided in paragraph 1 of this article and the duty to cooperate in the protection and development thereof, as provided in article

Id.

107. *Id.* at 55.

Article 7. Factors relevant to equitable and reasonable utilization

1. Utilization of an international watercourse [system] in an equitable and reasonable manner within the meaning of article 6 requires taking into account all relevant factors and circumstances,

The implementing factors of the ILC Rules mirror the ones found in the Helsinki Rules with a few exceptions. The similarities include consideration of the physical environment,¹⁰⁸ “existing and potential uses,”¹⁰⁹ the “social and economic” needs of the concerned states,¹¹⁰ and possible water alternatives.¹¹¹

The essential differences between the Helsinki Rules and the ILC Rules are readily apparent. First, the introductory language of the ILC Rules “requires”¹¹² the consideration of all relevant factors, including the listed factors. The Helsinki Rules suggest some factors “to be considered”¹¹³ but do not limit consideration to those factors alone.¹¹⁴ Thus, the ILC Rules formulate absolute minimum standards to be considered while the Helsinki Rules permit a more flexible inquiry. Second, the ILC extends the concept in the Helsinki Rules of avoidance of waste¹¹⁵ to include “conservation, protection, development and economy of use”¹¹⁶ of the resources. “Conservation” includes the prevention of resource waste. The words “[P]rotection, development and economy of use” communicate the desirability of actions to promote and improve future water usage. Third, the

including:

- (a) geographic, hydrographic, hydrological, climatic and other factors of a natural character;
- (b) the social and economic needs of the watercourse States concerned;
- (c) the effects of the use or uses of an international watercourse [system] in one watercourse State on other watercourse States;
- (d) existing and potential uses of the international watercourse [system];
- (e) conservation, protection, development and economy of use of the water resources of the international watercourse [system] and the costs of measures taken to that effect;
- (f) the availability of alternatives, of corresponding value, to a particular planned or existing use.

2. In the application of article 6 or paragraph 1 of the present article, watercourse States concerned shall, when the need arises, enter into consultations in a spirit of cooperation.

Id.

108. *Helsinki Rules*, *supra* note 97, art. V, § 2(a)-(c), at 488; *ILC Rules 1990*, *supra* note 104, art. 7, § 1(a), at 55.

109. *ILC Rules 1990*, *supra* note 104, art. 7, § 1(d), at 55; *Helsinki Rules*, *supra* note 97, art. V, § 2(d), (h), at 48.

110. *ILC Rules 1990*, *supra* note 104, art. 7, § 1(b), at 55; *Helsinki Rules*, *supra* note 97, art. V, § 2(e)-(f), at 488. Social and economic needs include dependent population calculations.

111. *ILC Rules 1990*, *supra* note 104, art. 7, § 1(f), at 55; *Helsinki Rules*, *supra* note 97, art. V, § 2(g)-(h), at 488.

112. *ILC Rules 1990*, *supra* note 104, art. 7, § 1, at 55.

113. *Helsinki Rules*, *supra* note 97, art. V, § 2, at 488.

114. *Id.*

115. *Id.* art. V, § 2(i).

116. *ILC Rules 1990*, *supra* note 104, art. 7, § 1(e), at 55.

Helsinki Rules incorporate the idea that conflicts concerning usage will arise and that compensation may be an equitable solution.¹¹⁷ The ILC Rules ignore the idea of compensation and make absolutely no provision for any form of dispute resolution.¹¹⁸

Although the Helsinki Rules and the ILC Rules are codified, they are not legally binding. Additionally, little judicial intervention over the issue has occurred so that the principles in the rules have had few legal tests.¹¹⁹ However, the principle of equitable utilization espoused in both sets of rules is considered the “norm of international law.”¹²⁰

B. A Test Case: The Columbia River Basin

The Columbia River flows for 1225 miles through both western Canada and northwestern United States.¹²¹ The river has sources on both sides of the international border, has an average runoff of 180 million acre-feet per year, and is possibly the fourth largest North American river.¹²² The primary use of the Columbia River is as a power generator.¹²³ However, developing the river has not always been a smooth process.

Columbia River Basin disputes between the riparian states, Canada and the United States, began with boundary conflicts.¹²⁴ From the War of 1812 until the signing of the Oregon Treaty in 1846, the two countries disputed ownership and control of the basin waters.¹²⁵ Following the Oregon Treaty, each state continued unilateral development of the Columbia River Basin's waters. Problems began arising when unilateral plans conflicted; one state's actions would endanger the plans, the water, or the quality of the water of the other state.¹²⁶ To resolve the growing number of disputes, the states signed the

117. See listing of Helsinki Rules, *supra* note 102, art. V, § 2(j), at 488.

118. The addition of a provision for dispute resolution was suggested and approved by the majority of the ILC members in 1993. *ILC Rules 1993*, *supra* note 105, at 86.

119. KLIOT, *supra* note 23, at 9 (citation omitted).

120. *Id.*

121. THE LAW OF INTERNATIONAL DRAINAGE BASINS 169-72 (A. H. Garetson et al. eds. 1967) [hereinafter *BASIN LAW*]. The Columbia River Basin affects British Columbia and Alberta in Canada, and Montana, Idaho, Washington, and Oregon in the United States. *Id.* at 169.

122. *Id.* at 171-73.

123. *Id.* at 174. For more information concerning the uses of the Columbia River, see *id.* at 174-78.

124. *Id.* at 179.

125. *Id.* at 179-80.

