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WORLD'S MAJOR RIVERS

AN INTRODUCTION TO INTERNATIONAL WATER LAW WITH CASE STUDIES

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FOREWORD

“A river is water going somewhere,” a magazine writer recently mused about the pleasures of floating downstream.¹

For some travelers, it is relaxation or adventure that entices them to the outdoors. For others, the river journey is spiritual, connecting the traveler, even on repeat visits, with something primordial. “No man ever steps into the same river twice, for it is not the same river, and he is not the same man,” the writer quoted the Greek philosopher Heraclitus.²

Rivers, of course, are more than mere roads on which to travel or contemplate. For thousands of years, their greatest use has been in supplying the most basic human needs: water for drinking and cooking, and for irrigation.

In modern times, we have put rivers to far more diverse and sophisticated uses: electricity, navigation and industry. We pump and divert water, sending it hundreds of miles away, outside of its basin. We have also come to value, sometimes belatedly, the benefits that the natural river habitat provides for fish and wildlife.

And yet an astonishingly small percent of all the water in the world – only three percent – is fresh water and usable by humans. Of this supply, roughly two-thirds is frozen in glaciers and the polar ice caps. Of the remaining amount, the vast majority is under ground. Only a tiny fraction is found in rivers and lakes.³ It is on this fragile supply that six and a half billion people on the planet depend.

Given those physical constraints, it is not surprising that river managers are often preoccupied with problems on their river and seldom have the time to ask what they might learn from other rivers in other parts of the world.

This book is intended to bridge that gap – to create a dialogue among those who seek to manage rivers, no matter where they are located, no matter what language is spoken on its shores.

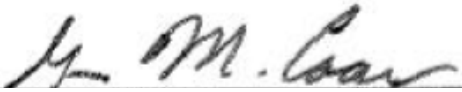
The primary research for this study was conducted between 2007 and 2008 by the Columbia Research Corporation, a consulting company in Seattle, Washington, with whom the Colorado River Commission of Nevada contracted. Preparation of the final report was completed by the staff of the Natural Resources Group of the Colorado River Commission of Nevada.

¹ Julian Smith & Brian Truitt, *Wet and Wild, From Fast & Furious to Slow & Soothing, Rivers Move Us to a Special Place*, OPEN AIR, May 2, 2008 at 34.

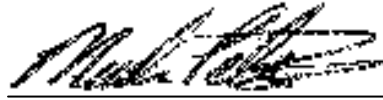
² *Id.* at 34.

³ Of the earth's total supply of water, only .0001 percent is found in rivers and streams. www.physicalgeography.net/fundamentals/8b.html.

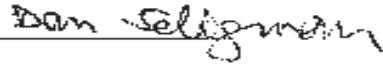
We hope the readers of this text will draw useful information from its pages. We welcome your comments.



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TABLE OF CONTENTS

MAP OF INTERNATIONAL RIVERS STUDIED..... xiii
TIMELINE: Water Tribunals and Treaties 805 to 2008 xv

1.0 INTRODUCTION..... **1**

 1.1 The Roots and Terminology of International Law..... 5

 1.1.1 The Origins of International Law 5

 1.1.2 International Law Today..... 6

 1.1.3 Treaties..... 6

 1.1.4 Customary Law..... 7

 1.1.5 “Soft Law” 8

2.0 INTERNATIONAL RIVERS..... **9**

 2.1 Europe 12

 2.1.1 The Danube River..... 12

 2.1.2 The Rhine River..... 18

 2.2 Middle East 27

 2.2.1 The Jordan River..... 28

 2.2.2 The Tigris-Euphrates Rivers..... 37

 2.3 Africa 43

 2.3.1 The Nile River 44

 2.4 Asia 50

 2.4.1 The Indus River 50

 2.4.2 The Ganges-Brahmaputra-Meghna River System 56

 2.4.3 The Mekong River 61

 2.5 Australia..... 65

 2.5.1 The Murray-Darling River..... 66

 2.6 South America..... 76

 2.6.1 The Amazon River..... 77

 2.6.2 The La Plata River 79

 2.7 North America..... 83

 2.7.1 The Colorado River (USA/Mexico) 83

 2.7.2 The Columbia River (USA/Canada)..... 88

 2.7.3 The Nelson-Saskatchewan River (USA/Canada) 94

 2.7.4 The Mississippi River (USA) 99

3.0 PRINCIPLES OF WATER ALLOCATION UNDER INTERNATIONAL LAW.....	105
3.1 Absolute Territorial Sovereignty: The Upstream State Prevails.....	106
3.2 Absolute Territorial Integrity: The Downstream State Prevails	111
3.3 The Doctrine of Equitable and Reasonable Utilization	112
3.3.1 The U.S. Supreme Court’s Equitable Apportionment Doctrine	113
3.3.2 The Helsinki Rules.....	114
3.3.3 The U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses.....	116
3.3.4 The Berlin Rules	119
3.4 International Water Allocation Today	120
4.0 THE INTERNATIONAL COURT OF JUSTICE	123
4.1 The Role of the U.N. Charter.....	124
4.2 Overview of the Court.....	126
4.3 Jurisdiction.....	128
4.4 Enforcement of the Court’s Opinions	131
4.5 Sources of Law.....	131
4.5.1 Treaties.....	132
4.5.2 Customary Law.....	135
4.5.3 General Principles of Civilized Nations	136
4.6 The Use of Judicial Decisions and Teachings	137
5.0 THE <i>GABCIKOVO-NAGYMAROS</i> DECISION.....	139
6.0 ENVIRONMENTAL LAW AT THE INTERNATIONAL BORDER.....	145
6.1 The Transboundary “No Harm” Principle	146
6.1.1 The Trail Smelter Case	146
6.1.2 The Espoo Convention on Environmental Impact Assessment.....	147
6.2 Sustainable Development.....	148
6.3 The Precautionary Principle.....	149
6.4 The Ramsar Convention on the Preservation of Wetlands	149
7.0 DOMESTIC AND INTERNATIONAL LAW RELEVANT TO THE RIVERS OF NORTH AMERICA.....	151
7.1 The Law of Water Allocation in the United States.....	153
7.1.1 Treaties.....	153
7.1.2 The Role of Congress	155

7.1.3	Interstate Compacts.....	155
7.1.4	The U.S. Supreme Court.....	156
7.1.5	Hydropower in the United States.....	156
7.1.6	The Role of State Governments.....	157
7.1.7	The Role of Native American Tribes.....	158
7.1.8	Administration of Environmental Law.....	158
7.2	The Law of Water Allocation in Canada.....	159
7.2.1	Treaties.....	159
7.2.2	The Constitution of Canada.....	160
7.2.3	The Role of Parliament.....	162
7.2.4	The Role of Common Law.....	162
7.2.5	The Supreme Court of Canada.....	163
7.2.6	The Role of Provincial Governments.....	164
7.2.7	The Role of Territorial Governments.....	165
7.2.8	First Nations/Aboriginal Peoples.....	166
7.2.9	Hydropower in Canada.....	166
7.2.10	Administration of Environmental Laws.....	167
7.3	Border Water Law Between the United States and Canada.....	167
7.3.1	International Treaties and Agreements.....	168
7.3.2	The International Joint Commission.....	173
7.3.3	The International Role of the U.S. EPA.....	178
7.3.4	The Governors of the Great Lakes States.....	178
7.3.5	The Role of NAFTA.....	180
7.4	The Law of Water Allocation in Mexico.....	180
7.4.1	Treaties.....	180
7.4.2	The Constitution of Mexico.....	180
7.4.3	The Role of Civil Law.....	181
7.4.4	The Supreme Court of Mexico.....	181
7.4.5	An Overview of Mexican Water Law.....	181
7.4.6	Hydropower in Mexico.....	183
7.4.7	Administration of Environmental Laws.....	184
7.5	Border Water Law Between the United States and Mexico.....	186
7.5.1	International Treaties and Agreements.....	186

7.5.2	The International Boundary and Water Commission	189
7.5.3	The International Role of the U.S. EPA	191
7.5.4	Agencies Created by NAFTA.....	192
8.0	INTERNATIONAL LAW RELEVANT TO THE RIVERS OF EUROPE	195
8.1	The Law of Water Allocation in Europe.....	196
8.2	The EU's Water Framework Directive	197
9.0	INNOVATIVE RIVER MANAGEMENT AGREEMENTS	199
9.1	Water Banking on the Lower Colorado River	200
9.2	Water Trading in Australia	203
9.3	Acquiring Downstream Benefits.....	206
9.3.1	The Rhine River.....	206
9.3.2	The Columbia River.....	209
APPENDICES:		
APPENDIX A: Summary Tables.....		A-1
APPENDIX B: International Tribunals before 1946.....		B-1
•	The Jay Treaty Tribunal	B-1
•	The Alabama Claims Arbitration	B-1
•	The Permanent Court of Arbitration	B-2
•	The Central American Court of Justice.....	B-3
•	Special Tribunals and Arbitrations.....	B-3
○	The Helmand River Delta Cases	B-3
○	The San Juan River Case.....	B-4
○	The Kushk River Case.....	B-4
○	The Faber Case.....	B-5
○	The Tacna-Arica Case.....	B-5
•	The Permanent Court of International Justice.....	B-5
•	Navigation on the Older River	B-6
•	Diversion of Water from the Meuse River.....	B-7
APPENDIX C: Sources and Citations.....		C-1
APPENDIX D: Conversion Table.....		D-1

LIST OF TABLES

Table 1. The 10 Longest Rivers in the World.....	10
Table 2. The Largest Rivers in the World by Average Annual Discharge at the Mouth.....	11
Table 3. The Danube River at a Glance	13
Table 4. Countries in the Danube River Basin.....	14
Table 5. The Rhine River at a Glance	19
Table 6. Countries in the Rhine River Basin.....	19
Table 7. The Jordan River at a Glance	29
Table 8. Countries in the Jordan River Basin.....	29
Table 9. Prior Water Allocation Plans for the Jordan River Basin	32
Table 10. The Tigris-Euphrates Rivers at a Glance	38
Table 11. Countries in the Tigris-Euphrates River Basin	39
Table 12. Major Dams (Existing and Proposed) in the Tigris-Euphrates Basin in Turkey	40
Table 13. The Nile River at a Glance.....	44
Table 14. Countries in the Nile River Basin	45
Table 15. The Indus River at a Glance.....	51
Table 16. Countries in the Indus River Basin	51
Table 17. Major Reservoir and Hydroelectric Projects in the Indus River Basin.....	52
Table 18. The Ganges-Brahmaputra-Meghna River System at a Glance	57
Table 19. Countries in the Ganges-Brahmaputra-Meghna River Basin.....	57
Table 20. Allocation of Water in the Ganges River at Farakka Dam under the 1996 Treaty.....	59
Table 21. The Mekong River at a Glance	61
Table 22. Countries in the Mekong River Basin.....	62
Table 23. Existing Large Dams in the Lower Mekong River Basin	63
Table 24. The Murray-Darling Rivers at a Glance.....	67

Table 25. States in the Murray-Darling River Basin.....	67
Table 26. Largest Dams in the Snowy Mountains Hydro-Electric Scheme.....	68
Table 27. Largest Reservoirs in the Murray-Darling River Basin	69
Table 28. The Amazon River at a Glance	77
Table 29. Countries in the Amazon River Basin.....	77
Table 30. The La Plata River at a Glance.....	80
Table 31. Countries in the La Plata River Basin	80
Table 32. The Colorado River at a Glance.....	84
Table 33. The Major Tributaries of the Colorado River	84
Table 34. Major Dams in the Colorado River Basin.....	85
Table 35. State Allocations in the Upper Colorado River Basin Compact.....	87
Table 36. Lower Basin Allocations Per U.S. Supreme Court Opinion.....	88
Table 37. The Columbia River at a Glance.....	89
Table 38. Major Tributaries of the Columbia River in the United States	89
Table 39. Dams on the Main Stem of the Columbia River in the United States.....	91
Table 40. The Nelson-Saskatchewan River System at a Glance.....	95
Table 41. Major Dams in Alberta and Saskatchewan (Nelson-Saskatchewan River Basin)	96
Table 42. Major Dams in Manitoba (Nelson-Saskatchewan River Basin)	97
Table 43. The Mississippi River at a Glance	100
Table 44. Major Tributaries of the Mississippi River	100
Table 45. Current Members of the International Court of Justice 2008.....	128
Table 46. U.S. Supreme Court's Equitable Apportionment Cases	156
Table 47. Generating Capacity and Reservoir Storage at Federal Dams	157
Table 48. The Largest Hydroelectric Projects in Mexico Owned by CFE.....	184
Table 49. Population Changes in the Largest Cities in the Lower Colorado River Basin	200

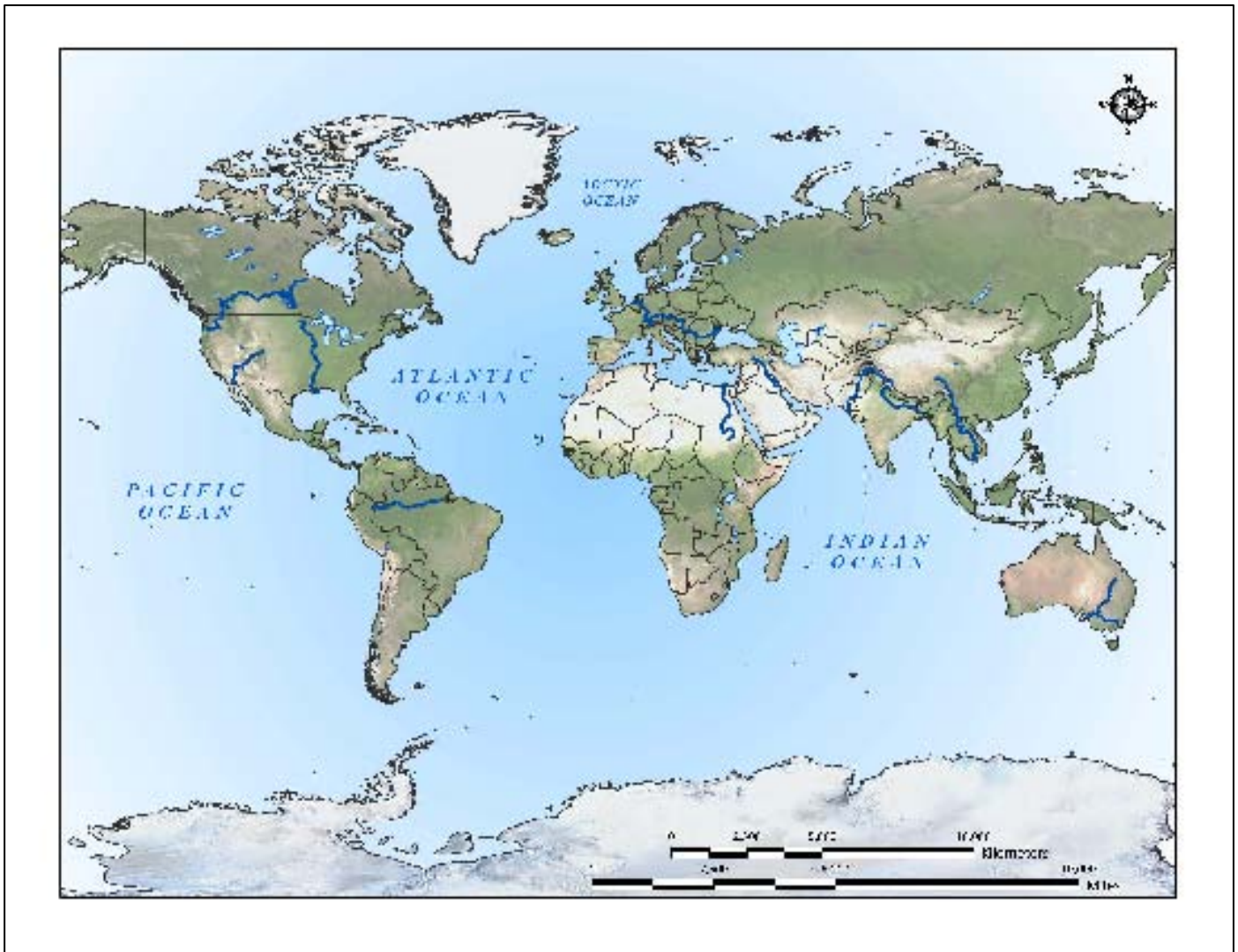
Table 50. Lower Basin Allocations Per U.S. Supreme Court Opinion..... 201

Table 51. Sharing the Cost of Chloride Prevention Measures in the Rhine River..... 208

LIST OF FIGURES

Figure 1. Map of the Danube and Rhine River.....	12
Figure 2. Danube River.....	13
Figure 3. Map of the Jordan and Tigris-Euphrates River	27
Figure 4. King Talal Dam Reservoir, Jordan.....	31
Figure 5. Israel Prime Minister Yitzhak Rabin and PLO Chairman Yasser Arafat shake hands in the presence of President Clinton at the White House.....	36
Figure 6. Map of the Nile River	43
Figure 7. Map of the Indus, Ganges and Mekong River	50
Figure 8. Marshall Khan of Pakistan and Jawaharlal Nehru of India at the signing of the Indus Waters Treaty, 1960	53
Figure 9. Map of the Murray-Darling River.....	65
Figure 10. Map of the Amazon and La Plata (Parana) River	76
Figure 11. Map of the Colorado (USA/Mexico), Columbia (USA/Canada), Nelson- Saskatchewan (USA/Canada), and Mississippi (USA) River.....	83
Figure 12. Prime Minister Diefenbaker of Canada and U.S. President Eisenhower signing the Columbia River Treaty on January 17, 1961	93
Figure 13. Judson Harmon, 42 nd United States Attorney General.....	106
Figure 14. UN Security Council Chamber in New York.....	124
Figure 15. UN Conference on Environment and Development in Rio de Janeiro, 1992	149

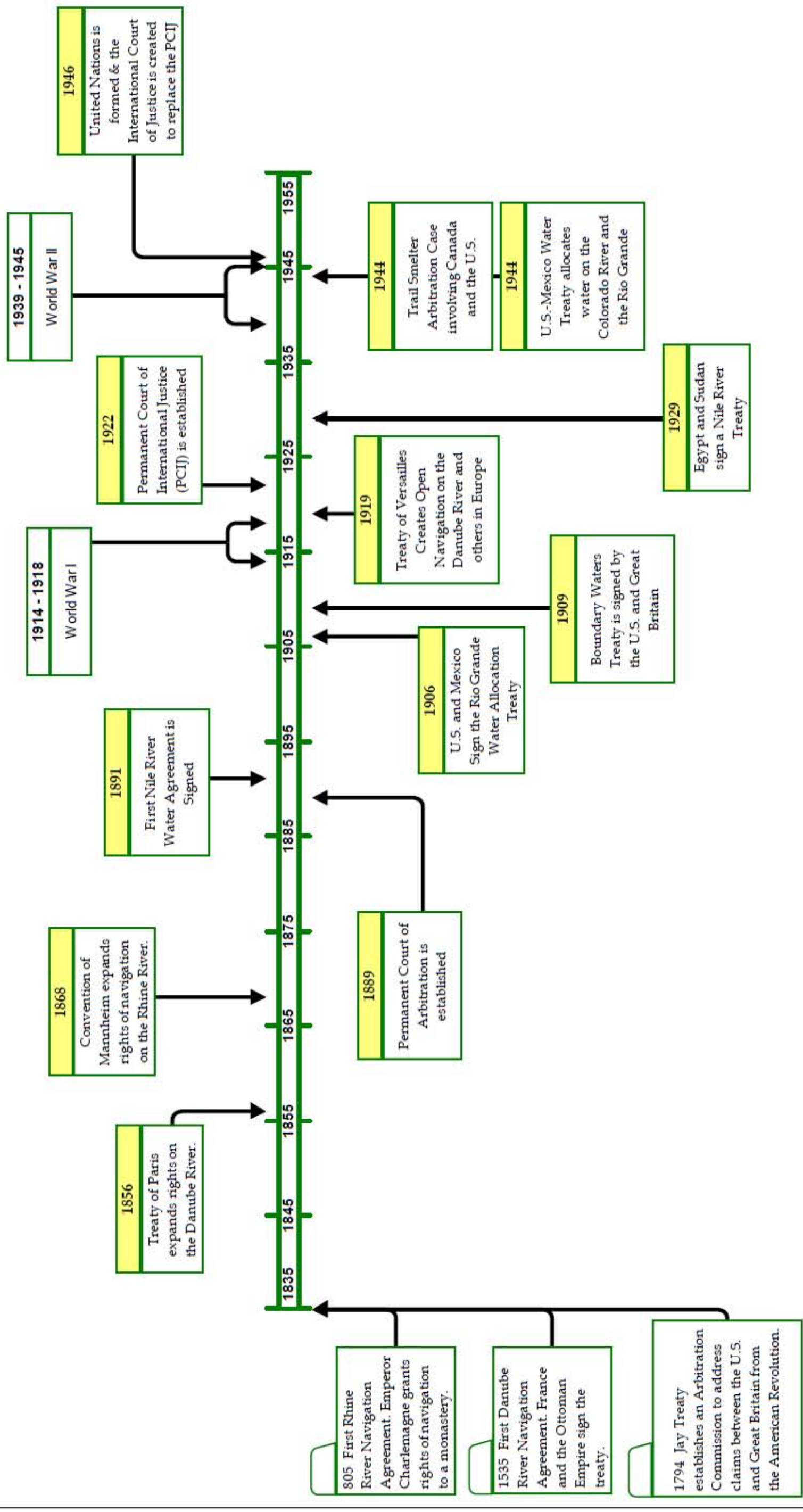
Map of International Rivers Studied



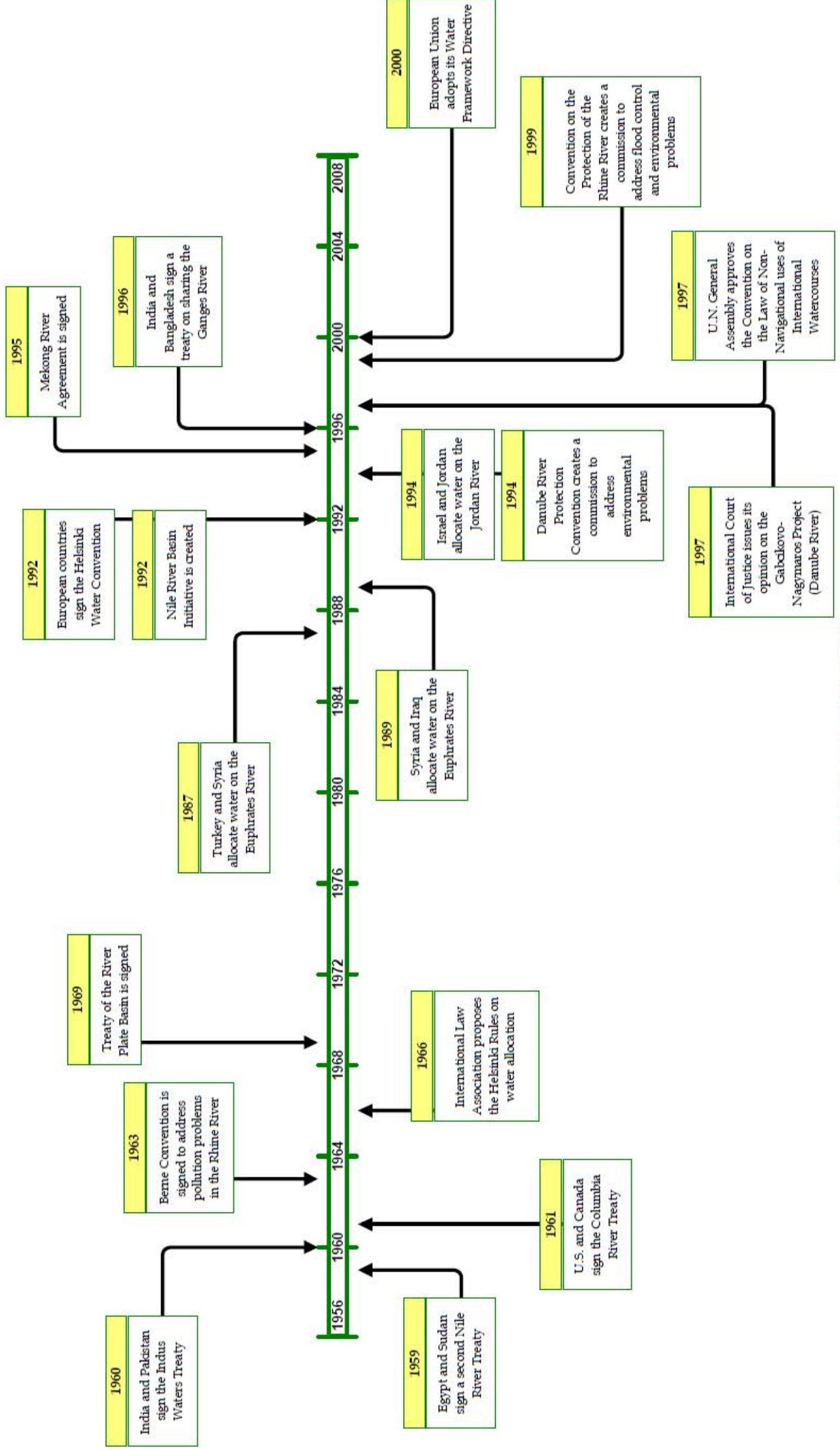
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Water Treaties & Tribunals 805 to 1955



Water Treaties & Tribunals 1956-2008



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CHAPTER 1

INTRODUCTION

In this chapter:

- 1.1 The Roots and Terminology of International Law
 - 1.1.1 The Origins of International Law
 - 1.1.2 International Law Today
 - 1.1.3 Treaties
 - 1.1.4 Customary Law
 - 1.1.5 “Soft Law”

1.0 INTRODUCTION

This study builds upon a 2006 report, entitled *Laws of the Rivers: the Legal Regimes of Major Interstate River Systems of the United States*, published by the Colorado River Commission of Nevada (“the Commission”).⁴

The 2006 report was a reference document: it compiled information about the laws, infrastructure and management regimes on 14 major interstate river systems of the United States. The Commission wanted to learn whether “the management of rivers other than the Colorado River can offer innovative solutions to the problems facing the desert Southwest.”⁵ The report did not take sides in disputes nor did it offer specific suggestions or preferences for how to resolve problems, stating, “Rather, we encourage others to work from the information contained in this report, thinking creatively about the management of interstate river systems and fashioning their own solutions.”⁶

This report attempts to accomplish the same goals, in a larger geographical context – the major rivers of the world. For the Commission, this inquiry is not a theoretical exercise. The Colorado River is an international waterway, shared with Mexico and subject to a treaty now 64 years old.⁷

In preparing this report, we collected detailed information about the laws and river governance of these rivers. We reviewed the major international treaties and agreements, as well as the law of water allocation among nations and the principles of international environmental law and international dispute resolution.⁸

This report does not offer opinions or judgments. Instead, the authors seek to answer basic questions. When one State⁹ wants to divert water from an international river for irrigation, or wants to build a dam for power in its territory, what are the rights of a neighboring country through which the river flows? Are both countries bound to negotiate an agreement that is equitable or reasonable? If so, what do those words mean? Who enforces the agreement? To what entity do the countries turn if they have a dispute? These are the questions that “international water law” addresses.

⁴ The Colorado River Commission of Nevada is a state agency that acts as a trustee for Nevada’s interests in the Colorado River. For the Commission’s home page, see www.crc.nv.gov. The Commission consists of seven commissioners and staff. Nevada Revised States (“NRS”) 538.041 to 538.251, inclusive, provide the statutory basis for the Commission duties.

⁵ LAWS OF THE RIVERS: THE LEGAL REGIMES OF MAJOR INTERSTATE RIVER SYSTEMS OF THE UNITED STATES (Colorado River Commission of Nevada 2006) at i.

⁶ *Id.* at 3.

⁷ *Treaty Relating to the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande*, Feb. 3, 1944, U.S.-Mex., 3 U.N.T.S. 313 (“Mexico Water Treaty”). The treaty is also found at 59 Stat. 1219.

⁸ See Appendix C of this report for the major sources used in researching and writing this report.

⁹ The words “nation,” “country,” and “State” (with a capital “S” to distinguish it from a state of the United States) are used interchangeably in this report.

But there are two common and recurring obstacles that complicate this search for peaceful solutions. First, the boundary lines of nations typically bear little resemblance to the topography and natural boundaries of rivers and their ecosystems. As a result, many international rivers cross a number of borders and pass through multiple nations with different laws, languages, religions, and cultures.

Second, there are ever-increasing demands for use of rivers. Many waterways are faced with pollution – the result of years of industrial growth or a burgeoning population with little infrastructure and ineffective regulation. The uncertain effects of climate change make matters worse. Many rivers are over-allocated or would be in the absence of strict regulation. They cannot meet the ever-increasing needs for irrigation, power, navigation, flood control, recreation, and, at the same time, the preservation of fish and wildlife. These conflicts often blur the line between water quantity (“who gets what from the river”) and diminishing water quality (caused by sewage, industrial effluent, invasive species, agricultural runoff, or other discharges). Furthermore, many water disputes are often exacerbated by religious and cultural differences that can create friction between nations or ethnic groups and even result in war.

A United Nations publication on transboundary freshwater disputes describes the problem succinctly:

Water not only ignores our political boundaries, it evades institutional classification and eludes legal generalizations. Interdisciplinary by nature, water’s natural management unit, the watershed – where quantity, quality, surface and groundwater all interconnect – strains both institutional and legal capabilities often past capacity.¹⁰

There are between 200 and 300 transboundary rivers and lakes in the world, depending on how tributaries are counted.¹¹ The definition of “transboundary” or “international” typically includes rivers that serve as the border between two or more countries and/or that cross the border between two or more countries.¹²

Sometimes, the nations that share transboundary rivers agree to create a joint commission to manage waters cooperatively and resolve disputes. The International Joint Commission between

¹⁰ HEATHER BEACH, ET AL., *TRANSBOUNDARY FRESHWATER DISPUTE RESOLUTION: THEORY, PRACTICE AND ANNOTATED REFERENCES* (U.N. University Press 2000) at 13-14.

¹¹ The United Nations estimated in 1977 that there were 214 international drainage basins. See The Secretary-General, *Register of the International Drainage Basins, delivered to the Security Council and the General Assembly*, U.N. DOC E/C 7/71 (Mar. 11, 1977). The number increased after the break-up of the Soviet Union and the Republic of Yugoslavia. Other documents put the number of major international rivers at 261. See PETER H. GLEICK, *THE WORLD’S WATER 2000-2001: THE BIENNIAL REPORT ON FRESHWATER RESOURCES (WORLD’S WATER)* (2000). Other analysts suggest the number is closer to 300. See SALMAN M.A. SALMAN & KISHOR UPRETY, *CONFLICT AND COOPERATION ON SOUTH ASIA’S INTERNATIONAL RIVERS* (World Bank 2002) at 3-4.

¹² Some rivers serve as the boundaries between nations and later cross other international borders on their way to the sea. The Tigris River, for instance, begins in Turkey, and then serves briefly as the border between Syria and Iraq. The river then crosses into Iraq and eventually joins with the Euphrates River to form the Shatt-al Arab River that serves as yet another international boundary, this time between Iraq and Iran.

the United States and Canada is a prime example,¹³ as is the International Boundary and Water Commission between the United States and Mexico.¹⁴

Agreements creating a river commission usually apply to a specific area of the world or to a single river basin. They are international in the literal sense – they are between nations – but they are not global in scope. The rules that apply in one basin may not (and likely do not) apply in another.

At present, there is only one multilateral treaty that establishes criteria for nations to use in allocating and managing water from international rivers and lakes: the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses.¹⁵ The U.N. Convention requires States to use common lakes and rivers in an “equitable and reasonable manner.”¹⁶ But the Convention does not create a formula or establish priorities among competing uses. Instead, the Convention lists the relevant factors (criteria) and creates a framework for nations to negotiate bilateral or multilateral agreements between themselves. Although the Convention was approved by the U.N. General Assembly, the treaty has yet to be ratified by the minimum number of signatory nations.¹⁷ As a result, the agreement is not in force and is not binding.

Furthermore, States do not rely regularly on the judicial machinery of the United Nations to resolve conflicts over international rivers. Since its creation in 1946, the International Court of Justice, commonly called “the World Court,” has decided only one case involving the management of an international river: the 1997 *Gabcikovo-Nagymaros Project (Hungary v. Slovakia)* on the Danube River.¹⁸

Nonetheless, there is a large body of international law – much of it bilateral or regional – which addresses the allocation and management of rivers between two or more nations that serve either as the border or cross the border. The law affects boundaries, navigation, commerce, fishing, power generation, irrigation, recreation, preservation of fish and wildlife, pollution, and a host of other activities and issues. In the next chapter, we describe briefly the historical foundation of this law and the role of “customary law” and “soft law.”

¹³ For the home page of the International Joint Commission, *see* http://www.ijc.org/en/home/main_accueil.htm.

¹⁴ For the home page of the International Boundary and Water Commission, *see* <http://www.ibwc.state.gov/home.html>.