126. *Id.* at 186-87. For a list of the various conflicts, see *id.*

Boundary Waters Treaty in 1909.¹²⁷ The Boundary Waters Treaty allowed each state to retain control over its wholly contained waters,¹²⁸ prohibited pollution,¹²⁹ and created a commission.¹³⁰ The commission, entitled the International Joint Commission (“IJC”), became the forum for all future development discussions between the riparian states.¹³¹ It is composed of six commissioners, three from each country, and is empowered to rule on conflicts concerning the use, obstruction, or diversion of water.¹³² It can make approval contingent on future actions of the states.¹³³ Additionally, upon request, the IJC has the authority to investigate issues and make recommendations.¹³⁴

Although formulated before the Helsinki Rules, the Boundary Waters Treaty espoused several of the principles later codified in the Helsinki Rules and the ILC Rules. For example, the idea of equitable utilization appears in

127. *Id.* at 186; Treaty Relating to Boundary Waters Between the United States and Canada, Jan. 11, 1909, U.S.-Gr. Brit., 36 Stat. 2449 [hereinafter Boundary Waters Treaty]. The treaty was between the United States and Great Britain because Canada was under the authority of Great Britain.

128. *Id.* art II.

Each of the High contracting Parties reserves to itself or to the several State Governments on the one side and the Dominion or Provincial Governments on the other as the case may be, subject to any treaty provisions now existing with respect thereto, the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line which in their natural channels would flow across the boundary or into boundary waters

Id.

129. *Id.* art. IV. “It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other.” *Id.*

130. *Id.* art. VII.

ARTICLE VII.

The High Contracting Parties agree to establish and maintain an International Joint Commission of the United States and Canada composed of six commissioners, three on the part of the United States appointed by the President thereof, and three on the part of the United Kingdom appointed by His Majesty on the recommendation of the Governor in Council of the Dominion of Canada.

Id.

131. For more information on the IJC, its background and its powers, see for example, JOHN E. CARROLL, ENVIRONMENTAL DIPLOMACY: AN EXAMINATION AND PROSPECTIVE OF CANADIAN-U.S. TRANSBOUNDARY ENVIRONMENTAL RELATIONS (1983); THE INTERNATIONAL JOINT COMMISSION SEVENTY YEARS ON (R. Spencer et al. eds., 1981); Barry Sadler, *The International Joint Commission: Past and Future*, 4 TRANSBOUNDARY RESOURCES REP. 1 (1990).

132. Boundary Waters Treaty, *supra* note 127, art. VII; *see also id.* art. III, IV. The commissioners are appointed by the U.S. President and the Canadian Prime Minister. *See supra* note 130 (containing the text of article VII); David LeMarquand, *The International Joint Commission and Changing Canada-United States Boundary Relations*, 33 NAT. RESOURCES J. 59, 66 (1993).

133. Boundary Water Treaty, *supra* note 127, art. VIII.

134. *Id.* art. IX; LeMarquand, *supra* note 132, at 66.

Article VIII of the Boundary Waters Treaty.¹³⁵ Control is retained by the riparian entities over the waters located within the state.¹³⁶ Such control is recognized in subsection (a) of both the Helsinki Rules and the ILC Rules.¹³⁷ Prevention of pollution, in Article IV of the Boundary Waters Treaty, is also included in the Helsinki Rule prohibiting waste¹³⁸ and the ILC Rule concerning conservation.¹³⁹ In fact, the idea behind the IJC is found in the Helsinki Rules¹⁴⁰ but not in the ILC Rules.¹⁴¹

When conflict arose in the 1940s concerning development of the Columbia River Basin, the IJC held hearings.¹⁴² However, the IJC was unable to resolve all of the issues¹⁴³ and after many years of discord, research, negotiation, and intermediary decisions, Canada and the United States signed the Columbia River Treaty¹⁴⁴ on January 17, 1961.¹⁴⁵ As disagreements and developments in and around the basin continued over the next several decades, the two riparian states negotiated and signed several "Water Quality Agreements and Protocols."¹⁴⁶ One agreement in particular, the Agreement on Great Lakes Water Quality of 1972,¹⁴⁷ expanded the powers of the IJC. The

135. Boundary Waters Treaty, *supra* note 130, art. VIII.

136. *Id.*

137. *Helsinki Rules*, *supra* note 97, art. V, § 2(a), at 488; *ILC Rules 1990*, *supra* note 104, art. 7, § 1(a), at 55.

138. *Helsinki Rules*, *supra* note 97, art. V, § 2(i), at 488. See *supra* note 102 for the complete text of the subsection.

139. *ILC Rules 1990*, *supra* note 104, art. 7, § 1(e), at 55. See *supra* note 107 for a complete text of the subsection.

140. *Helsinki Rules*, *supra* note 97, art. XXXI, at 524 & advisory committee note. The advisory committee note explicitly mentions the Boundary Waters Treaty. *Id.*

141. See *supra* notes 117-18 and accompanying text. Dispute resolution usually includes methods to prevent conflict from arising. The ILC has no dispute resolution provision or conflict management provision.

142. *BASIN LAW*, *supra* note 121, at 197.

143. The IJC was able to facilitate the negotiations. Additionally, the IJC commissioned the International Columbia River Engineering Board. The board was "to produce a report and return with recommendations concerning the best way to develop the river, especially with regard to power and flood control." *Id.* at 198. During the period before the signing of the Columbia River Treaty, the IJC approved the Libby Dam in 1951, held hearings on diversion rights, and generally served as a useful channel of communication between the riparian countries. *Id.* at 198, 204, 208.

144. Treaty on Columbia River Basin: Cooperative Development of Water Resources, Jan. 17, 1961, U.S.-Can., T.I.A.S. No. 5638 [hereinafter Columbia River Treaty].

145. See generally *BASIN LAW*, *supra* note 121, at 197-219.

146. See Lynton K. Caldwell, *Emerging Boundary Environmental Challenges and Institutional Issues: Canada and the United States*, 33 NAT. RESOURCES J. 9, 14 (1993). Some of the agreements included "the Water Quality Agreement of 1972, 1978, and Protocol of 1987." *Id.* (footnote omitted).