¹⁵ *United Nations Convention on the Law of the Non-navigational Uses of International Watercourses*, 36 I.L.M. 700 (1997) (“*the U.N. Convention*”), available at http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf.

¹⁶ *Id.* art 5. *See also* art. 6, which contains the factors that States should take into account when they allocate international rivers.

¹⁷ The U.S. is not a signatory to the *U.N. Convention*.

¹⁸ *The Gabcikovo-Nagymaros Project (Hungary v. Slovakia)*, Judgment, 1997 I.C.J. Reports 7 (September 25).

1.1 THE ROOTS AND TERMINOLOGY OF INTERNATIONAL LAW

“International law” is a broad term that refers to the rules and principles which govern (or are supposed to govern) the conduct of States. It consists of two components: 1) “public international law,” which addresses relations among governments; and 2) “private international law,” which addresses relations among individuals, organizations, and corporations, and which is usually associated with trade and commerce. The former applies to the world of diplomacy; the latter to the world of business.

International water law typically straddles both spheres. In virtually every country, water is a public “resource” that is considered a sovereign asset – an asset to be owned or managed in some fundamental way by government, not the private sector. At the same time, individuals, organizations, and corporations are the ones who invariably use water for irrigation, navigation, fishing, recreation, and other purposes. International water law therefore addresses the complex relationships among these public and private actors when their activities cross national borders.

International law develops through three means: 1) the making of treaties, which are written agreements between States; 2) the formation of “customary law,” which develops over time based on the behavior of States; and 3) the establishment of “soft law” principles derived from the resolutions and declarations of international organizations and groups.

1.1.1 The Origins of International Law

International law, as it developed in Europe in medieval times, rested on the concept of “natural law” that derives from a “higher source” and is often associated with religious principles and mandates. In the natural law view of the world, the king is a representative of a deity. The king’s possessions, and his representatives, are “holy” and sovereign.¹⁹

The “divine right of kings” ceased to be the basis for international law by 1648, when the Peace of Westphalia began a new order in Europe based on the concept of national sovereignty.²⁰ Thereafter, the “law of nations” became known as “international law.” Its principles and rules regulated the relations between States.²¹

The development of democracies in the 18th Century, based on the consent of the governed, raised the corollary principle: that States themselves consent to be governed by international law as a condition of their independence. When new States are formed we refer to them, even now, as “joining a community of nations” and assuming the responsibilities associated with this status.

¹⁹ In China, the emperors ruled with a “Mandate of Heaven” – a similar concept to divine rights – but with one major difference: the Mandate of Heaven was conditional on the emperor treating his subjects justly – if he did not, his subjects could (and did occasionally) rebel.

²⁰ The Peace of Westphalia refers to two treaties signed in 1648 that ended the Thirty Years’ War in Germany and the Eighty Years’ War between Spain and The Netherlands.

²¹ Hazel Fox, *Time, History and Sources of Law: Peremptory Norms: Is There a Need for New Sources of International Law?*, in *TIME, HISTORY, AND INTERNATIONAL LAW* (Matthew Craven, Malgosia Fitzmaurice & Maria Vogiatzi, eds., Martinus Nijhoff Publishers 2007).

Codification of modern-day international law commenced only in 1873, with the founding of the Institute of International Law at Ghent, Belgium.²² Scholars there and elsewhere developed an interest in the development of “comparative law,” in which they examined the legal traditions and compared the cultures in which the laws developed.²³

1.1.2 International Law Today

International law today has a new look. The parameters of international law have enlarged and now include subjects, such as human rights, international commerce in a global world, and the values of natural resources and the environment. International law, once the exclusive domain of sovereign nations, now impacts global corporations, individuals and non-governmental organizations, who enjoy protections under an international legal regime that addresses both human rights and property rights. Treaties filed with the United Nations cover subjects ranging from refugees and stateless persons, narcotics, obscene publications, educational and cultural matters, commercial arbitration, fiscal matters and outer space, to name a few. Accompanying this rise in global commerce are new organizations such as the World Trade Organization (“WTO”), which comes with its own set of rules.²⁴ Disputes are numerous, too. In January 2007, the WTO’s Annotated Reporter of Dispute Settlement Decisions was already in its 82nd volume.²⁵

1.1.3 Treaties

For thousands of years, States have signed treaties to resolve boundary and navigation disputes. Much of modern-day water law has its origins in these attempts to delineate maritime borders and establish the rights and obligations of nations to each other. As a result of those water treaties, States developed elaborate protocols of behavior for ships in domestic and international rivers and waterways. Later, in the early days of the industrial era, States expanded these agreements to address common river management problems arising out of locks and dams (usually built for the dual purpose of navigation and power supply), as well as issues surrounding irrigation and the canals and infrastructure needed to move water. Sometimes these agreements were signed to settle a dispute.²⁶ In other instances, the treaty was intended to foster cooperation for development; it represented the collective aspirations of several basin States.

²² For the home page of the Institute of International Law, see www.idi-iiil.org. The Institute was awarded the Nobel Peace Prize in recognition of its activities supporting the arbitration of disputes among States.

²³ See, e.g., SIR PAUL VINADOGROFF, *OUTLINES OF HISTORICAL JURISPRUDENCE* (Oxford University Press 1922). See, e.g., PHANOR J. EDER, *A COMPARATIVE STUDY OF ANGLO-AMERICAN AND LATIN-AMERICAN LAW* (New York University Press 1950); JOHN HENRY MERRYMAN & DAVID S. CLARK, *COMPARATIVE LAW: WESTERN EUROPEAN AND LATIN AMERICAN LEGAL SYSTEMS, CASES AND MATERIALS* (Bobbs-Merrill Company 1978); KONRAD ZWEIGERT & HEIN KÖTZ, *AN INTRODUCTION TO COMPARATIVE LAW* (Tony Wier trans., Clarendon Press 3rd ed. 1998).

²⁴ The World Trade Organization was created in 1995. Its rules are intended to liberalize global trade. It is the successor to the General Agreement on Tariffs and Trade, which was created in 1947. The WTO has 153 members. Its headquarters are located in Geneva, Switzerland. For the WTO home page, see www.wto.org.

²⁵ Bernan’s Annotated Reporter, *WORLD TRADE ORGANIZATION DISPUTE SETTLEMENT DECISIONS* (Bernan Press 2007). For more information on the WTO’s dispute resolution activities, see http://www.wto.org/english/tratop_e/dispu_e/dispu_e.htm.

²⁶ The English word “rival” comes from the Latin word “rivalis,” meaning someone who uses the same

In this report, we use the word “treaty” to mean any binding agreement between two or more nations whether it is called a convention, protocol, charter, pact or other name.

Professor Thomas Buergenthal (now a judge who sits on the International Court of Justice) and Sean Murphy, co-authors of a reference book on international law, explain:

[T]he same legal rules apply to one as the other. The choice of this or that name may at times be prompted by the belief that a given designation implies greater or less solemnity or importance. But as a matter of international law, a treaty by whatever name is still a treaty.²⁷

The terms are interchangeable, and as a matter of international law, have no legal significance.

1.1.4 Customary Law

Customary laws are rules that nations practice tacitly. The rules are assumed from the time-honored behavior of individuals and States. Customary law is sometimes recognized by courts, sometimes enshrined in treaty, and sometimes described merely as appropriate conduct. Customary law results from a consistent practice of States, followed from *a sense of legal obligation*.²⁸

Professors Buergenthal and Murphy explain:

A practice does not become a rule of international customary law merely because it is widely followed. It must, in addition, be deemed by states to be obligatory as a matter of law. This test will not be satisfied if the practice is followed out of courtesy or if states believe that they are legally free to depart from it any time.²⁹

Within the jurisprudence of customary law are important decisions of the International Court of Justice and its predecessor, the Permanent Court of International Justice, which addressed transboundary water conflicts.³⁰

1.1.5 “Soft Law”

Soft law is the product of non-governmental organizations and groups of advocates. It is typically found in the pronouncements of these organizations, whose proclamations in the form

river as another.

²⁷ THOMAS BUERGENTHAL & SEAN MURPHY, PUBLIC INTERNATIONAL LAW (West Publishing 4th ed. 1990) (“BUERGENTHAL & MURPHY”) at 106-107.

²⁸ RESTATEMENT (THIRD) OF FOREIGN RELATIONS § 102(2) (1987).

²⁹ BUERGENTHAL & MURPHY, *supra* note 27, at 22.

³⁰ We discuss the holding of the International Court of Justice in the *Gabcikovo-Nagymaros Project* case in section 5 of this report and the Permanent Court of International Justice in Appendix B.

of “declarations” and “resolutions” state what the law *should* be. The scholarly writing on the subject of “soft law” is extensive but amorphous because it often includes the opinions of experts who promote particular propositions hoping they will over time rise to a level of enforceable rules of international law.

In many instances, the agencies of the United Nations organize conferences where States participate in the preparation of these declarations and resolutions.³¹ The Stockholm Declaration on the Human Environment³² and the Rio Declaration on Environment and Development³³ are worthy examples of declarations passed under the auspices of the United Nations.

Although these declarations are helpful in defining the direction or movement of international customary law, their immediate practical effect is often quite limited. Unless States adopt these norms in treaties or change their conduct, the declarations are mere exhortations and remain non-binding. Nonetheless, these declarations and resolutions can (and often do) move the debate forward. It is by this slow-moving, iterative process that international law develops.

In the case studies that begin in the next chapter, we examine 15 rivers and the laws as they have developed over the years. Some laws date back centuries; others laws and treaties are the product of the 20th century, enacted to authorize large-scale hydropower dams and sophisticated irrigation schemes. The legal regimes in these rivers are as diverse as their ecology.

³¹ The U.N. General Assembly is the closest the world has to a “legislative body,” but it represents States and is not democratically elected. Furthermore, its duties under the U.N. Charter are limited. Even if the U.N. General Assembly approves a treaty, a specified number of signatory countries must still ratify the document in order for it to come into force (i.e., become binding). The treaty itself will state how many nations must ratify the document before it comes into force.

³² *Declaration of the U.N. Conference on the Human Environment*, U.N. Doc. A/Conf. 48/14 (June 16, 1972) (“*Stockholm Declaration*”), available at <http://www.unep.org/Documents/Default.asp?DocumentID=97&ArticleID=1503>. Principle 24, for example, provides that “International matters concerning the protection and improvement of the environment should be handled in a cooperative spirit by all countries, big and small, on an equal footing.”

³³ *U.N. Declaration on Environment and Development*, U.N. Doc. A/CONF.151/5 (June 14, 1992) (“*Rio Declaration*”), available at <http://www.unep.org/Documents/Default.asp?DocumentID=78&ArticleID=1163>. Principle 2 provides that “States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.”

CHAPTER 2

INTERNATIONAL RIVERS

In this chapter:

- 2.1 Europe
 - 2.1.1 The Danube River
 - 2.1.2 The Rhine River
- 2.2 Middle East
 - 2.2.1 The Jordan River
 - 2.2.2 The Tigris-Euphrates Rivers
- 2.3 Africa
 - 2.3.1 The Nile River
- 2.4 Asia
 - 2.4.1 The Ganges River
 - 2.4.2 The Indus River
 - 2.4.3 The Mekong River
- 2.5 Australia
 - 2.5.1 The Murray-Darling River
- 2.6 South America
 - 2.6.1 The Amazon River
 - 2.6.2 The La Plata River
- 2.7 North America
 - 2.7.1 The Colorado River (USA/Mexico)
 - 2.7.2 The Columbia River (USA/Canada)
 - 2.7.3 The Nelson-Saskatchewan River (USA/Canada)
 - 2.7.4 The Mississippi River (USA)

2.0 INTERNATIONAL RIVERS

This chapter contains 15 case studies, arranged atlas-style, in the following order:

- Europe, where multi-national participation is greatest and western international law is perhaps best developed;
- The Middle East, where water is short in supply and long on conflict;
- Africa, home of the Nile River;
- Australia, the most arid continent in the world; and
- The Americas, first with South America, then back home to North America.

We chose rivers that represented the remarkable diversity of the world's waterways. The following charts put these rivers in perspective. There are, of course, many different ways to measure rivers. Length and flow are the two most common. The rivers depicted in bold font are analyzed in this report.

TABLE 1. The 10 Longest Rivers in the World.

River:	Region:	Length:	
		(Miles)	(Kilometers)
Nile	Africa	4,132	6,650
Amazon	South America	4,000	6,400
Yangtze	China	3,915	6,300
Mississippi*	North America	3,710	5,971
Yenisey	Russia-Asia	3,442	5,540
Yellow	China	3,395	5,464
Ob-Irtysh	Russia	3,362	5,410
Parana-La Plata	South America	3,032	4,880
Congo	Africa	2,900	4,700
Amur	Asia	2,761	4,444

Bold indicates rivers analyzed in this report.

*The distance of the Mississippi River is measured from the headwaters of the Missouri River (its largest tributary) to the mouth in the Gulf of Mexico.

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) at 179.

To put these numbers in perspective, imagine a river that stretches from Los Angeles to New York, and then to Miami. That is roughly the distance of the Nile or the Amazon in their respective continents.

Measuring a river by flow – the average amount of water each year that reaches the mouth – tells a different story.

TABLE 2. The Largest Rivers in the World by Average Annual Discharge at the Mouth. [Million Acre Feet (MAF) per year and cubic meters per second (m³/s)]

River:	Country:	Discharge:	
	(Mouth)	(MAF)	(m³/s)
Amazon	Brazil	5,430	212,375
Congo	Congo	1,014	39,659
Ganges-Brahmaputra	India-Bangladesh	985	38,525
Yangtze	China	557	21,003
Parana-La Plata*	Argentina-Uruguay	480	18,773
Yenisey	Russia	445	17,405
Mississippi	United States	442	17,287
Orinoco	Venezuela	434	16,974
Lena	Russia	396	15,488

Bold indicates rivers analyzed in this report.

* Includes the combined flow of the Uruguay Rivers and their tributaries.

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) at 181.

The flow of the Amazon, at 5,430 MAF, is greater than the combined total of all the other rivers in the above table. To put this number in perspective, the average annual flow of the Colorado River at Lee Ferry, Arizona, is only 15 MAF, a day in the life of the Amazon River at its mouth.

But it is not numbers that drove the selection of the rivers for this report. Rather, this report focuses on those rivers that cross one or more borders or where the rivers are of such national importance that they deserve examination even though they are not “international.” Two rivers – the Murray-Darling River system in Australia and the Mississippi River in North America – fall into that category. Those rivers are included because of their size and impact on the economy of Australia and the United States, respectively. Many more rivers could have been included, such as the great Yangtze River in China, the mighty Lena and Volga Rivers in Russia, and the Congo in Africa. Time, however, simply did not permit their inclusion.

A detailed analysis of every international treaty on each of the rivers is beyond the scope of this report. We focus instead on major water allocation and river management agreements. We attempt to create a picture of these waterways by describing their uses and by summarizing the terms of the major treaties.

2.1 EUROPE



FIGURE 1: Map of the Danube and Rhine River

For this study, we examined two of Europe’s largest rivers: the Danube River and the Rhine River. Together, they drain parts of every nation in Europe and face the common problems of water quality and shared resources. The Danube is the only river that is the subject of a major river management decision from the International Court of Justice.³⁴ The Rhine River – once nick-named the “romantic sewer of Europe” to contrast its distinguished cultural heritage with its severely polluted condition – is now making a recovery as the result of a coordinated cleanup effort.

2.1.1 The Danube River

What’s in a Name? The name Danube has its origins in the Indo-European word *danu*, meaning stream or river. In German, the river is known as the *Donau*, in Hungarian, the *Duna*, and in Bulgarian, the *Dunav*.

The Danube River begins in the Black Forest of Germany and empties into the Black Sea in Romania. The river basin drains part or all of 18 countries and is home to 81 million people. The river is an intrinsic part of Europe’s culture; its name is memorialized in the *Blue Danube*

³⁴ See discussion of the *Gabcikovo-Nagymaros Project* case in section 5.

Waltz by Johann Strauss and by a circle of landscape painters from the 16th Century known as “The Danube School.”

TABLE 3. The Danube River at a Glance.

Length:	1,770 miles (2,850 kilometers)
Basin Size:	307,000 square miles (796,000 square kilometers)
Average Discharge:	158 MAF per year (6,173 m ³ s)

Sources: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) at 179-81 and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

The Danube flows through four national capitals: Vienna (Austria); Bratislava (Slovakia); Budapest (Hungary); and Belgrade (Serbia). Other cities along its banks include: Ulm, Regensburg and Passau, Germany; Linz, Austria; and Braila, Romania.