147. Agreement on Great Lakes Water Quality, Apr. 15, 1972, U.S.-Can., T.I.A.S. No. 7312 [hereinafter 1972 Water Quality Agreement].

IJC became responsible for “collecting, analysing and disseminating relevant data and information; surveillance of water quality; monitoring the effectiveness of governmental programmes; co-ordinating the two countries’ activities; tendering advice and assistance; reporting to the Governments and the public; and recommending legislation and further programmes to meet the water quality objectives.”¹⁴⁸ However, the 1987 Protocol limited these expanded powers to the 1978 Agreement.¹⁴⁹ The governments restricted the responsibilities of the IJC to the “evaluat[ion] of the progress being made by the governments in implementing remedial action plans.”¹⁵⁰

The IJC is still a vital element in the management of the Columbia River Basin. However, its role and its powers often meet with criticism.¹⁵¹ The IJC’s strengths include its effective handling of the “administrative and quasi-judicial tasks [in] both minor and major boundary level issues.”¹⁵² It is also well respected for its impartiality, its flexibility, its fair weighing of facts, its ability to mediate, and its “facilitat[ion of] consensus among governments.”¹⁵³ The IJC also has a history as an “independent and successful problem-solving facilitator.”¹⁵⁴

Some of the criticisms of the IJC include its inherent weakness; the states can ignore the IJC by not requesting advice, requesting advice and not following it, not appointing commissioners, or not providing a budget.¹⁵⁵ Additionally, the IJC has no “formal relationship with states and provinces on

148. Bilder, *supra* note 96, *reprinted in* CARTER & TRIMBLE, *supra* note 96, at 1188-98, 1195 (discussing 1972 Water Quality Agreement, *supra* note 147, art. VI). For more detailed information on the procedures and responsibilities of the IJC, see sources *supra* note 131.

149. Agreement to Amend the Great Lakes Water Quality Agreement of 1978, Nov. 18, 1987, U.S.-Can., 1987 Can. T.I.A.S. No. 11551. Many of the increased responsibilities found in the Great Lakes Water Quality Agreement of 1972 are reiterated in the Great Lakes Water Quality Agreement of 1978. LeMarquand, *supra* note 132, at 71-72 & nn.68-84.

150. LeMarquand, *supra* note 132, at 73 (footnote omitted).

151. *See id.* at 77-79.

152. *Id.* The list of strengths and weaknesses is based on LeMarquand’s list. *Id.*

153. *Id.* at 77-78.

The IJC serves to facilitate consensus among governments. The informal network spawned by the IJC through its reference boards, boards of control, and other institutional mechanisms (called in the Great Lakes context the “invisible college”) creates among senior water managers a shared experience in dealing with boundary problems and a basis for governments subsequently to accept the advice of the IJC.

Id. (footnote omitted).

154. *Id.* at 78.

155. *Id.* at 78-79; David J. Allee, *Subnational Governance and the International Joint Commission: Local Management of United States and Canadian Boundary Waters*, 33 NAT. RESOURCES J. 133, 141 (1993).

matters within their jurisdictional competence¹⁵⁶ and no authority to determine that jurisdiction or responsibility.¹⁵⁷ Nor can the IJC independently decide to monitor that which it has not previously been given authority to monitor.¹⁵⁸ Without such authority, the IJC cannot remedy the problems of implementation that go unchecked.¹⁵⁹

Although there has been ongoing controversy concerning the waters of the Columbia River Basin, relations have been friendly between the riparian countries. In an atmosphere of trust, the two countries have been able to negotiate solutions to the problems that have developed because of advances in technology and growth in population. Although that atmosphere does not exist in the Jordan River Basin, the procedures developed and used by Canada and the United States may be instructive for management of the Jordan River Basin.

IV. ATTEMPTS TO EASE THE JORDAN RIVER BASIN WATER PROBLEMS

At several points in the modern history of the Jordan River Basin, the riparian states have attempted to resolve the water dispute. Many of the solutions offered in the past have been based on the principles and ideas contained in the conventions discussed in Part III. This Part discusses some past attempts to ease the Basin's water problems, examines the treaties and agreements of the 1990s, and reviews the technological advances that have been suggested as alternatives or supplements to any water management regime.

A. History

On several occasions, some of the riparian entities have attempted to cooperate and create a regime to equitably distribute the Basin's waters. Full cooperation was achieved in none of the cases, and thus no plan was ever wholly successful.¹⁶⁰

156. Barry Sadler, *Shared Resources, Common Future: Sustainable Management of Canada-United States Border Waters*, 33 NAT. RESOURCES J. 375, 387 n.40 (1993).

157. LeMarquand, *supra* note 132, at 78.

158. *Id.* at 79.

159. Allee, *supra* note 155, at 141; LeMarquand, *supra* note 132, at 68 (noting that "with no follow-up implementation authority . . . the IJC's role [is] largely advisory"); see *supra* note 155 and accompanying text.