There are 26 major tributaries to the Danube River. The tributary with the largest basin (in terms of area) is the Tisza River, which drains parts of Hungary, Romania, Serbia, Slovakia, and the Ukraine. The Tisza is also the longest tributary (600 miles/966 kilometers). By flow, the largest tributary to the Danube River is the Sava River, which drains part of Albania, Bosnia-Herzegovina, Croatia, Montenegro, Serbia and Slovenia. The Sava River merges with the main stem of the Danube River in Belgrade, Serbia.



FIGURE 2. Danube River

[Source: www.tripsfinder.net/.../2007/09/danube.jpg]

TABLE 4. Countries in the Danube River Basin.

Country:	% of the Basin:
Albania	<.1
Austria	10.0
Bosnia and Herzegovina	4.6
Bulgaria	5.9
Croatia	4.4
Czech Republic	2.9
Germany	7.0
Hungary	11.6
Italy	<.1
Macedonia	<.1
Moldova	1.6
Poland	<.1
Romania	29.0
Serbia-Montenegro	11.1
Slovak Republic	5.9
Slovenia	2.0
Switzerland	.2
Ukraine	3.8
TOTAL	100.0

Source: U.N. Environmental Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 79.

Water Uses

The Danube River is the source of drinking water for 10 million people. Small- and medium-sized ocean-going vessels can travel from the mouth of the river at the Black Sea upstream 105 miles (169 kilometers) to Braila, Romania. Smaller ships can traverse the river all the way to Germany. Many of the Danube's tributaries are also navigable for barges and shallow boat traffic.

In Germany, the Danube River is connected by the Main-Danube Canal with the Rhine River, allowing commercial barge traffic to travel between the North Sea and the Black Sea. The canal, completed in 1992, is 106 miles (171 kilometers) long. Other canals in the Danube River basin

include the Danube-Tisza-Danube Canal System, located in Serbia, and the Danube-Black Sea Canal in Romania. The river and its tributaries are also used to generate electricity.³⁵

Treaties and Agreements

Treaties and agreements on the Danube River fall into four categories: 1) navigation treaties; 2) water allocation treaties on tributaries; 3) treaties on infrastructure; and 4) broad, multi-lateral agreements on curbing pollution and restoring the river ecology.

Navigation Treaties

Navigation commissions have existed on the Danube River since 1535, when France signed a navigation treaty with the countries in the Ottoman Empire to open certain ports for commerce.³⁶ Other treaties followed. In 1856, for example, the Treaty of Paris guaranteed free navigation for riparian nations on most of the river.³⁷ The treaty created a European Commission, a temporary technical body, to enforce the navigation provisions.³⁸

Once the major States in Europe signed the 1919 Treaty of Versailles that ended World War I, the Danube River became an “international” waterway – and open for navigation to all nations – from Ulm, Germany, to its mouth at the Black Sea.³⁹ The Treaty of Versailles established an

³⁵ Seven hundred dams and weirs, many of them small, have been built on the main stem and tributaries of the Danube River. Of these, about 59 dams have been built along the river's first 600 miles (from its source in Germany to Gabčíkovo, Czech Republic). One of the largest structures on the main stem of the Danube River is Djerdap (Iron Gate) Dam, jointly operated by Romania and Serbia-Montenegro, which has the capacity to generate 2,300 MW. The dam is the subject of a separate treaty. *Instrument: Iron Gates Water Power and Navigation System on the Danube*, Rom.-Yugo., Nov. 30, 1963, 512 U.N.T.S. 2. Another large structure on the Danube River is the Jochenstein Dam, which spans the river between Germany and Austria.

³⁶ *Freedom of Navigation in Ports of the Ottoman Empire*, 1 Noradoughian (Recueil d'actes internationaux de l'Empire Ottoman), cited in FOOD AND AGRICULTURE ORGANIZATION, SYSTEMIC INDEX OF INTERNATIONAL WATER RESOURCE TREATIES, DECLARATIONS, ACTS AND CASES BY BASIN (FAO Press 1978) (“FAO COMPILATION”) at 1.

³⁷ The treaty ended the Crimean War. *General Treaty of Peace of, Paris*, March 30, 1856, 10 Herstlet Comm'l. Treaties 533. The treaty expanded the concept of free (or open) navigation, first agreed to among eight leading European nations in *The Final Act (General Treaty), Congress of Vienna*, art. 108-116, June 9, 1815, 64 Parry 453. Article 15 of the treaty stated: “The Act of the Congress of Vienna having established the principles intended to regulate the navigation of rivers which separate or traverse different States, the Contracting Parties [in this treaty] stipulate among themselves that those principles shall in future be also applied to the Danube and its mouths. They declare that this arrangement henceforth forms a part of the public law of Europe”

³⁸ For a discussion of navigation treaties on the Danube River, see *Advisory Opinion, Jurisdiction of the European Commission of the Danube between Galatz and Braila*, 1927 P.C.I.J. (Ser. B. No. 14, Ser. C. Nos. 191V (1),(II), (III), and (IV)). The opinion addressed the European Commission's jurisdiction between two cities, Galatz and Braila, in Romania.

³⁹ *Treaty of Peace with Germany*, June 28, 1919, 2 Bevans 43 (“*Treaty of Versailles*”). Article 331 identified several rivers, including the Danube, by name and declared them to be “international.” Article 332 states: “On the waterways declared to be international in the preceding Article, the nationals, property and flags of all Powers [Parties to the Treaty] shall be treated on a footing of perfect equality, no distinction being made to the detriment of the nationals, property or flag of any Power between them and the nationals, property or flag of the riparian State itself or of the most favored nation.” The “Powers” of the treaty referred to the victorious “Allied Powers,” including countries outside of Europe (e.g., South America) that had declared war but had limited or no

international conference to draft a comprehensive statute for navigation on the entire river.⁴⁰ The parties drafted the statute in 1921; it formally extended the jurisdiction of the European Commission from Ulm, Germany, to Braila, Romania.⁴¹ The statute remained in force until 1948, when the nations bordering the river signed another treaty that is still in effect today. It regulates the middle and lower parts of the Danube River.⁴²

Treaties on Tributaries

Separate treaties allocate water and/or address management issues on several of the Danube's tributaries. In 1954, for example, Austria and Yugoslavia signed a water allocation agreement for the Drava River, a tributary that empties into the Danube in Croatia.⁴³ In 1956, Czechoslovakia and Hungary signed a boundary treaty that allocated water on the Tisza River, which begins in the Ukraine and empties into the Danube River in Serbia.⁴⁴

Treaties on Infrastructure

Other agreements address the construction, maintenance, and operation of locks, dams, and other infrastructure at specific locations. In 1952, for example, Austria, Germany and its state of Bavaria signed an agreement authorizing the construction of a large hydroelectric project on the river at Jochenstein, east of Passau, in southeast Germany.⁴⁵

In 1977, Czechoslovakia and Hungary signed a treaty to build a series of locks and dams on the Danube River, a large project known as Gabčíkovo-Nagymaros. The treaty obligated both nations to pay for and cooperatively manage the infrastructure, which would generate power and

³⁹ military involvement.

⁴⁰ *Id.* art. 349.

⁴¹ *The Definitive Statute of the Danube*, July 23, 1921, 26 L.N.T.S. 220.

⁴² *Convention Concerning the Regime of Navigation on the Danube*, Aug. 18, 1948, 33 U.N.T.S. 181. The agreement is known as the "Belgrade Convention." An 11-member Danube Commission (with one representative from each country) administers the treaty, but it has no decision-making authority (i.e., it cannot impose penalties). Each riparian State retains power to make its own regulations on most of the Danube River. *See id.* art. 23. For the home page of the Danube Commission, *see* <http://www.danubecom-intern.org/ENGLISH/SUMMARY.htm>. The seven original signatory States were: Bulgaria, Czechoslovakia, Hungary, Romania, the Ukraine, Yugoslavia and the U.S.S.R. With the breakup of the U.S.S.R., Czechoslovakia and Yugoslavia, the members now include the following countries (in alphabetical order): Austria, Bulgaria, Croatia, Germany, Hungary, Moldova, Slovakia, Romania, Russia, Serbia and the Ukraine.

⁴³ *Convention between Yugoslavia and Austria concerning Water Economy Questions relating to the Drava*, Yugo.-Austria, May 25, 1954, 227 U.N.T.S. 128.

⁴⁴ *Tisza River Convention*, Czech.-Hung., Apr. 16, 1954, 504 U.N.T.S. 254.

⁴⁵ *Agreement Between the Government of the Republic of Austria and the Government of the Republic of Germany and of the Free State of Bavaria Concerning the Donaukraftwerk-Jochenstein-Aktiengesellschaft (Danube Power-Plant and Jochenstein Joint-Stock Company)*, Austria-F.R.G.-Bavaria, Feb. 13, 1952 ("Jochenstein Dam Treaty"), available at www.waterlaw.org/regionaldocs/danube-austria-germany.html.

facilitate navigation of larger vessels. A dispute between the two countries ended in litigation before the International Court of Justice.⁴⁶

Treaties on Environmental Issues

The most important basin-wide agreement, the Danube River Protection Convention, was signed in 1994, and addresses a range of environmental issues. The Convention came into force in 1998.⁴⁷ Its purpose is to ensure that surface waters and ground waters are managed and used “sustainably and equitably.”⁴⁸ The 14 signatories are: Austria, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Slovenia, the Ukraine and the European Union. The Danube River Protection Convention does not allocate water.

Governance

The International Commission for the Protection of the Danube (“ICPDR”) was established in 1998, pursuant to the Danube River Protection Convention.⁴⁹ It is the main international body that addresses environmental issues in the basin. The ICPDR is based in Vienna, Austria.⁵⁰

The goals of the ICPDR are to safeguard the Danube’s water resources, reduce the risk from toxic chemicals, and reduce hazards from floods and other natural accidents. Since its creation, the ICPDR has established clean-up priorities and strategies for the Danube River and its tributaries. A trans-national monitoring network under the auspices of the ICPDR, for example, analyzes changes in water quality in the basin. The ICPDR is a forum for the exchange of information and cooperation among the 14 signatories.

The European Water Directive (approved in 2000), which requires basin-wide planning, has now imposed a regulatory regime on the Danube River, as it has on other rivers. The Water Directive has the force of law; the ICPDR facilitates compliance with the Directive but does not enforce its provisions.⁵¹

Unresolved environmental problems in the Danube River Basin include industrial contamination, loss of wetlands, and agricultural runoff. A spill of cyanide from a gold mine in northern

⁴⁶ For a discussion of this case in detail, *see* section 5 of this report.

⁴⁷ *Convention on Cooperation for the Protection and Sustainable Use of the Danube River*, June 29, 1994, Int’l. Env. Rep. 35:0251, available at <http://www.icpdr.org/icpdr-pages/drpc.htm>.

⁴⁸ *Id.* art. 2(1). “The Contracting Parties shall strive at achieving the goals of a sustainable and equitable water management, including the conservation, improvement and rational use of surface waters and ground water in the catchment [basin] area as far as possible.”

⁴⁹ *Id.* art. 18.

⁵⁰ For the home page of the International Commission for the Protection of the Danube River, *see* www.icpdr.org.

⁵¹ *See* section 8.2 at page 197 of this report on the European Water Directive.

Romania severely damaged portions of the Tisza River and prompted calls for increased environmental controls.

Slovakia and Hungary have still not reached an agreement on the controversial Gabčíkovo-Nagymaros Project, which once was envisioned as a cooperative venture to control flooding and produce power. The project is a continuous source of frustration between the two nations, who have yet to resolve their claims after a 1997 International Court of Justice opinion.

There are other small bilateral or multilateral commissions on Danube River tributaries. The four nations in the basin of the Sava River, for example, have established the International Sava River Basin Commission, whose members include the signatory States of Bosnia-Herzegovina, Croatia, Slovenia and the Federal Republic of Yugoslavia. The purpose of the Sava River Basin Commission is to establish an international navigation regime on the river and its tributaries, prevent or limit floods and other hazards, and establish sustainable water management for the basin.⁵²

2.1.2 The Rhine River

What's in a name? The word "Rhine" has its origins in the Latin word *rhoe*, meaning flow. In German, the river is the *Rhein*; in French, the *Rhin*, in Dutch, the *Rijn*.

The Rhine River begins in Switzerland and empties downstream in the North Sea, near Hoek van Holland (Hook of Holland), the Netherlands.

The Rhine River flows north from its source in the Swiss Alps.⁵³ It forms the border between Switzerland and Liechtenstein and then between Switzerland and Austria. The river then turns west and flows into and out of Lake Constance (in German, "Bodensee"), one of the largest lakes in central Europe and the only body of water of its size managed cooperatively without defined boundaries. The three nations – Switzerland, Austria, and Germany – have agreed to treat the lake as if it were under collective ownership.

From the outflow of Lake Constance, the Rhine River continues west, where it forms the boundary between Switzerland and Germany. It then passes through Basel, Switzerland, the first major city along its route. From there, the river turns north, passing within just 30 miles (48 kilometers) of the hills in the Black Forest where the Danube River begins.

As the Rhine continues north, it forms the boundary between France and Germany for 120 miles (193 kilometers), where the French once built the fortifications for the Maginot Line on the western bank and the Germans built the Siegfried Line on the east bank, each designed to keep the other from invading. The river then flows into the heart of Germany, entering a steep gorge, famous for its scenery, castles and wines, and where the surrounding country is known as the "Rhineland." Eventually, the river emerges into the North German Plateau, where it becomes broad and sluggish. The river then flows into the Netherlands and empties into the North Sea in

⁵² For the home page of the Sava River Commission, see www.savacommission.org. The Commission is located in Zagreb, Croatia. It was established by an agreement signed in 2002.

⁵³ Two different tributaries, the Vorderrhein and Hinterrhein, are often described as the source of the river. The tributaries converge near Reichenau, Switzerland.

an area known as the Rhine-Meuse-Scheldt Delta, where two other rivers, the Meuse and the Scheldt, merge with the Rhine in a bewildering array of canals, tributaries and distributaries.

Parts of nine countries – Austria, Belgium, France, Germany, Italy, Liechtenstein, Luxembourg, the Netherlands, and Switzerland – lie in the Rhine River basin. About 50 million people live there. Major cities along the path of the river downstream of Basel include: Strasbourg, France; Mannheim, Bingen, Mainz, Bonn, Cologne, Dusseldorf and Duisberg, Germany; and Rotterdam, the Netherlands.

Major tributaries of the Rhine River include the Aare, the Ruhr, the Mosel, the Neckar, the Main and, in the lower delta, the Scheldt River and Meuse River, known for a landmark 1937 decision from the Permanent Court of International Justice that bears its name.⁵⁴ The river is associated with many legends and myths, from the 12th century German epic poem, *Nibelungenlied*, to the story of Lorelei, the mermaid who sits on a rock in the narrowest part of the river near St. Goarshausen, Germany, and lures the unwary sailor to death.

TABLE 5. The Rhine River at a Glance.

Length:	865 miles (1,392 kilometers)
Basin Size:	77,000 square miles (199,000 square kilometers)
Average Discharge:	56 MAF per year (2,190 m ³ s)

Sources: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

TABLE 6. Countries in the Rhine River Basin.

Country:	% of the Basin:
Germany	56
Switzerland	14
France	13
Belgium	8
Netherlands	6
Luxembourg	1
Austria	<1
Liechtenstein	<1
Italy	<1

TOTAL **100**

Source: U.N. Environment Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 114.

⁵⁴ See discussion in Appendix B for a summary of the 1937 Meuse River dispute.

Water Uses

The Rhine River is the main navigation channel from Basel in northern Switzerland, 497 miles (800 kilometers) to its mouth in the North Sea, and has been an important navigable waterway since the Roman Empire. Even today, it is one of Europe's most important commercial waterways. Rotterdam, at the mouth of the Rhine River, is the largest port in Europe and one of the largest ocean harbors in the world, drawing more oil tankers from the Middle East than anywhere else. Coal, grain, and timber are the principle cargoes shipped upstream. One of the world's densest corridors of road and rail networks follows its course.

The untamed Rhine River was unruly and moved in a meandering path across a broad flood plain. Beginning in the 1800s, however, the German hydraulic engineer Johann Tulla built channels for the river – a massive “rectification” project that made the river run straight and “prepared the Rhine for its role as the great river highway of the state of Germany that was created in 1871. Along its banks grew the great industrial cities of the new Germany, such as Mannheim, Koblenz, Cologne and Dusseldorf.”⁵⁵

The Rhine and its tributaries are now also used for municipal (drinking) water, supplying 30 million people. Other uses include water for chemical and pharmaceutical industries, agriculture, hydropower generation, thermal power plant cooling (both coal and nuclear), tourism and recreation. Construction of dams in the Rhine River Basin began in 1895 and continued sporadically until 1977. There are now 21 dams on the main stem of the Rhine River and dozens on tributaries and canals.⁵⁶ The dams on the main stem are comparatively small and have little reservoir storage.