160. For complete lists and discussions of Basin development and sharing plans see KALLY, *supra* note 86, at 5-24; KLIOT, *supra* note 23, at 187-208; Naff & Matson, *supra* note 27, at 30-53; WOLF,

One of the first plans was the Franghia Plan in 1913.¹⁶¹ The plan proposed the use of the Jordan River system for irrigation and electricity.¹⁶² Sponsored by the Ottoman Empire, the plan foundered with the fall of the empire after World War I.¹⁶³ Thirty-one years later, in 1944, the United States recommended the Lowdermilk Plan.¹⁶⁴ This plan was based on the Tennessee Valley Authority, and proposed the irrigation of the Negev Desert with the waters of the Jordan and Litani rivers.¹⁶⁵ Also included in the Lowdermilk Plan was the refilling of the Dead Sea through a canal from the Mediterranean Sea.¹⁶⁶ The Lowdermilk Plan was abandoned following the change of circumstances in the Jordan River Basin after World War II (e.g., the creation of Israel, the influx of large numbers of refugees).¹⁶⁷

Following the creation of the state of Israel in 1948, the countries in the region began to act unilaterally.¹⁶⁸ States laid intrastate water systems and took water without regard to other states' interests.¹⁶⁹

Several plans were created after the Lowdermilk Plan. The Johnston Plan (also called the Unified Plan), formulated between 1953 and 1956, had the greatest impact.¹⁷⁰ The Johnston Plan was the cumulative result of a series of

supra note 92, at 12-69; and Wolf, *supra* note 41, at 801-05;

161. Naff & Matson, *supra* note 27, at 30.

162. *Id.*

163. *Id.* When the Ottoman Empire fell in World War I, this plan lost its sponsoring entity and no further progress was made.

164. *Id.* at 32.

165. *Id.*

166. *Id.* The Dead Sea is an extremely condensed, large, old body of water. Use of the Dead Sea and the drought in the late 1980s caused the Sea to further condense. *See supra* notes 10, 37 (concerning the use of the Dead Sea and the drought of the late 1980s). As the water of the Dead Sea began to condense, the Sea divided into two smaller bodies of water. A canal was dug between the two deep areas of the sea to prevent the division and drying of the sea. A canal, as suggested in the Lowdermilk Plan, would thus replenish the Dead Sea and serve to maintain it as a single body of water.

167. Naff & Matson, *supra* note 27, at 32. With the end of World War II, the situation in the Basin changed dramatically. Large numbers of Holocaust refugees and Jewish refugees from surrounding Arab states filled the newly created state of Israel. At the same time, large numbers of Palestinians who left or were forced out of the state of Israel became refugees in Jordan and other surrounding Arab states. *See also supra* note 31.

168. Naff & Matson, *supra* note 27, at 35.

169. *Id.* The unilateral actions of the various states resulted in national water systems. Two resulting systems were the Israeli National Water Carrier and the Jordanian East Ghor Main Canal. MURAKAMI, *supra* note 11, at 174. For a discussion of those two systems, see *supra* notes 43-50, 60-65 and accompanying text.

170. Naff & Matson, *supra* note 27, at 42. Although never ratified, the Johnston plan is often the basis for many of the ongoing analyses. *See, e.g.,* Elmusa, *supra* note 63, at 63 ('Israel has been extracting 150-200 mcm more water from the Jordan basin than the 375-400 mcm allotted to it under

negotiations among the riparian states.¹⁷¹ The primary issues in the negotiations leading up to the plan included allotments to the riparians, use of the allotments, use of Lake Tiberias as a reservoir, and the determination of which waters would be included within any sharing plan.¹⁷² Although the technical committees from both Israel and the Arab League addressed the issues and accepted the Johnston Plan in 1955,¹⁷³ neither Israel nor the Arab League Council ratified the plan.¹⁷⁴ But the lack of political ratification did not prevent the implementation of some technical aspects.¹⁷⁵ However, mere implementation of the technical aspects did not solve the political issue of impartial monitoring. The lack of procedural mechanisms to handle potential

the 1955 Johnston Plan, not to mention 5-10 mcm from the Golan Heights." (footnote omitted).

171. Several plans preceded the Johnston negotiations and the resulting Unified Plan. All began with the UNRWA-sponsored desk study prepared by Charles T. Main. Naff & Matson, *supra* note 27, at 39. The Israelis supported the Cotton Plan created by Joseph Cotton in 1954. *Id.* at 40. The same year, the Arabs responded with the Arab Plan. The distribution proposed by the various plans was summarized clearly in the following table found in Naff and Matson's *Water in the Middle East*.

Water Allocations to Riparians of Jordan River System
(in million cubic meters/year)

Plan/Source	Lebanon	Syria	Jordan	Israel	Total
Main Plan	nil	45	774	394	1213
Arab Plan	35	132	698	182	1047
Cotton Plan	450.7	30	575	1290	2345.7
Unified Johnston Plan					
Hasbani	35				35
Banias		20			20
Jordan (main stream)		22	100	375*	497*
Yarmuk		90	377	35	492
Side wadis			243		243
Total Unified Plan	35	132	720	400*	1287*

Note: The Cotton Plan included the Litani as part of the Jordan River System. Different plans allocated different amounts in accordance with differing estimates of the resources of the system. One major variable in the reporting of the planned allocations is the amount of ground water included in the estimates.

* According to the compromise "Gardiner Formula," the share to Israel from the main stream of the Jordan was defined as the "residue" after the other co-riparians had received their shares. This would vary from year to year, but was expected to average 375 mcm.

Naff & Matson, *supra* note 27, at 42.

172. *Id.* at 39.

173. *Id.* at 41.

174. *Id.*

175. *Id.*

problems marked the genesis of future problems.¹⁷⁶

B. Steps Toward Peace in the 1990s

1. Israeli-P.L.O. Peace Process

Political attempts to resolve disputes in the Jordan River Basin culminated in a series of treaties beginning with the Israeli-Palestinian Declaration of Principles of 1993 (“Declaration of Principles”).¹⁷⁷ The Declaration of Principles, signed on September 13, 1993,¹⁷⁸ established a process of peace for the two entities. Although not a peace agreement per se, the agreement began the process of peace for the entire Basin. It established a schedule according to which various elements of peace were to be accomplished.¹⁷⁹ Although several of the stages were performed late,¹⁸⁰ the procedure established by the Declaration of Principles remains fully operational. However, the Declaration of Principles did not discuss the issue of water. Considered one of the most difficult issues, water was left for later negotiations.¹⁸¹

Following the Declaration of Principles, Israel and the Palestinian Liberation Organization signed the Agreement on Preparatory Powers and Responsibilities (“P.L.O. Preparatory Agreement”)¹⁸² on August 29, 1994.¹⁸³

176. *Id.*

177. Declaration of Principles, *supra* note 31.

178. *Id.*

179. Included within the Declaration of Principles are plans for the following: Palestinian elections, redeployment of Israeli troops, permanent status negotiations, and Palestinian authority over various areas of daily life. Declaration of Principles, *supra* note 31, at 1528-31. The goal for the elections was nine months after the entry into force of the Declaration of Principles. *Id.* art. III, § 2, at 1528.