The Rhine-Main-Danube Canal, completed in 1992, connects the Rhine and Danube Rivers in Germany. The canal, 106 miles (171 kilometers) long, allows commercial traffic to go up the Rhine from the North Sea into the Main River at Bamberg, Germany, and then continue down the Danube River until it empties into the Black Sea. The idea of a continuous waterway between the Main and Danube Rivers was first proposed by Charlemagne in 793. Other canals include the 31-mile long (50 kilometers) Grand Canal d'Alsace, which parallels the river between France and Germany, and which produces hydropower at two locations and provides cooling water for a nuclear power plant.⁵⁷

For many years after the end of World War II, the Rhine River was one of the most contaminated rivers in central Europe. Cities and industries, particularly in the Ruhr Valley, Germany, were

⁵⁵ Fred Pearce, *The New Scientist*, June 26, 1993.

⁵⁶ MARC CIOC, *THE RHINE: AN ECO-BIOGRAPHY* (University of Washington Press 2002) at 131. The dams are owned primarily by French and German utilities.

⁵⁷ *Treaty of Versailles*, June 28, 1919, available at www.yale.edu/lawweb/avalon/imt/menu.htm. The treaty gave France the unilateral right as a victor in World War I to build the canal without Germany's approval. See art. 358, which gave France the right to “take water from the Rhine to feed navigation and irrigation canals (constructed or to be constructed) or for any other purpose” and “the exclusive right to the power from works of regulation on the river, subject to the payment to Germany of the value of half the power actually produced....” France ultimately built the Grand Canal to divert water from the main stem of the Rhine River, where it formed the border with Germany, and it also built small hydroelectric dams between Basel, Switzerland, and Strasbourg, France. The Grand Canal reconnected with the Rhine River downstream at Strasbourg.

the primary source of pollution. The most famous incident occurred in 1986, when a fire at Sandoz, a Swiss chemical plant, flushed large amounts of insecticides and chemicals downstream. The river's health is slowly improving.

Treaties and Agreements

Treaties on the Rhine River fall into four categories: 1) navigation; 2) water allocation on tributaries; 3) infrastructure; and 4) broad, multi-lateral agreements on curbing pollution and restoring the river ecology.

Navigation Treaties

The Emperor Charlemagne executed the first navigation agreement on the Rhine River in 805 when he granted freedom of navigation to a monastery.⁵⁸ Dozens of treaties followed over the years. The Treaty of Munster of 1648, which along with a companion treaty are referred to as the Peace of Westphalia, opened the lower Rhine River to navigation.⁵⁹

In 1814, the Treaty of Paris expanded free navigation. It opened the Rhine River for all nations that bordered the main stem of the river.⁶⁰ The following year, in 1815, the nations at the Congress of Vienna approved an agreement, called the "Final Act of the Congress of Vienna," which, among other things, created the Central Commission for Navigation on the Rhine to enforce the Treaty of Paris.⁶¹ "The navigation of the Rivers, along their whole course . . . shall be entirely free, and shall not, in respect to Commerce, be prohibited to anyone."⁶²

Additional agreements on navigation followed. In 1868, the riparian nations signed another navigation treaty, the Convention of Mannheim, which expanded the duties of the Central Commission and moved its headquarters from Mainz, Germany (where it had been located since 1815) to Mannheim, Germany.⁶³ The Convention ensured freedom of navigation, simplified customs clearance, and created uniform safety regulations. The importance of the Commission's duties was reinforced by the 1919 Treaty of Versailles, which confirmed that the 1868 Convention of Mannheim "shall continue to govern navigation on the Rhine," and stated that "vessels of all nations, and their cargoes, shall have the same rights and privileges as those [of countries bordering the Rhine River]."⁶⁴

⁵⁸ *Grant of Freedom of Navigation*, 3 Verzijl 126, cited in the FAO COMPILATION, *supra* note 36 at 1.

⁵⁹ *Treaty of Peace Between France and the Empire*, Oct. 14, 1648, 1 CTS 271. *See id.* art. XII.

⁶⁰ *Treaty of Paris*, Mar. 31, 1814, 63 Parry 107. *See also Rules for the Free Navigation of Rivers*, March 24, 1815, 64 Parry 13. Signatory States were: Austria, France, Germany, Great Britain, Prussia and others.

⁶¹ *Final Act (General Treaty), Congress of Vienna*, June 9, 1815, 64 Parry 453. *See* art. 108-116 of Annex XVI. With this legislation, the Rhine River was placed (in the terminology of its day) under an "international regime." Any riparian State could ship goods on the river.

⁶² *Id.* art. 109.

⁶³ *Convention of Mannheim*, Oct. 17, 1868, 138 Parry 167.

⁶⁴ *Treaty of Versailles* art. 354 & 356. Article 354 confirmed the Mannheim Convention. Article 356 further stated that "none of the provisions . . . of the Convention of Mannheim [1868], or in later Conventions, shall impede the free navigation of vessels and crews of all nations on the Rhine and on waterways to which such

The Central Commission for Navigation on the Rhine continues to operate to this day, and is now the oldest navigation commission in the world.⁶⁵ It is located in Strasbourg, France, and enforces the 1868 Convention of Mannheim, which remains the major navigation treaty on the river. The member States (in alphabetical order) are: Belgium, France, Germany, the Netherlands and Switzerland.

Treaties on Tributaries

Several treaties address water allocation and management issues on tributaries, including an agreement between Belgium and the Netherlands on the Meuse River, which originates in France, flows through Belgium, and then empties into the North Sea.⁶⁶ The Meuse River Treaty restricted diversions but a dispute between the Netherlands and Belgium led to litigation in the 1930s before the Permanent Court of International Justice (“PCIJ”).⁶⁷

Another treaty between the Netherlands and Germany, signed in 1960, created the Dutch-Germany Boundary Waters Commission to address water management issues on 97 small cross-border rivers in three lower river basins: The Rhine, the Ems, and the Meuse.⁶⁸ The commission helps implement the European Union’s Water Framework Directive and also addresses issues concerning ecological recovery and flood control.

In 1994, the nations in the Meuse River Basin and the Scheldt River Basin, which empty into the Rhine River Delta, signed companion agreements on environmental issues, which, among things, called for them to reduce chemical effluent discharge and created a commission to foster cooperation.⁶⁹

Infrastructure Treaties

The first infrastructure treaties were signed in the mid-1800s and concerned dams at Lake Constance. The Treaty of Versailles ended World War I and gave France, as one of the victors, the unilateral right to build a canal on the border it shared with Germany, though the treaty obligated France to share power with Germany.⁷⁰ More agreements followed over the years, as France, Switzerland, and Germany all built dams on the river.

Conventions apply . . . [subject to pilotage and police measures drawn up by the Central Commission].”

⁶⁵ For the home page of the Central Commission for Navigation on the Rhine River, see <http://www.ccr-zkr.org>.

⁶⁶ *The 1863 and 1873 Convention on Diversion of Water from the Meuse*, Belg.-Neth., May 12, 1863, and Jan. 11, 1873, 474 U.N.T.S. 161.

⁶⁷ See discussion in Appendix B of this report.

⁶⁸ *Treaty Between the Kingdom of the Netherlands and the Federal Republic of Germany Concerning Arrangements for Co-operation in the Ems Estuary (Ems-Dollard Treaty)*, Neth.-F.R.G., Apr. 8, 1960, 1129 U.N.T.S. 393, available at http://untreaty.un.org/unts/60001_120000/1/30/00001470.pdf.

⁶⁹ *Agreement for the Protection of the Meuse River*, Apr. 26, 1994, 34 I.L.M. 851, and *Agreement for the Protection of the Scheldt River*, Apr. 26, 1994, 34 I.L.M. 851. Five governments signed each agreement: France, the Netherlands and three regional governments in Belgium (the Walloon Region, the Flemish Region and the Brussels-Capital Region).

Treaties on Environmental Issues

The first treaty to address environmental issues was signed in 1885, when three States (Germany, the Netherlands, and Switzerland) signed a Salmon Treaty establishing an International Salmon Commission.⁷¹ But the construction of major industry along the river's banks – and the decision to build canals and dams along the river – changed the river's ecology. Salmon vanished from the Rhine by the mid-1950s.

In 1893, the States bordering Lake Constance signed the Agreement of Bregenz to regulate commercial fishing.⁷² The treaty is the oldest known international fishery treaty. It allowed the States to assert jurisdiction only over the part of the lake near the shoreline, and it treated the remainder of the lake as a “condominium,” an area in common to be managed cooperatively even though there were no defined national boundaries.⁷³ Modern-day agreements on Lake Constance address other concerns. In 1961, Austria, Germany, and Switzerland signed an agreement to protect Lake Constance from pollution.⁷⁴ Five years later, the three nations signed an agreement requiring each of them to notify the others of proposed water withdrawals from the lake and to use binding arbitration to resolve disputes.⁷⁵

Environmental agreements on the main stem of the Rhine River evolved more slowly. Over the years, the river had served as the dumping ground for the chemical and potash industry, agricultural runoff, sewage, and other pollutants. Some writers said the river smelled of carbolic acid and tasted salty.

In 1963, the five States bordering the river signed the Convention on the International Commission for the Protection of the Rhine Against Pollution (commonly called the “Berne Convention”).⁷⁶ The agreement, however, had its limitations. It addressed only the main stem of the river downstream of Lake Constance, Switzerland, and not tributaries.⁷⁷ Under the

⁷⁰ *Treaty of Versailles* art. 358.

⁷¹ *Salmon Fishery on the Rhine*, June 30, 1885, 166 Parry 255. The signatories included: Germany (Prussia and some states), the Netherlands and Switzerland.

⁷² *Agreement Respecting the Adoption of Identical Regulations Respecting the Fisheries of Lake Constance*, Jul. 5, 1893, 179 Parry 37 (“*Agreement of Bregenz*”). The signatories included: Austria-Hungary (then part of a common monarchy), three German states (Baden, Bavaria and Wurttemberg), Liechtenstein and Switzerland.

⁷³ The shoreline and water up to a depth of 15.5 feet (25 meters) of Lake Constance remain a national responsibility.

⁷⁴ *Convention on the Protection of Lake Constance Against Pollution*, Aus.-F.R.G.-Switz., Oct. 27, 1960, 620 U.N.T.S. 191.

⁷⁵ *Agreement: Withdrawal of Water from Lake Constance*, Aus.-F.R.G.-Switz., Apr. 30, 1966, 620 U.N.T.S. 191, available at www.internationalwaterlaw.org/regionaldocs/lake-constance.html.

⁷⁶ *Agreement: International Commission for the Protection of the Rhine Against Pollution*, Apr. 29, 1963, 994 U.N.T.S. 3 (“*the Berne Convention*”). The five signatory States were: France, Germany, Luxembourg, the Netherlands and Switzerland.

⁷⁷ *Id.* art. 1.

Convention, the International Commission for the Protection of the Rhine (“ICPR”) had limited powers. It could conduct research and make recommendations; its decisions had to be unanimous.⁷⁸ Furthermore, the budget for the Commission staff was extremely small.⁷⁹

By the mid-1970s, however, pollution of the river had reached critical levels. Heavy metals detected at the border between Germany and the Netherlands reached such a high level that the Dutch government could not use soil from the river to reclaim land. Six upstream industries, including potash mining companies, contributed half of the amount of chloride ions (salt) in the river, which was so elevated it exceeded acceptable levels.⁸⁰

In 1976, five States bordering the Rhine River signed two agreements to limit pollution. The first agreement established limits on the amount of salt (chloride ions) that could be discharged into the river.⁸¹ The second agreement addressed a broad range of chemical substances.⁸² For the first time, the five signatory States agreed to let the Rhine Commission propose concentration and discharge limits.⁸³

A fire in 1986 at the Sandoz plant near Basel, Switzerland, illustrated the limits of past accords. Several hundred thousand cubic feet of water and insecticides were flushed into the Rhine River, creating a red trail of contaminants more than 40 miles (70 kilometers) long. The spill killed thousands of fish and forced cities along its route to close their municipal water intakes.⁸⁴

But it was not until 1999 that the parties signed a comprehensive new treaty, the Convention on the Protection of the Rhine, commonly called “the Rhine Convention,” which expanded the obligations of basin States below Lake Constance to protect the environment and added the

⁷⁸ *Id.* art. 6.

⁷⁹ Menno T. Kamminga, *Who Can Clean Up the Rhine: The European Community or the International Rhine Commission?*, in *THE LEGAL REGIME OF INTERNATIONAL RIVERS AND LAKES* (Zachlin and Caflisch, ed., Martinus Nijhoff 1981) at 373.

⁸⁰ For an overview of Rhine River pollution and a history of cleanup efforts, see CIOC, *supra* note 56.

⁸¹ *Convention for the Protection of the Rhine Against Pollution by Chlorides*, Dec. 3, 1976, 1404 U.N.T.S. 91. The five signatory States were: France, Germany, Luxembourg, The Netherlands and Switzerland. [An arbitral panel was convened under the auspices of the Permanent Court of Arbitration in 2004 to resolve a dispute between France and the Netherlands over the agreement’s cost-sharing formula. See section 9.3.1 at page 206 of this report for details.]

⁸² *Convention for the Protection of the Rhine River Against Chemical Pollution*, Dec. 3, 1976, 1124 U.N.T.S. 406 (“*Chemical Pollution Convention*”). The signatory States were: France, Germany, Luxembourg, the Netherlands, Switzerland and the European Economic Community.

⁸³ *Id.* art. 5.

⁸⁴ For a description of the Sandoz spill and the failure of treaties to address the problem, see Aaron Schwabach, *The Sandoz Spill: The Failure of International Law to Protect the Rhine from Pollution*, 16 *ECOLOGICAL L.Q.* 443 (1989). See also Ine D. Frijters and Jan Leentvaar, *Rhine River Case Study*, UNESCO-IHP (2003) at 28-29, available at www.unesco.org/water/wwap/pccp/summary/cs_rhine.shtml.

European Union as a full partner.⁸⁵ The Convention became effective January 1, 2003, and remains the most important environmental agreement on the river.

The Rhine Convention is broader than prior agreements. It applies not only to the river itself but to: groundwater that interacts with the river; the aquatic and terrestrial ecosystems which interact with the river; and the entire Rhine catchment (basin) area for purposes of reducing pollution by noxious substances and preventing floods.⁸⁶ Nor is the Rhine Convention limited to a specific type of pollution (i.e., chemical or chlorides). Instead, it extends to a range of man-made substances, whatever their source.⁸⁷

The Rhine Convention called for States to be “guided by” a set of ecological principles, including the “precautionary principle,” the “polluter-pays principle,” and the “principle of sustainable development.”⁸⁸ Signatories of the accord include: France, Germany, Luxembourg, the Netherlands, Switzerland, and the European Union. To administer its terms and serve as a forum for the signatory States, the Rhine Convention created the International Commission for the Protection of the Rhine (“ICPR”).⁸⁹

Governance

The ICPR, based in Koblenz, Germany, is the most influential regional entity on the Rhine River.⁹⁰ Its primary mission is to address water quality problems, ranging from industrial effluent and agricultural runoff to protection of migratory fish. The ICPR also develops flood forecasts. Serious flooding has occurred as recently as 1995, when many cities in the lower basin were inundated with water. The ICPR has similar duties to the International Commission for the Protection of the Danube River (“ICPDR”) in Vienna, Austria, the major regional entity for the Danube River Basin.

Both surface water and ground water fall within the jurisdiction of the Rhine River Commission. Administrative duties are exercised by a Secretariat. Environment ministers from each of the signing countries and the European Commission serve as Rhine River Commission members.

⁸⁵ *Convention for the Protection of the Rhine River (The Rhine Convention)*, Apr. 12, 1999, available at http://www.iksr.org/fileadmin/user_upload/documents/convention_on_the_protection_of_the_rhine.pdf. Article 19 repealed the 1963 Berne Convention, the 1976 Chemical Pollution Convention, and other agreements.

⁸⁶ *Id.* art. 2.

⁸⁷ *Id.* art. 3.

⁸⁸ *Id.* art. 4. None of the principles is defined in the text. The precautionary principle usually refers to countries adopting the best available science and exercising caution in their actions before taking them and is meant to shift the burden from opponents or critics to the government itself to show that its actions will not harm the environment. The “polluter-pays” principle is an extension of the *Trail Border* case between the United States and Canada. See section 6.1.1 at page 146 of this report for more information about that dispute. The Rhine Convention is one of the few examples where the parties have also agreed to obey the principle of “sustainable development” as it applies to an international river.