As to the redeployment of Israeli troops, an agreement was to be signed two months following the enactment of the Declaration of Principles that regulated the troop movement. *Id.* annex II, § 1, at 1535. The deployment was to be complete by the time of the elections. *Id.* art. XIII, at 1532.

180. Elections were extremely late. Elections should have been held nine months after entry into force of the agreement. *See supra* note 179. Nine months after the entry into force of the agreement—one month after the agreement’s signing on October 13, 1993—would have been July 13, 1994. Elections were held for the first time on January 20, 1996. Redeployment of Israeli troops was not complete by the time of the Palestinian elections. Redeployment is now scheduled to be completed in 1997. *See generally* Isabel Kershner, *Power to the Palestinians*, JERUSALEM REP., Jan. 25, 1996, at 20.

181. *See generally* Declaration of Principles, *supra* note 31. Other issues not discussed included the status of “Jerusalem, refugees, settlements, security arrangements, borders, relations and cooperation with other neighbors, and other issues of common interest.” *Id.* art. V, at 1529.

182. PLO Preparatory Agreement, *supra* note 31.

183. *Id.*

Like the Declaration of Principles, this agreement did not discuss the issue of water.

Later negotiations culminated in the Oslo II Accords. Signed on September 28, 1995,¹⁸⁴ Oslo II explicitly excluded water issues¹⁸⁵ but made further plans for Palestinian elections.¹⁸⁶

2. Israeli-Jordanian Peace Process

Negotiated simultaneously with the Declaration of Principles, the Common Agenda for the Bilateral Peace Negotiations¹⁸⁷ ("Common Agenda") between Israel and Jordan was signed on September 14, 1993.¹⁸⁸ Like the Declaration of Principles, the Common Agenda organized the basis for a peace agreement but was not the agreement itself. However, unlike the Declaration, the Common Agenda explicitly addressed the water issue.¹⁸⁹ The two sides agreed to divide the water into "rightful water shares" and to "[s]earch[] for ways to alleviate water shortage."¹⁹⁰

Israel and Jordan later dealt more specifically with the water situation in the Jordan Peace Treaty.¹⁹¹ In the Jordan Peace Treaty, the parties agreed that the intrastate development of water could not harm the resources of the other state in any way.¹⁹² The parties recognized their water shortages and agreed to look for more sources.¹⁹³ The two countries established details of their water plan. Annex II of the Treaty of Peace creates a joint water committee and discusses allocation during the different periods of the year, as well as storage, water quality, groundwater use, notification and agreement, and cooperation.¹⁹⁴

184. Horovitz, *supra* note 31, at 15; Matthews, *supra* note 31, at 1A.

185. Bob Deans, *Israel to Leave West Bank Cities in Accord*, NEW ORLEANS TIMES-PICAYUNE, Sept 29, 1995, at A12. Discussion of water issues was explicitly delayed until May of 1996. *Id.* Other issues excluded were specific dates for Israeli troop withdrawal from remaining Palestinian cities, prisoner releases, electricity control, Jerusalem, refugees, and settlements. *Id.*

186. *See supra* notes 179-80, and accompanying text (discussing the Palestinian elections).

187. Common Agenda, *supra* note 31.

188. *Id.*

189. *Id.* at 1523.

190. *Id.*

191. Jordan Peace Treaty, *supra* note 31, art. 6, annex II, 34 I.L.M. at 48-49, 58-60.

192. *Id.* art. 6, at 49. Use that does not harm the other state in any way is based on the principle of equitable utilization. *See supra* notes 92-120 and accompanying text.

193. Jordan Peace Treaty, *supra* note 31, art. 6, at 49. Jordan and Israel were using 110% of their water resources during the drought of the late 1980s. *See Gleick, supra* note 37, at 100. For a comparison of demand and supply in both Israel and Jordan, see charts *supra* notes 33 and 53.

194. Jordan Peace Treaty, *supra* note 31, annex II, at 58-60. The Joint Committee proposal

3. *Other Negotiations*

Negotiations between Israel and Syria took place in the United States in 1995. However, no agreement had been reached when the negotiations were abruptly halted following terrorist activity in February and March of 1996. After an easing of the hard-line stance taken by Israel's Prime Minister Benjamin Netanyahu and pressure from the United States and Jordan, negotiations may resume in late 1997.

Negotiations have not taken place between Israel and Lebanon. They must take place for a basin-wide approach to be successful.

C. *Possible Technological Solutions*

Until the signing of the Israeli-Palestinian Declaration of Principles in 1993,¹⁹⁵ an international regime to manage the water of the Basin was not plausible. To address the issue of potential water shortages, engineers, water experts, and citizens of the Basin states suggested several alternatives. Some suggestions have been tested and any management regime will probably employ a combination of the suggestions. However, technological solutions alone will not provide enough water to end permanently the water problems in the Basin; technology will only provide more time before the situation reaches crisis proportions.¹⁹⁶

First, the individual riparian states could reduce consumption by

provides significant insight into what the parties find acceptable for a daily operation regime. Extensions of the Jordanian-Israeli plan can be made to form a basis for a larger, basin-wide regime. The Treaty states the following concerning the powers and activities of the regime:

ARTICLE VII: JOINT WATER COMMITTEE

1. For the purpose of the implementation of this Annex, the Parties will establish a Joint Water Committee comprised of three members from each country.
2. The Joint Water Committee will, with the approval of the respective governments, specify its work procedures, the frequency of its meetings, and the details of its scope of work. The Committee may invite experts and/or advisors as may be required.
3. The Committee may form, as it deems necessary, a number of specialized sub-committees and assign them technical tasks. In this context, it is agreed that these sub-committees will include a northern sub-committee and a southern sub-committee, for the management on the ground of the mutual water resources in these sectors.