⁸⁹ *Id.* art. 6-10.

⁹⁰ For a description of Commission activities, see its home page, www.iksr.org.

The ICPR can only act unanimously.⁹¹ Neither the ICPR nor the Secretariat has regulatory or coercive authority over member nations, and it cannot compel compliance. Instead, the ICPR provides a forum for the exchange of information and cooperation among the signatory States.

The ICPR has now adopted and is in the process of implementing an extensive program for ecological rehabilitation called the Rhine Action Plan (“RAP”). The RAP’s goals include the creation of an environment sufficiently healthy to sustain the return of salmon.

The European Water Directive (2000), which requires basin planning, has now imposed a regulatory regime on the Rhine River, as it has on other rivers. The Water Directive has the force of law; the ICPR facilitates compliance with the Directive but does not enforce its provisions.⁹²

Environmental restoration projects are typically funded by the host country and the European Union. The ICPR has adopted standards for reducing nitrates along the German-Dutch border and has facilitated the construction of chemical purification plants in Switzerland.

There are separate governance issues affecting Lake Constance in the upper Rhine River basin. The lake, which straddles the boundaries of Switzerland, Austria, and Germany, is a source of drinking water for four million people in southwest Germany. The three countries have created a number of joint commissions to address navigation, fisheries, and environmental problems, such as eutrophication. These commissions include the International Commission for the Protection of Lake Constance (“IGKB”).⁹³

⁹¹ *The Rhine Convention* art. 10.

⁹² See section 8.2 at page 197 of this report for additional information on the European Water Directive.

⁹³ In German, *the Internationale Gewässerschutzkommission für den Bodensee*.

2.2 MIDDLE EAST



FIGURE 3: Map of the Jordan and Tigris-Euphrates River

2.2.1 The Jordan River

What's in a Name? The name Jordan is derived from the Hebrew word *yarden*, meaning “descending.” The river is known today as the *Nehar Hayarden* in Hebrew and the *Nahr al-Urden* in Arabic.

The Jordan River drains most of the Great Rift Valley, an area rich in Biblical history that encompasses parts of modern-day Israel, the Kingdom of Jordan,⁹⁴ Lebanon and Syria. The basin is one of the most politically-volatile areas in the world. Skirmishes have been fought in part over water and its control.

The Jordan is a comparatively short river – its entire length is roughly equal to the distance between New York and Washington, D.C. The Jordan River Basin is comparatively small, too, about 7,100 square miles (18,389 square kilometers), roughly the size of the state of New Jersey.

The Jordan River Basin occupies the eastern half of Israel. In the Kingdom of Jordan, the other major riparian State, the river basin includes the western one-quarter of the country, including the capital, Amman.

The Jordan River begins on of the southwest slopes of Mount Hermon (Jabel Al Sheik in Arabic), where three tributaries converge only six miles within the boundary of Israel.⁹⁵ Mt. Hermon is on the northern part of the Golan Heights, a strategic plateau that became part of Israeli control after the Six-Day War in 1967 and which Israel formally placed under its jurisdiction in 1981.

From there, the river drops in elevation and flows through Lake Huleh, a swamp-like area drained in the 1960s and which is now only a fraction of its natural state. From there, the river flows further south into Lake Kinneret (Lake Tiberias or the Sea of Galilee, as it is referred to in the Bible). Lake Kinneret is the largest lake in Israel, with a surface area of about 64 square miles (165 square kilometers) and an average depth of 82 feet (25 meters). The lake lies 690 feet (210 meters) below sea level.

South of Lake Kinneret, the river forms the border between Israel and the Kingdom of Jordan. The river there is shallow and with a different water quality (i.e., high chlorides from saline springs). Six miles (10 kilometers) downstream, the Jordan River is joined from the east by the Yarmouk River, its most important tributary.⁹⁶

⁹⁴ The formal name is the “Hashemite Kingdom of Jordan.” The text here refers to “the Kingdom of Jordan” rather than “Jordan” to distinguish it from the river.

⁹⁵ The three major northern tributaries of the Jordan River are: the Dan River, with headwaters in Israel, and which contributes roughly half of the flow in northern Israel; the Hasbani River, which begins in Lebanon; and the Baniyas River, which begins in both Israel and Syria.

⁹⁶ The Yarmouk River begins in Syria, forms the border between Syria and the Kingdom of Jordan, and then flows entirely in the Kingdom until it reaches the southern end of the Golan Heights, where it borders Israeli territory for approximately 8 miles (12 kilometers) before emptying into the main stem of the Jordan River.

TABLE 7. The Jordan River at a Glance.

Length:	223 miles (360 kilometers)
Basin Size:	7,100 square miles (18,000 square kilometers)
Average Discharge:	The annual flows into the Dead Sea are negligible

Source: *Encyclopedia Britannica*

TABLE 8. Countries in the Jordan River Basin.

Country:	% of the Basin:
Kingdom of Jordan	48
Israel	21
Syria	11
West Bank*	7
Egypt**	6
Golan Heights***	3
Lebanon	1
TOTAL	100

* The West Bank is largely under control of the Palestinian Authority. The area had been part of the Kingdom of Jordan before the Six-Day War of 1967. After the war, the lands were under Israeli administration.

** As a practical matter, Egypt contributes virtually no water to the Jordan River at all. The inclusion of Egypt is based on topography only – the basin technically includes the area south of the Dead Sea, where a number of wadis (dry streams) drain from the Sinai Peninsula north toward Israel. Egypt is therefore included in the table even though there are no tributaries that flow into the Jordan River.

*** The Golan Heights have been under Israeli administration since the Six-Day War of 1967. The southern slopes of Mt. Hebron are on the Golan Heights.

Source: U.N. Environmental Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 65.

Much of the Yarmouk River has been diverted before it reaches the main stem of the Jordan River. Even with these reduced flows, the Yarmouk contributes about 40% of the Jordan River's water as the main stem continues south. Forty miles later, another tributary from the east, the Zarqa (Jabbok) River, which also originates in the Kingdom of Jordan, merges with the main stem of the river.

The Jordan River then empties into the Dead Sea, the most saline lake in the world; it has a salt concentration ten times greater than the Mediterranean Sea. The Dead Sea lies half in Israel and half in Jordan. It is the lowest body of water on earth: 1,370 feet (420 meters) below sea level. The Jordan River ends there: there is no outlet from the Dead Sea.

In the course of its journey, the Jordan has traveled through several ecosystems: precipitation in the northern part of the Lake Kinneret Basin, for example, averages 37 inches (950 milliliters) per year, but the area at the southern end of the Dead Sea receives only an inch (25 milliliters) per year. Three quarters of the water in the river comes from Arab countries.

The total population of the Jordan River Basin is 17 million people. Approximately 11 million people live in either Israel or the Palestinian territories.

Water Uses

The Jordan River Basin has a total average annual runoff of about 1.1 MAF (1.3 BCM), but this number is deceptive. Ninety percent of its runoff is diverted for use in Israel, Syria, and Jordan before it reaches the Dead Sea. In parts of the river above the Dead Sea, the Jordan River consists of little more than raw sewage at certain times of year.

Israel relies heavily on the upper Jordan River for half of its domestic water supply. The National Water Carrier pumps water from the northwest corner of Lake Kinneret outside of the basin into a large system of canals and pipelines that delivers water to Israel's largest city, Tel Aviv, and to other cities in the populated coastal plains, and to the Negev desert in the southern part of the country. Average annual withdrawals from Lake Kinneret total 567,000 AF (700 MCM).⁹⁷

In Syria, the tributaries to the Jordan River are used primarily for irrigation. Syria does not have direct access to the main stem of the Jordan River. It has constructed many small dams and wells in the basin. The most recent dam, al-Wahdi (Unity) on the Yarmouk River, was built jointly by both Syria and the Kingdom of Jordan and finished in 2005.

The Kingdom of Jordan is one of the driest countries in the world. Major dams and infrastructure in the Jordan River Basin include the King Talal Dam on the Yarmouk River, which diverts water for irrigation and municipal supplies, and the King Abdullah Canal (formerly the East Ghor Canal), which diverts water at Adassiya, southeast of Lake Kinneret. The canal runs south, parallel to the river for 68 miles (110 kilometers). The lower part of the canal is fed primarily from the Zarqa River Basin in the Kingdom of Jordan, an area that includes the capital city of Amman and the most densely populated and industrialized area east of the river basin.

⁹⁷ A significant portion of water (240,000 AF/300 MCM) is lost due to evaporation.



FIGURE 4. King Talal Dam Reservoir, Jordan

[Source: <http://en.wikipedia.org/wiki/Image:Kingtalaldam.jpg>]

In addition to the sources from the Jordan River and its tributaries, the four nations in the basin depend in varying degree on groundwater. In Israel, the two largest groundwater reservoirs are the Yarkon-Taninim (or Mountain aquifer), beneath the West Bank, and the Coastal Aquifer, which lies underneath a narrow strip of land near the Mediterranean Sea. Both are vulnerable to over use and pollution.⁹⁸

Israel currently uses about 405,000 AF (500 MCM) of groundwater. Palestinian communities on the West Bank use about 85,000 AF (105 MCM). Unlike Israel, which relies on a more diverse supply of water, including Lake Kinneret, the Palestinian towns on the West Bank rely on aquifers for 90% of their needs. Withdrawals for both Israel and Palestinian communities from groundwater sources far exceed the natural rate of replenishment. Israel estimates its cumulative “water deficit” (the amount used in excess over the rate of replenishment) now equals 1.62 MAF (2 BCM).⁹⁹

⁹⁸ Alon Tal, founder of the Arava Institute for Environmental Studies, an umbrella group of Israel’s 80 environmental organizations, writes that the Coastal Aquifer lies roughly 98 ft. (30 m) below an unsaturated zone of sandy soils where pollutants seep down roughly one meter a year. Pollutants dumped in the soil in the 1960s and 1970s are just now being detected. ALON TAL, *POLLUTION IN A PROMISED LAND: AN ENVIRONMENTAL HISTORY OF ISRAEL* (University of California Press 2002).

⁹⁹ For information on Israel’s water resources, *see* www.mfa.gov.il/MFA/Facts+About+Israel/Land/THE+LAND-+Water.htm.

Treaties and Agreements

There have been ambitious plans to build dams in the Jordan River Basin since the early 1900s. The table below lists the regional water proposals developed over the years for the Jordan River Basin prior to the signing of the 1994 Peace Treaty between Israel and Jordan.

TABLE 9. Prior Water Allocation Plans for the Jordan River Basin.

Year of Plan:	Name:	Sponsor/Organization:
1913	Franhia Plan	Ottoman Empire
1922	Mavromatis Plan	Great Britain
1928	Henriques Report	Great Britain
1935	Palestine Land Development Co.	World Zionist Organization
1939	Ionides Survey	Transjordan
1944	Lowdermilk	USA
1946	Survey of Palestine	Anglo-American Comm. of Inquiry
1948	Hays-Savage Plan	World Zionist Organization
1950	MacDonald Report	Jordan
1951	All Israel Plan	Israel
1952	Bunger Plan	Jordan/USA
1953	Main Plan	UNRWA*
1953	Israeli Seven-Year Plan	Israel
1954	Cotton Plan	Israel
1954	Arab Plan	Arab League Technical Committee
1955	Baker-Harza Plan	Jordan
1955	Johnston Unified Plan	USA
1956	Israeli Ten-Year Plan	Israel
1956	Israeli National Water Plan	Israel
1957	Great Yarmouk Project	Jordan
1964	Jordan Headwaters Diversion	Arab League
1991	Integrated Joint Development Plan	University of Tokyo, Japan

* UNRWA refers to the United Nations Relief and Works Agency for Palestinian Refugees, which developed the plan based on a study prepared by the Tennessee Valley Authority in the United States.

Source: THOMAS NAFF AND RUTH MATSON, WATER IN THE MIDDLE EAST: CONFLICT OR COOPERATION (University of Pennsylvania 1984).

The most successful of these efforts was the 1955 Johnston Unified Plan, named after Eric Johnston, a businessman and special envoy in the Eisenhower Administration, who attempted to address water issues in the Middle East.¹⁰⁰

Johnston sought to negotiate a comprehensive agreement between Israel, Lebanon, Syria and Jordan for the entire Jordan River Basin. An aide later described Johnston's approach to the typically staid world of diplomacy. "I watched him argue and cajole his way through hundreds of weary hours of the most detailed and harassing negotiations it is possible to imagine.... American ambassadors winced at his tough talk to Presidents, Prime Ministers, and Kings, watched him shatter all the rules of diplomatic exchange, and ended up with a considerable amount of admiration for what several of them now call the 'Johnston technique.'"¹⁰¹

After a two-year effort, the States informally agreed to the plan, which contained an allocation of water for each of them from the Jordan River and tributaries.¹⁰² The Council of the Arab League declined to approve the Johnston Unified Plan,¹⁰³ and both Israel and the Kingdom of Jordan then embarked on water storage and development plans within their own borders.

Tension erupted again in the mid-1960s when Israel began drawing water from Lake Kinneret. Syria and Jordan responded by attempting to divert water from the Hasbani River into the Litani River in Lebanon, thus bypassing Israel entirely, and from the Baniyas River into the Yarmouk River, thus depriving Israel of the water from that tributary as well. In 1965, Israeli tanks attacked the diversion works in Syria. These events precipitated a prolonged chain reaction of border violence that ultimately led to the Six-Day War in 1967, in which Israel captured not only the headwaters of the Jordan River but also the West Bank, Golan Heights and the Gaza Strip.¹⁰⁴

Despite those conflicts, the countries in the Jordan River Basin have signed treaties that affect water allocation and management: 1) between the Kingdom of Jordan and Syria; 2) between the

¹⁰⁰ Johnston (1896-1963) was born in Spokane, Washington. He was the president of the U.S. Chamber of Commerce between (1941-1947) and served on several war-time commissions during World War II under President Roosevelt, in addition to serving as a special envoy to the U.S.S.R. In 1946, he became president of the Motion Picture Association of America, a position he held when President Eisenhower named him in 1953 as his personal envoy to the Middle East. At the time, UNRWA had unveiled its basin-wide proposal, and Jordan and Syria had just signed the first of their water treaties. Israel had announced its plan to divert water from Lake Kinneret and to drain the Huleh swamps, north of the lake, and had engaged in skirmishes with Syria when it sought to divert water from the Baniyas River for its own uses.

¹⁰¹ George Barnes, *\$200 million for what?*, THE REPORTER, Feb. 7, 1957 at 25-26, quoted in JEFFREY K. SOSLAND, COOPERATING RIVALRY: THE RIPARIAN POLITICS OF THE JORDAN RIVER BASIN (State University of New York Press 2007) at 38.

¹⁰² The Johnston Plan proposed allocating 52% of water in the basin to the Kingdom of Jordan; 32% to Israel; 13% to Syria and 3% to Lebanon. For more information about the Johnston Plan, see SOSLAND, *supra* note 101, at 49-61.

¹⁰³ The Council of the Arab League did not formally reject the Johnston Plan but its refusal to approve the proposal was considered a fatal blow.

¹⁰⁴ Aaron T. Wolf, "Hydrostrategic" Territory in the Jordan Basin: Water, War and Arab-Israeli Peace Negotiations, in HUSSEIN A. AMERY AND AARON T. WOLF, WATER IN THE MIDDLE EAST: A GEOGRAPHY OF PEACE (University of Texas Press 2000) at 87-88.

Kingdom of Jordan and Israel; and 3) between Israel and the Palestinian Authority. There are no water agreements between Israel and Syria.

Kingdom of Jordan-Syria

The Kingdom of Jordan and Syria agreed in 1953 to build Maqarin Dam on the Yarmouk River in Syria and to allocate both water and power among themselves.¹⁰⁵ The dam was never built, despite efforts by the United States in 1963, 1978, and 1988 to revive the project with funding assistance.

In 1987, the Kingdom of Jordan and Syria signed another treaty on the Yarmouk River, which called for the construction of al-Wahda Dam, near the site of Maqarin Dam, to provide 80 MCM per year of additional water to Jordan.¹⁰⁶ The dam was completed in 2005. The treaty also allowed Syria to build small earthen dams upstream and to use the water for its own benefit.

Kingdom of Jordan and Israel

The Kingdom of Jordan and Israel signed a landmark Treaty of Peace in 1994 that calls on both countries to find solutions to water problems and cooperate on the resolution of transboundary surface and ground water issues.¹⁰⁷ The Treaty states that the parties aim to find a “comprehensive and lasting settlement of all the water problems between them.”¹⁰⁸

Under the Treaty, the Kingdom of Jordan and Israel expressly acknowledge the “rightful allocations of both of them in Jordan River and Yarmouk River waters” and to certain groundwater supplies.¹⁰⁹ “The Parties recognize that their water resources are not sufficient to meet their needs. More water should be supplied for their use through various methods, including projects of regional and international co-operation.”¹¹⁰

An addendum to the Treaty – Annex II – allocated water and addressed issues in more detail.¹¹¹

¹⁰⁵ *Agreement for the Utilization of Waters from the Yarmuk River*, Jordan-Syria, June 4, 1953, 184 U.N.T.S. 15.

¹⁰⁶ *Agreement Concerning the Utilization of the Yarmouk Waters*, Jordan-Syria, Sept. 3, 1987, 1870 U.N.T.S. 286, available at http://untreaty.un.org/unts/120001_144071/22/5/00018208.pdf.

¹⁰⁷ *Treaty of Peace between Israel and the Hashemite Kingdom of Jordan*, Oct. 26, 1994, Isr.-Jordan, 34 I.L.M. 43 (1995) (“*Israel-Jordan Peace Treaty*”), available at <http://www.kinghussein.gov.jo/peacetreaty.html>.

¹⁰⁸ *Id.* art. 6.

¹⁰⁹ *Id.* art. 6(1).

¹¹⁰ *Id.* art. 6(3).

¹¹¹ *Id.* Annex II, arts. I-IV.

- Article I: Allocation

The annex specified how much water Israel and Jordan could each withdraw from The Yarmouk and Jordan Rivers, depending on the time of year.

Yarmouk River: In summer, Israel can withdraw 12 MCM with Jordan retaining the rest. In winter, Israel can withdraw 13 MCM, with Jordan retaining the rest. Israel also has the right to pump an additional 20 MCM from the Yarmouk in winter in return for Israel transferring to Jordan certain quantities of water from the Jordan River near Lake Kinneret.

Jordan River: In exchange for Jordan agreeing to let Israel take an additional 20 MCM from the Yarmouk River in winter, Israel lets Jordan take 20 MCM from the Jordan River near Lake Kinneret in summer and put it into a canal “upstream” of Deganya, at the southern end of the lake. Details are to be worked out in a separate protocol. In winter, Jordan can store a minimum of 20 MCM of Jordan River water south of the confluence with the Yarmouk River.

Both countries also agreed to cooperate in finding additional supplies for water “of drinkable standards” for Jordan in the quantity of 50 MCM.

- Article II: Storage

Israel and Jordan shall cooperate on building a diversion/storage dam on the Yarmouk River downstream of Adassiya, Jordan. “The purpose is to improve the diversion efficiency of the King Abdullah Canal . . . and possibly for the diversion of Israel’s allocation of the river water.”¹¹² The dam was never built.

- Article III: Water Quality and Protection

Israel and Jordan will undertake to protect groundwater supplies within their own Jurisdiction and shall establish monitoring stations.

- Article IV: Groundwater

Israel is limited in the amount of groundwater it can pump from the Emek Ha’arava/Wadi Araba area.

Other parts of the Annex address additional areas of cooperation (Article VI) and create a Joint Water Committee (Article VII) composed of three representatives from each nation to resolve issues.¹¹³

¹¹² *Id.* Annex II, art. 2.

¹¹³ *Id.* Annex II, arts. VI-VII.

Israel and the PLO

Israel and the Palestinian Liberation Organization (“PLO”) signed a Declaration of Principles in 1993 at the conclusion of negotiations in Oslo, Norway.¹¹⁴ The interim agreement provided for the creation of a Palestinian Authority, with responsibilities for the territories (the West Bank and the Gaza) under its control. The Declaration said Israel and the PLO would cooperate “in the field of water” and will develop proposals for studies on water rights of each party, “as well as the equitable utilization of joint water resources for implementation”¹¹⁵ The agreement expired in five-years because the parties expected to reach a permanent agreement on the control of the Palestinian territories by then.

Israel and the Palestinian Authority executed another interim agreement in 1995,¹¹⁶ commonly called “Oslo II.” This agreement was signed on the White House lawn by Israeli prime minister Itzak Rabin and PLO leader Yasser Arafat, both of whom had won the Nobel Peace Prize the previous year for their efforts to settle the decades-long Israel Palestinian dispute. President Clinton witnessed the signing. Annex III to the agreement included provisions on water and sewage and, among other things, required Israel to provide specified amounts of water to Palestinian communities.¹¹⁷ The agreement also created a Joint Water Committee to manage resources and enforce water policies.¹¹⁸



FIGURE 5. Israel Prime Minister Yitzhak Rabin and PLO Chairman Yasser Arafat shake hands in the presence of President Clinton at the White House.

¹¹⁴ *The Declaration of Principles on Interim Self-Government Arrangements*, Isr.-P.L.O., Sept. 13, 1993, 32 I.L.M. 1525, 1537-38.

¹¹⁵ *Id.* Annex III.

¹¹⁶ *Israeli-Palestinian Interim Agreement on the West Bank and Gaza Strip*, Isr.-Palestinian Authority, Sept. 28, 1995, 36 I.L.M. 551 (1997).

¹¹⁷ *Id.* art. 40, contains a number of “principles” to guide both parties. See principle 2: “Both sides recognize the necessity to develop additional water for various uses.” See also principles 6-10 for Israel’s obligations to provide water for Palestinian communities.

¹¹⁸ *Id.* art. 40, principles 11-15.

But the second Intifada, which began in 2000, and Israel's response foreclosed additional cooperation. Proposed infrastructure improvements were postponed and remain in limbo to this day.¹¹⁹

Other proposals currently under consideration include one of the most ambitious water canals ever built: a north-south canal linking the Red Sea and the Dead Sea Canal. The canal would move water from the Red Sea north; when it fell into the Dead Sea, it would generate electricity to power a desalination plant.¹²⁰ The canal would also replenish the Dead Sea, restoring levels last seen 20 years ago, and it would irrigate large amounts of desert land along the way. In 2005, Israel, the Kingdom of Jordan, and the Palestinian Authority agreed to examine the proposed canal in detail.

Governance

There is no single entity managing the Jordan River. In Syria, the Ministry of Irrigation is the lead agency for water management. In the Kingdom of Jordan, the Jordan Valley Authority ("JVA") and the Water Authority of Jordan both operate under the auspices of the Ministry of Water and Irrigation. In Israel, the Water Commission has established regulations for withdrawals from Lake Kinneret since 1996. The water system itself is managed by Mekorot, the national (state-owned) water company.¹²¹

Israel continues to grapple with water shortages and the effect of over pumping from both Lake Kinneret and the Dead Sea. The Dead Sea is in a more precarious state: it has lost 30% of its area in the last two decades. Water levels continue to drop at the rate of 3.3 feet (1 meter) per year. The Dead Sea is now 45 miles (75 kilometers) shorter than it was in the 1970s. The lowering of the water level is due to the diversion of upstream sources to meet domestic, agricultural, tourist and industrial demands, such as potash and other mineral extraction, in both Israel and Jordan.

2.2.2 The Tigris-Euphrates Rivers

What's in a Name? Tigris-Euphrates is Greek in origin: Tigris is "tiger," and Euphrates probably derives from *phrat*, meaning fertilizing or fruitful. In Turkish, the Tigris River is known as the *Dicle*, and the Euphrates River as the *Firat*. In Arabic, the Tigris River is the *Dijla* and the Euphrates River is *Al-Furat*.

¹¹⁹ The first Intifada (usually translated as "uprising" in English) lasted between 1987-1993.

¹²⁰ In 1855, British Rear Admiral William Allen (1792-1864) proposed linking the Mediterranean Sea, the Red Sea, and the Dead Sea together as an alternative to building the Suez Canal. In 1902, Theodore Herzl, the journalist and founder of modern-day Zionism, proposed a Mediterranean-Dead Sea Canal in his book, *Altneuland*. THEODORE HERZL, *ALTNEULAND* (Markus Weiner Publishers 1987). In 1944, Walter Lowdermilk, a soil scientist with the U.S. Department of Agriculture, called for the construction of a similar canal as part of a United States plan to develop the Jordan River Basin.

¹²¹ For the home page of Mekorot, see www.mekorot.co.il/Eng/Pages/default.aspx.

The Tigris-Euphrates River Basin contains some of the earliest records of human inhabitation, dating back to 4,000 B.C., the time of the civilization of Mesopotamia (“between the rivers” in Greek).

Both the Tigris and the Euphrates Rivers begin in the mountains of eastern Turkey. The Euphrates River, the westerly of the two rivers, flows from Turkey southwest into Syria and then dissects that country before it turns eastward and enters into Iraq. Cities in Iraq along its route include Karbala and Najaf.

The headwaters of the Tigris River are found in the same area of Turkey as the Euphrates, but the river takes a different route. From its source, it flows southeast until the border city of Cizre. The Tigris River then forms the border with Syria for approximately 20 miles (32 kilometers). The river then crosses into Iraq, where it flows southerly, past the cities of Mosul and eventually Baghdad, capital of Iraq, which lies at the confluence of the Tigris and Diyala River (a tributary).

The Tigris River continues flowing south until it merges with the Euphrates at Al-Qurnah, a village 46 miles (74 kilometers) north of the city of Basra, and about 125 miles (200 kilometers) upstream from the Persian Gulf.

The river – with the combined flows of both the Tigris and the Euphrates – is then called Shatt al-Arab in Arabic (literally, River of the Arabs) and Arvand River in Persian. Shatt al-Arab forms the border between Iraq and Iran, and is joined by the Karun River, a tributary from Iran. The Shatt al-Arab river has been the subject of boundary disputes between the two countries, and is of huge strategic importance to Iraq because the river represents its sole access to the sea. In the absence of the relatively narrow strip of land around Shatt al-Arab, Iraq would be landlocked and would have no territory of its own to off load oil into tankers that leave via the Persian Gulf. The delta of the Shatt al-Arab was once home to the largest date palm forest in the world, but disease and salt water intrusion have destroyed many trees.

TABLE 10. The Tigris-Euphrates Rivers at a Glance.

Length:	1,740 miles (2,800 kilometers) for the Euphrates River
	1,180 miles (1,900 kilometers) for the Tigris River
	125 (200 kilometers) for the Shatt al-Arab River
Basin Size:	296,000 square miles (766,000 square kilometers)
Average Discharge:	37 MAF per year (1,441 m ³ s)*

* Includes the flow for tributaries, primarily the Karun River, which enter below the confluence of the Tigris and Euphrates, and where the river is known as the Shatt al-Arab.

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

Each of the four nations – Iraq, Iran, Syria and Turkey – has a claim to water in the Tigris-Euphrates River Basin. But Turkey is the dominant nation when it comes to controlling the water. It supplies more than 90% of the water in the Euphrates River and a majority of the water

in the Tigris River.¹²² Both rivers are subject to extreme variations in flow, ranging from drought to severe flooding.

TABLE 11. Countries in the Tigris-Euphrates River Basin.

Country:	% of the Basin:
Iraq	40
Turkey	25
Iran	20
Syria	15
Jordan	<1
Saudi Arabia	<1
TOTAL	100

Source: U.N. Environment Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 75.

Water Uses

The Tigris-Euphrates Rivers provide water for Iraq's population of 28 million and irrigate between 2.5 and 3.1 million acres (between 1 and 1.3 million hectares) in one of the most arid regions of the world.¹²³ The soil is naturally saline in much of the country; as a result, repeated use of water for irrigation has created salinity problems in much of the lower basin.

The Tharthar Canal, built in 1988, links the Tigris and Euphrates Rivers south of Baghdad. The Tigris is navigable upstream from the Persian Gulf to Baghdad for shallow-draft vessels.

The Tigris and Euphrates Rivers also generate electricity in Turkey, Syria and Iraq. The largest hydroelectric structure in Syria is the Al-Tabka Dam on the Euphrates River, completed in 1975 (and sometimes called Euphrates Dam). The reservoir is called Lake Assad. Iraq and Syria came close to going to war over water when Syria filled the dam. Iraq threatened to bomb it. Intervention by Saudi Arabia helped avert conflict, and the nations subsequently agreed on an interim allocation of water, a formula that was made permanent by a 1989 treaty.

¹²² The numbers are subject to some interpretation. In the Euphrates River, some sources show that Syria contributes 12% of the water in the basin, but the supply comes from tributaries that originate in Turkey, not Syria. In the Tigris River Basin, Turkey supplies about 52% of the flow, with Iraq serving as the source for the remaining 48% but here again, Iraq's share of the water does not begin in its territory but rather in tributaries that have their headwaters in Iran.

¹²³ The exact amount of acreage irrigated by the Tigris and Euphrates Rivers is not readily available. The Central Intelligence Agency ("CIA") estimates that Iraq has a total of about 8 million acres (3.2 million hectares) of irrigated land, but this total includes acreage irrigated from groundwater and other sources. See the CIA's World Fact Book, available at www.cia.gov/library/publications/the-world-factbook/print.iz.html.

The largest dams in Iraq are Mosul Dam (formerly known as Saddam Dam) (800 MW), which includes a pumped storage unit on the Tigris River, and Haditha Dam (600 MW) on the Euphrates River.¹²⁴

Turkey continues to build dams as part of the Southeastern Anatolia Project (Guneydogu Anadolu Projesi or “GAP”), which includes a large network of dams for power, irrigation and domestic water supply. Unveiled in the 1970s, the project is still only partially complete and is the source of continuing tension between Turkey, Syria, and Iraq. The two latter countries, as downstream riparian nations, have demanded that Turkey release water for their use.

TABLE 12. Major Dams (Existing and Proposed) in the Tigris-Euphrates Basin in Turkey. [Ranked by generating capacity].

Name of Dam:	Basin:	Capacity: (MW)	Status:
Ataturk*	E	2,400	Complete (1992)
Karakaya	E	1,800	Complete (1987)
Ilisu	T	1,200	Planned
Birecik	E	672	Complete (2000)
Cizre	T	240	Planned
Batman	T	198	Complete (1998)
Karkamis	E	189	Complete (1999)
Silvan	T	150	Planned
Dicle	T	110	Complete (1997)
Kralkizi	T	94	Complete (1997)
TOTAL		7,053	

* Originally called Karababa Dam and renamed Ataturk Dam after Mustafa Kemal Ataturk (1881-1938), founder of the Turkish Republic.

E = Euphrates River

T = Tigris River

MW = megawatts (million watts) of generating capacity.

Source: Compiled from data available at <http://www.gap.gov.tr/English/enerji.html>.

Treaties and Agreements

There are no comprehensive treaties that allocate the waters for the entire Tigris-Euphrates River Basin.

¹²⁴ Smaller dams include Hindiya Barrage on the Euphrates River, built between 1911-1914 and designed by British civil engineer Sir William Willcocks who first proposed building Aswan Low Dam on the Nile River in Egypt.

Turkey and Iraq

The only formal agreement¹²⁵ between Turkey and Iraq on the Tigris-Euphrates River was signed in 1946, when Iraq was a monarchy under King Feisal II. Both nations agreed to collaborate on technical investigations and surveys.¹²⁶ But the agreement did not call for the construction of specific dams. Instead, the agreement said that each of the works identified by those investigations and surveys would be subject to a separate agreement.¹²⁷

Turkey and Syria

In 1987, Turkey and Syria signed an interim agreement in which Turkey agreed to maintain minimum flows of approximately 12.8 MAF per year (500 m³/s) in the Euphrates River at the border with Syria, roughly half the average annual flows.¹²⁸ The agreement was signed at a time when Turkey was in the process of filling up Ataturk Dam, and was intended as an interim measure, until Turkey, Syria, and Iraq reached agreement on the “final allocation of waters” from the Euphrates River. No final agreement was ever reached, and the interim flow requirements remain in force. The 1987 agreement was tied politically to Syrian support in repressing Kurdish nationals within Syrian’s borders who supported an independent state within Turkey, though there is no mention of the rebels in its provisions.

Syria and Iraq

In 1989, Syria and Iraq signed an agreement for the Euphrates River in which Syria agreed to take no more than 42% of the water flowing from Turkey into Syria, leaving 58% for Iraq.¹²⁹

Boundary Disputes on the Shatt al-Arab River

Border and navigation conflicts over the Shatt al-Arab River (the waterway below the confluence of the Tigris and Euphrates) go back almost four hundred years. In 1639, a peace treaty between Persia and the Ottoman Empire established the border. Periods of agreement and conflict

¹²⁵ *Protocol on the Tigris and Euphrates Rivers and their Tributaries*, an annex to the *Treaty of Friendship and Good Neighborly Relations Between Iraq and Turkey*, Iraq-Turk., Mar. 29, 1946, 37 U.N.T.S. 226.

¹²⁶ *Id.* art. 1 and 3.