Id. at 60. For a full analysis of the Jordan Peace Treaty's treatment of riparian rights, see Telerant, *supra* note 97.

195. See *supra* note 31 and accompanying text.

196. See *Water Resources*, *supra* note 23, at 258-59 (remarks by professor John Kolars suggesting the rejection of the use of technology alone to solve the problems of the Basin disputes).

industrializing their agrarian societies.¹⁹⁷ Agriculture consumes more water than industrial or household use.¹⁹⁸ However, a greater emphasis on industry will not necessarily improve the situation.¹⁹⁹ Industrialization often increases water demand and environmental damage.²⁰⁰ Industrializing an agrarian society can also damage the social structure.²⁰¹

A second suggestion that has received widespread attention is a joint desalination plant in the Gulf of Aquaba (also known as the Gulf of Eilat). Israeli officials estimated the plant could reclaim 800 mcm of drinking water over a thirty-year period for the benefit of Israel, Jordan, and the Palestinian Authority.²⁰² Critics claim that a desalination plant would be too expensive to be practical.²⁰³ However, there is a possibility that the United States would fund desalination in conjunction with other water-saving plans.²⁰⁴

A third suggestion postulates a canal that uses water from either the Red Sea or the Mediterranean partially to flood the Dead Sea.²⁰⁵ The canal would be used to produce hydroelectric power²⁰⁶ and desalinated water.²⁰⁷ Currently, a canal between the Red and Dead Seas is preferred.²⁰⁸ Funding for a canal and hydroelectric plant would likely come from the World Bank.²⁰⁹ However,

197. Dshazo & Sutherlin, *supra* note 8; Lowi, *supra* note 9, at 138; Ozanne & Gardner, *supra* note 4; *see also supra* note 41.

198. Dshazo & Sutherlin, *supra* note 8.

199. *Id.*

200. *Id.*

201. *Id.* (construing ARNON SOFFER, *RIVERS OF FIRE: THE CONFLICT OVER WATER IN THE MIDDLE EAST* 233-34 (1992)).

[D]e-emphasizing agriculture in favor of industrialization will only increase the social hardships on the population and the leadership as well. The reason being that the land, and subsequently agriculture, has a preponderant influence on traditional society in the Middle East. Clearly, such a shift to industry would have negative repercussions that would be felt throughout the community.

Id. (footnote omitted).

202. Julian Ozanne, *Jordan Eager for Quick Fix with Israel*, *FIN. TIMES*, July 20, 1994, at 4.

203. Rodan, *supra* note 35.

204. *Id.* Recently, Thomas Naff, one of the foremost scholars on the water situation in the Middle East, rejected the idea that the U.S. would be a major funding source for a Middle East water project. To receive additional funding, the riparian entities must compete with Egypt and Syria—states which have already sought funds from the United States. *Id.*

205. The idea of a canal is not new. For an example of its prior recommendation, see *supra* note 166 and accompanying text.

206. Ozanne, *supra* note 202.

207. D'Vora Ben Shaul, *Good for Peace, Bad for Seas*, *JERUSALEM POST*, Oct. 2, 1995, at 7. An estimated 800 megawatts of electricity could be created from a hydroelectric plant using the canal's water. That much electricity could power "a number of large-scale desalination projects to provide fresh water to both states." *Id.*

208. *Id.*

209. *Id.* When Turkey was seeking to build a dam on the Euphrates River, the International

the canal would present problems. Because the canal would traverse groundwater resources, it could deplete or salinate the aquifer's fresh water.²¹⁰ With limited water resources, any possible damage to current supplies is an extraordinary risk.

A fourth proposal, often dubbed the "Peace Pipeline," proposes transferring water from Turkey into the more arid parts of the Basin.²¹¹ Proponents of the proposal cite favorable feasibility studies, low long-term costs, the growth of jobs while the pipeline is being laid, and the interdependence of all connected countries.²¹² Critics point to the high cost of building the pipeline, the extended period of construction, and the political strife among and reluctance of the purchasing entities.²¹³

To extend current water resources, each state must exploit its current

Monetary Fund ("IMF") refused to loan it any money until a multilateral agreement was reached. *Water Resources*, *supra* note 23, at 268. The response of the IMF suggests that bilateral action of Jordan and Israel in building a canal and a plant would likely merit funding. *Id.*

210. Shaul, *supra* note 207. Aquifer damage from the canal could result from either of two possibilities. Either salt water from the canal could seep into the fresh water of the aquifers or the salt water from the canal could, through osmosis, pull fresh water from the underground reserves into the canal. *Id.* Salt water infiltration of the aquifers would occur more quickly if the canal leaked, and "[t]here has yet to be a canal that doesn't leak." Sue Fishkoff, *Greening of the Middle East*, JERUSALEM POST, Oct. 27, 1995, at 12 (discussing regional environmental protection and quoting EcoPeace Secretary-General Gideon Bromberg). A second major problem is a land barrier created by the canal itself. *Id.* "A separation between two parts of a natural population might drive some rarer species to extinction." Shaul, *supra* note 207. Possible solutions to the problem include bridges and ground covering over the canal.

211. Joyce R. Starr, *Water Wars*, 82 FOREIGN POL'Y 17, 28 (1991). Starr best describes the pipeline's development and route in the following way:

Since the mid-1980s, . . . [former] President and former Prime Minister Turgut Ozal has been championing the concept of a Turkish water "peace pipeline" to serve both Gulf and Near East countries. The proposal is to take water from two rivers, the Seyhan and Ceyhan, that empty into the Mediterranean, and transport it southward through Syria, Jordan and Saudi Arabia to the Gulf. Two massive pipelines would supply water to these countries—one to Jordanian and Syrian cities and the other to Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE.

Id. An extension to Israel and the Palestinian authority would increase costs by approximately one billion dollars but is still viable. Deshazo & Sutherlin, *supra* note 8. Approximate total construction costs range from 8.5 to more than 20 billion dollars. *Compare* Starr, *supra*, at 28, and Deshazo & Sutherlin, *supra* note 8.

212. Deshazo & Sutherlin, *supra* note 8. Deshazo and Sutherlin suggest that the pipeline would reduce water conflicts between the parties because one cannot prevent the flow of water to one party without affecting the other takers. *Id.*

213. Starr, *supra* note 211, at 28-29. The possible future purchasing states are reluctant to support the plan because they fear Turkey's control of the water supply. *Id.* at 29. The Euphrates River's downstream riparians pose additional problems. The Peace Pipeline could largely reduce the Euphrates flow to Iraq and Syria and thus make both downstream riparians dependent on the pipeline for water. *Id.* Thus, both Syria and Iraq are extremely wary of the proposal.

resources as much as possible. Each state must promote conservation,²¹⁴ prevent pollution, and reduce irrigation.²¹⁵

V. PROPOSAL

In an era of peace, a managerial system based on the International Joint Commission (“IJC”) of the Boundary Waters Treaty²¹⁶ would be viable in the Jordan River Basin. The prospect of peace, which is more possible today than in the past, will provide the essential element of trust that has made the IJC successful.²¹⁷ Past attempts at a managerial regime in the Basin have usually failed because of the region’s geopolitical situation.²¹⁸ Reduced tensions²¹⁹ and the water crisis of the next two decades²²⁰ will provide the momentum to make this regime successful where the other attempts have failed. Additionally, the strengths and the success of the IJC make it a paradigm for river basin management, regardless of the need to remedy its weaknesses.²²¹ Moreover, any IJC weakness can be addressed and improved in a Jordan River Basin International Joint Commission (“JRB-IJC”).

Any managerial scheme in the Middle East must involve a joint commission.²²² The IJC is composed of three members from each riparian state.²²³ With the power to seek out and disseminate data, put countries on notice,²²⁴ and regulate disputes,²²⁵ the IJC has succeeded in managing the

214. Lowi, *supra* note 9, at 138.

215. Ozanne & Gardner, *supra* note 4; Rodan, *supra* note 35; see KL10T, *supra* note 23, at 265.

216. See *supra* Part III.B.

217. See *supra* note 153 and accompanying text (discussing the IJC’s reputation).

218. See *supra* Part IV.A; see also *supra* note 31 (listing some of the political tensions that have occurred in the region).

219. See *supra* Part IV.B.

220. See *supra* Part II; see *supra* note 2 and accompanying text.

221. See *supra* notes 151-59 and accompanying text (discussing the strengths and weaknesses of the IJC).

222. Steve Rodan, *Divided Waters—Part I*, JERUSALEM POST, Sept. 1, 1995, at 8; Rodan, *supra* note 35.

The most effective way for such management would be to create a permanent institutionalized means, that is a basin-wide inter-riparian commission, or agency, or authority, with sufficient power, expertise, data and funds to plan, manage and allocate the scarce waters of the basin Were such an entity to come into being and succeed in the Jordan basin, the prospects for future conflict among the basin’s nations would be significantly diminished.

Id. (quoting Thomas Naff, a leading author on the water dispute in the Jordan River Basin).

223. See *supra* note 130.

224. See *supra* notes 147-48 and accompanying text.

225. See *supra* note 153 and accompanying text.

daily affairs of the U.S.-Canadian boundary waters.

The JRB-IJC would be composed of an equal number of commissioners from each riparian entity. The JRB-IJC should include two commissioners from each state.²²⁶ The advantage of having two commissioners is that if one commissioner cannot attend a meeting, there is another individual who is qualified to represent the state. Additionally, the large number of commissioners provides enough people to divide into committees. Establishing a guideline of two commissioners from each entity instead of three as done in the IJC is advantageous also because it prevents entities from bringing too many people to each meeting. The appointment of the commissioners should be left to the leader of each state as it is in the IJC.²²⁷

Once selected, the commissioners must be free to act in the best interests of the region as a whole and not as arms of each riparian entity. Although each commissioner will bring national biases to the negotiating table, the goal must be to reach a consensus.²²⁸ To insure that the commissioners can work unrestrained by their government and to lessen the national pressure on the commissioners in the JRB-IJC, payment of the commissioners and any experts retained by the commission should be made from a joint fund.²²⁹ A joint fund would reduce the monetary pressure a state could apply on its commissioners. This payment plan differs from the Boundary Waters Treaty which requires that each country pay its respective commissioners.²³⁰

The role of the JRB-IJC would be multifaceted. Like the IJC, the JRB-IJC would be responsible for monitoring the water situation, adjudicating any

226. Unlike the IJC which has 6 total commissioners (3 per state for 2 states), the JRB-IJC would have 10 (2 per state/entity for 5 states/entities).

227. See *supra* note 132 and accompanying text (discussing the appointment process for the IJC).

228. See LeMarquand, *supra* note 132, at 68. LeMarquand notes that

[the IJC's] reputation for impartiality arises because the six commissioners seek consensus in making decisions and rarely split along national lines. Unlike most boundary commissions, the IJC commissioners do not act under instruction of or as representatives of their governments. Of course, as citizens of their own countries, and often as former politicians or senior public servants, they bring to their tasks national prejudices and may caucus along national lines. Nevertheless, they are free from government control and meet as one body, which encourages a collegial approach to problem solving, as opposed to the negotiation approach characteristic of commissioners acting as agents of their governments.

Id. (footnote omitted).

229. Contribution levels need not necessarily be equal. Contribution could be determined by a percentage of usage rates of the Basin waters, by population, or by ability to pay.

230. Boundary Waters Treaty, *supra* note 127, art. XII, at 2453. However, the Boundary Waters Treaty does attempt to make the work of the commissioners unpressured in other ways. Bilder, *supra* note 148, at 1194; Boundary Waters Treaty, *supra* note 127, art. XII, at 2453.

claims that arise, and acting as a forum for communication among the countries.²³¹ Also, the JRB-IJC would be able to create boards to investigate issues.²³² As a concession to the sovereignty concerns of the member states,²³³ the JRB-IJC would be limited, like the IJC, to those issues it is asked to handle.²³⁴ As trust builds and the competency of the commissioners is proven, these limits can gradually be removed.

The JRB-IJC must also have a program for ensuring implementation. The IJC's lack of such a program has been criticized as one of its flaws.²³⁵ The situation in the Jordan River Basin has reached almost crisis proportions and to permit the fully authorized, rationally decided, scientifically based recommendations of the JRB-IJC to be ignored would make its work useless. The ability to monitor implementation also requires some punitive strength on the part of the JRB-IJC; it is insufficient merely to know that one party is not fulfilling the recommendation. The commission must be able to *do* something. However, giving an international commission this level of power will be difficult. This would require the riparian parties to give up some sovereignty.²³⁶ However, it is possible that the severity of the situation and the progress shown in the peace negotiations may permit a power transfer to the JRB-IJC.

A Jordan River Basin Commission based on the International Joint Commission would have several advantages. First, the past eight and a half decades of experience have proven that this type of commission can work in an atmosphere of trust.²³⁷

Second, the principle of equitable utilization, which forms the basis of most modern treaties and agreements,²³⁸ is clearly in use in the IJC.

Third, any disputes that arise would be handled by commissioners who

231. See *supra* notes 130-34 and accompanying text (discussing some of the responsibilities of the IJC).

232. *Id.*

233. See Caldwell, *supra* note 146, at 18.

234. Although this limit in the power of the JRB-IJC is one of the problems often noted with the IJC, see *id.* at 19, it is important to make the states feel comfortable with the agreement. Sovereignty is a key element of any state, and failure to pay some homage to it could cause a plan to collapse—the plan would be decried as overly invasive or broad. Such a plan would have little hope of approval by the riparian states.

235. See *supra* note 159 and accompanying text.

236. See *supra* note 234 and accompanying text (discussing the role and importance of a state's sovereignty).

237. See *supra* notes 127, 147 and accompanying text.

238. See *supra* notes 135-36 and accompanying text.

fully understand the environmental, political, ethnic, and emotional elements pertinent to the conflict.²³⁹ Efficient handling of disputes will promote cooperation and prevent the development of distrust.²⁴⁰

Fourth, a Jordan River Basin Commission, if based on the International Joint Commission, would satisfy the arrangements made by Jordan and Israel in the Treaty of Peace.²⁴¹ The relative freedom of action²⁴² is similar to that contained in the Great Lakes Water Quality Agreement.²⁴³

Although the International Joint Commission as established in the Boundary Waters Treaty provides an excellent model, a few disadvantages are also evident. First, the authority of the International Joint Commission did not expand until 63 years after its creation.²⁴⁴ Six decades provided time for mutual trust to grow between the riparian entities and between the countries and the commission. The JRB-IJC must begin with that level of power without the luxury of the same time period for trust to grow. However, the situation is critical enough that a regime would work while trust is being established.

Second, as shown above, the International Joint Commission does not serve as a perfect model. The International Joint Commission must be modified to work in the Basin. Instead of merely two countries, the Jordan River Basin Commission must balance the interests of five entities.²⁴⁵ The balancing process will be extremely delicate because of the unique environmental, political, ethnic, and emotional framework of the region.²⁴⁶ This framework is extremely different from the framework surrounding the Columbia River Basin.²⁴⁷

239. The tension in the Basin area is extremely high because of the large number of elemental religious sites—among other reasons. For a brief listing of the region's history, see *supra* note 31. It is a region best regulated by those who live there, because they are the most affected and best understand the realities of life there.

240. Should the commission not be able to come to a decision, the procedures established in the Boundary Waters Treaty provide alternate methods for dispute resolution. Boundary Waters Treaty, *supra* note 127, art. X, at 2453.

241. See *supra* note 194 and accompanying text.

242. *Id.*

243. See *supra* notes 147-48 and accompanying text.

244. See *supra* notes 127, 147 and accompanying text.

245. See *supra* note 8 and accompanying text.

246. For a general discussion of the region's environmental, political, ethnic, and emotional framework, see *supra* Parts II and III.

247. For an abbreviated discussion of the environmental, political, ethnic, and emotional framework of the Columbia River Basin, see *supra* Part III.B; see also *BASIN LAW*, *supra* note 121; *supra* note 131.

VI. CONCLUSION

In summation, as peace becomes a legitimate possibility in the Middle East, a regime to manage the water resources for all the riparian entities is essential. In the next one to two decades population and industrial growth will deplete all available water in the Jordan River Basin. The most plausible regime with the greatest likelihood of success is a regime based on the International Joint Commission developed in the Boundary Waters Treaty. A broadly empowered regime will have the ability to successfully tackle water issues as well as work as an additional pillar providing support for the process of peace in the Middle East.

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