¹²⁷ *Id.* art. 4.

¹²⁸ *Protocol on Matters Pertaining to Economic Cooperation*, Turkey-Syria, July 17, 1987, 1724 U.N.T.S. 4, available at http://untreaty.un.org/unts/60001_120000/30/24/00059195.pdf. The Protocol addressed cooperation in petroleum and gas exploration, telecommunications, and a wide variety of other trade and commercial matters. The Protocol also referred to a proposed “Peace Pipe Line,” which Turkey said it planned to build from its borders through Syria to Jordan and Saudi Arabia. “The Syrian Side agreed in principle to the project . . .” the agreement said. *Id.* The Peace Pipe Line was never built, though it was the subject of considerable publicity in the 1990s.

¹²⁹ *Agreement Ratifying Joint Minutes*, Syria-Iraq, April 17, 1989, available at <http://faolex.fao.org/docs/texts/irq15920.doc>. The agreement ratified the “Joint Minutes” concluding a meeting held in Baghdad, Iraq. The Joint Minutes (item 1) states: “The Iraq water share on the border region between Iraq and Syria is 58% as a fixed annual total percentage (water year) of the water of [the] Euphrates River allowed to pass in Syria through the border with Turkey, and the Syrian share of water is the remainder quantity 42% of the water of [the] Euphrates River allowed to pass through the border between Turkey and Syria.”

followed. A 1937 Treaty between Iraq and Iran established the border as the low-water line on the Iranian side. Nor did a 1975 agreement, commonly called the Algiers Accord, settle the dispute.¹³⁰ In 1980, war erupted between Iraq and Iran in part because of conflicts over the lower river: Iraq wanted to recover what it said were exclusive rights of navigation on the Shatt al-Arab and to regain possession of several islands in the tidal area held by Iran since the 1970s.¹³¹ The war lasted eight years, with Iraq finally accepting the 1975 border, but only in 1990 in response to United Nations Security Council Resolution 598, passed in the aftermath of Iraq's failed invasion of Kuwait.¹³²

Governance

Turkey and Iraq created a Joint Technical Committee for Regional Waters in 1982. Syria joined the following year. The Joint Technical Committee continues to meet and discuss water allocation issues affecting all three countries, but it has not succeeded in drafting a water allocation agreement on the upper Tigris or Euphrates River, where Turkey continues to build infrastructure within its own borders.

Syria and Iraq support a “formula approach” (a specific amount) they would receive from both the Tigris and Euphrates Rivers each year. Turkey supports treating the rivers as a whole, as a single transboundary river basin, and believes any allocation should be based on needs. Other governance issues – still unresolved – include the role, if any, that the Turkish government will give to the Kurds, an ethnic minority, in eastern Turkey. The stability of Iraq since the 2003 American invasion and the fall of Saddam Hussein add yet another layer of tension and uncertainty.

¹³⁰ *Algiers Accord*, Iraq-Iran, June 13, 1975, 1017 U.N.T.S. 54.

¹³¹ The tension – and in some cases, hostility – between Iraq and Iran involve long-standing historical, cultural, and religious differences, not just differences over river boundaries. Iran is the successor of the Persian empire; Iraq of the Babylonian empire.

¹³² *See generally* Security Council Res. 598, U.N. Doc. S/RES/598 (July 20, 1987).

2.3.1 The Nile River

What's in a Name: The word Nile comes from the Greek word *neilos*, meaning river valley. In Arabic, the name is the *an-nil*. In ancient Egypt, the name of the river was *iteru*, meaning “great river.”

The Nile River is the longest in the world. It has two main tributaries: the Blue Nile, which begins near Lake Tana in Ethiopia; and the White Nile, which flows from Lake Victoria, the largest lake in Africa.¹³³ A number of tributaries, including the Kagera River, serve as the source of Lake Victoria.¹³⁴ In southern Sudan, the White Nile passes through an area known as the Sudd, the largest freshwater swamp in the world.

The Nile River Basin drains roughly one-tenth the surface of Africa. It empties into the Mediterranean Sea north of Cairo, Egypt.

The Nile River valley in Egypt was home to one of the oldest cultures in the world and includes some of the most famous monuments, including the Giza pyramid complex and the Great Sphinx. In ancient times, the Nile River was revered as a god and remains to this day Egypt's lifeblood. The great majority of Egypt's 80 million inhabitants live near the river's banks. Beyond the narrow strip of water, Egypt is mostly desert. The major upstream riparian nations are the Sudan, Ethiopia, Uganda, and Tanzania.

The Blue Nile and the White Nile join near Khartoum, Sudan. A third tributary, the Atbara, joins the river 60 miles north of Khartoum. The Nile River then continues flowing north through Egypt, which is so arid it contributes virtually no flow to the river. Below Cairo, the largest city on its route, the Nile River splits into two forks (distributaries): the Rosetta (to the west) and the Damietta (east). The Nile River Delta stretches from the city of Alexandria in the west to Port Said in the east.

TABLE 13. The Nile River at a Glance.

Length:	4,132 miles (6,650 kilometers)
Basin Size:	1.3 million square miles (3.3 square kilometers)
Average Discharge:	72.4 MAF per year (2,832 m ³ s)

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

¹³³ Lake Victoria is itself an international watercourse: 49% is in Tanzania; 45% in Uganda; and 6% in Kenya.

¹³⁴ The Kagera River has its source in Burundi and Rwanda.

TABLE 14. Countries in the Nile River Basin.

Country:	% of the Basin:
Sudan	64
Ethiopia	12
Egypt	9
Uganda	8
Tanzania	4
Kenya	2
Congo	<1
Rwanda	<1
Burundi	<1
Eritrea	<1
Egypt/Sudan (joint)	<1
TOTAL	100

Source: U.N. Environment Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 40.

Water Uses

The Nile River is used for agriculture, drinking water, transportation, power generation, flood control, fishing, tourism, and other uses. The completion of Aswan High Dam¹³⁵ in Egypt in 1970 significantly changed the river's ecology. River flows are now modulated for flood control, power generation, and irrigation. The result, however, is that the flow of nutrients and minerals, essential for fertilizing the lower basin for agriculture, are also curtailed.¹³⁶

Aswan High Dam releases about 44 MAF of water each year, of which 84% is ultimately diverted for agriculture. The waters irrigate about 8.3 million acres (3.3 million hectares) and are essential to Egypt's economic health. Aswan High Dam also has the capacity to produce 2,100 MW of electricity.¹³⁷

¹³⁵ The reservoir behind Aswan High Dam is Lake Nasser.

¹³⁶ Construction of Aswan High Dam began in 1959. The United States and the World Bank declined to provide financing so the Egyptian Government under President Nasser built the project with Soviet assistance. Total cost: more than \$1 billion. The dam is upstream of a much smaller, older structure known as Aswan Low Dam, completed by the British in 1902.

¹³⁷ When the Aswan High Dam first reached peak production, it generated roughly half of Egypt's power supply. The dam now produces roughly 10% of the nation's power with another 6% coming from other dams and the remaining 84% coming from plants powered by natural gas. The Egyptian Electric Holding Company, a state-owned entity, manages the structure.

Other major dams in the Nile River Basin are: the Zifta Barrage (Egypt); Delta Barrage (Egypt); Asyut Barrage (Egypt); Nag Hammadi Barrage (Egypt); Isna Barrage (Egypt); Roseires Dam (Sudan); Sennar Dam (Sudan); Khashm el Girba Dam (Ethiopia); Jebel Aulia Dam (Sudan); and Nalubaale Dam (formerly Owen Falls) (Uganda).

The proposed Jonglei Canal Project, to be built by Egypt and Sudan, has been halted since 1983 because of the Sudanese civil war. Begun in 1980, the project was intended to promote economic development in semi-isolated regions in both nations. The original plan was to divert about 3.8 MAF (4.7 billion cubic meters/“BCM”) from the Nile River.

Treaties and Agreements

Between 1891 and 1925, the United Kingdom signed five treaties prohibiting the construction of dams and irrigation works upstream on the Nile River that would have harmed Egypt. At the time, the U.K. controlled what is now Egypt and Sudan. Starting in the late 1880s, the Egyptian Irrigation Service, composed of British engineers, had built small dams and irrigation works and contemplated ever larger ones. A dam at Aswan (now called Lower Aswan Dam) was finished in 1902 and other structures were planned.

It was in this context that the U.K. sought agreement from neighboring countries not to interfere on their own right with the flows of the Nile and its major tributaries.

In 1891, the U.K. and Italy signed a protocol delineating their respective spheres of influence in eastern Africa. One part of the protocol affected the Atbara River, a tributary of the Nile. The protocol prohibits Italy from undertaking the construction of any irrigation works or other infrastructure on the river “which might sensibly modify its flow into the Nile.”¹³⁸

In 1902, the U.K., Ethiopia and Italy signed a treaty obligating Ethiopia “not to construct or allow to be constructed any work across the Blue Nile, Lake Tana [headwaters of the Blue Nile], or the Sobat, which would arrest the flow of their waters into the Nile, except in agreement with His Britannic Majesty’s Government and the Government of Sudan.”¹³⁹

In 1906, the U.K. and the Congo signed a treaty restricting the Congo’s ability to undertake the construction of any work on or near the Semliki or Islango Rivers that would diminish the volume of water entering Lake Albert in the upper Nile Basin, except in agreement with the government of Sudan (controlled by the British).

Also in 1906, the U.K., France, and Italy signed a three-party agreement that included a declaration that signatories would preserve the regulation of waters in Ethiopia and its tributaries of the Nile River.

¹³⁸ *Protocols Between Great Britain and Italy on the Demarcation of their Respective Spheres of Influence in East Africa*, art. III, U.K. (Sudan)-Italy (Eth.), Apr. 15, 1891, 19 *Herstlet* 686.

¹³⁹ *Delimitation of the Frontiers Between Ethiopia, Eritrea and Sudan*, art. III, Eth.-UK.-Italy, May 15, 1902, 191 *Parry* 178.

In 1925, the U.K. and Italy exchanged notes in which Italy recognized the prior “hydraulic rights” of both Egypt and the Sudan (under British control) in the upper Nile River (both Blue Nile and White Nile). Italy agreed not to construct infrastructure that might modify the flow into the main stem of the Nile River.

It was not until 1929 that a treaty attempted to allocate water in the Nile River.¹⁴⁰ The treaty between the U.K. and Egypt incorporated the findings of a Nile River Commission that had completed an engineering study of additional dams. An annex to the treaty gave Egypt the right to 39 MAF (48 BCM) per year and Sudan only 3.2 MAF (4 BCM), thus leaving a sizeable portion of the flow unallocated. At the time, the other countries in the basin, except for Ethiopia and the Congo, were still under British administration and control.

The British Foreign Minister outlined the purpose of the treaty:

The principle is accepted that the waters of the Nile, that is to say, the combined flow of the White and Blue Niles and their tributaries, must be considered as a single unit, designed for the use of the peoples inhabiting their banks according to their needs and their capacity to benefit there from; and, in conformity with this principle, it is recognized that Egypt has a prior right to the maintenance of her present supplies of water for the areas now under cultivation, and to an equitable proportion of any additional supplies which engineering works may render available in the future.¹⁴¹

The 1929 treaty stated:

[N]o irrigation or power works or measures are to be constructed or taken on the river Nile and its branches, or on the lakes from which it flows, so far as all these are in the Sudan or in countries under British administration, which would, in such a manner as to entail any prejudice to the interests of Egypt, either reduce the quantity of water arriving in Egypt, or modify the date of its arrival or lower its level.¹⁴²

Nonetheless, Egypt acknowledged in the 1929 treaty that “the development of the Sudan requires a quantity of the Nile water greater than that which has been so far utilized by the Sudan.”¹⁴³

Britain and Egypt eventually signed subsequent agreements between 1949 and 1953 allowing for the construction of Owens Falls Dam (now Nalubaale Dam) at the outlet of Lake Victoria in Uganda.¹⁴⁴

¹⁴⁰ *Nile River Navigation*, U.K.-Egypt, May 7, 1929, 93 L.N.T.S. 43 (“1929 Nile River Treaty”).

¹⁴¹ STEPHEN C. MCCAFFREY, *THE LAW OF INTERNATIONAL WATERCOURSES* (Oxford University 2nd ed. 2007) at 137, *citing* PAPERS REGARDING NEGOTIATIONS FOR A TREATY OF ALLIANCE WITH EGYPT, Cmd. 3050, at 31 (London: HM Printing Office 1928).

¹⁴² *1929 Nile River Treaty* art. 4(b).

¹⁴³ *Id.* art. 2.

¹⁴⁴ *Exchange of Notes Constituting an Agreement Between the UK and Egypt Regarding Owens Falls Dam*, U.K.-Egypt, May 30-31, 1949, 226 U.N.T.S. 274, and Dec. 5, 1949, 226 U.N.T.S. 280, and Jan. 5, 1953, 207

Then, in 1959, Egypt and Sudan signed the Nile Waters Treaty, which gave each country a larger annual allotment of the river.¹⁴⁵ The treaty set the stage for Egypt to build Aswan High Dam and for Sudan to build Roseires Dam on the Blue Nile River.¹⁴⁶ By then, Sudan was an independent country. The treaty increased Egypt's annual share of Nile River waters to 44 MAF (55.5 BCM) and Sudan's share to 15 MAF (18.5 BCM), measured at Aswan High Dam.¹⁴⁷ Under the terms of the treaty, Egypt had rights to 87% of the river while Sudan received the remaining 13% of the flows. The treaty created a Permanent Joint Technical Committee to plan new projects.

The 1959 treaty limited the needs of the other upper Nile River nations to between .8 MAF and 1.62 MAF (1-2 BCM) per year. Ethiopia, the source of the Blue Nile, was not consulted and did not sign the accord.

In 1993, Egypt and Ethiopia finally signed a framework for cooperation in which they agreed that neither country would do anything with the Nile River that causes "appreciable harm" to the other, and to consult and cooperate on projects.¹⁴⁸ In 1994, Tanzania, Uganda, and Kenya signed an agreement to create the Lake Victoria Fisheries Organization, whose duties include managing the fishery resources of the lake in a coordinated manner among the three East African nations.¹⁴⁹

Governance

Because of the fragmented nature of these agreements, the Nile River does not have a commission with basin-wide authority to plan for or address water allocation or water quality. Egypt, as the downstream riparian State, remains the prime beneficiary of the 1959 Nile River Treaty.

Four nations – Burundi, Rwanda, Tanzania, and Uganda – created the Kagera River Basin Organization in 1977 to address development issues in the basin, a tributary of the Nile that flows into Lake Victoria.¹⁵⁰

U.N.T.S. 278. The Owens Falls Dam, completed in 1954, controls the flow of Lake Victoria and produces electricity.

¹⁴⁵ *Agreement for the Full Utilization of the Nile Waters*, United Arab Republic (Egypt)-Sudan, Nov. 8, 1959, 453 U.N.T.S. 51 ("1959 Nile River Treaty").

¹⁴⁶ Id. art (2). The treaty refers to the dam as Sudd al Aali. A small part of the reservoir flooded land in Sudan.

¹⁴⁷ *1959 Nile River Treaty* art 2.

¹⁴⁸ *Framework for general co-operation between the Arab Republic of Egypt and Ethiopia*, Egypt-Eth., July 1, 1993, available at <http://www.fao.org/docrep/w7414b/w7414b0p.htm>.

¹⁴⁹ *Convention for the Establishment of the Lake Victoria Fisheries Organization*, Tanz-Uganda-Kenya, June 30, 1994, 36 I.L.M. 667 (1994). For the home page of the Lake Victoria Fisheries Organization, see www.lvfo.org.

¹⁵⁰ *Agreement to Establish an Organization for the Management and Development of the Kagera Basin*, Apr. 24, 1977, 1089 U.N.T.S. 172.

In 1992, the basin states formed a partnership called the Nile Basin Initiative (“NBI”) to work cooperatively to develop the river, share in its socio-economic benefits, and promote regional peace and security.¹⁵¹ The participating nations are: Burundi, Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda. Eritrea participates in the NBI as an observer. Funding for activities comes from the World Bank and other sources. The NBI is based in Kampala, Uganda.

¹⁵¹ For the home page of the Nile Basin Organization, see www.nilebasin.org.

2.4 ASIA



FIGURE 7: Map of the Indus, Ganges, and Mekong River

2.4.1 The Indus River

What's in a Name? The name Indus is a variant of the Sanskrit word *Sindhu*, meaning river.

The Indus River begins in the Himalayan Mountains of Tibet in the vicinity of Lake Manasarovar, the highest freshwater lake in the world (15,000 feet/4,572 meters). The river initially flows northwest for 600 miles (966 kilometers) but then turns south, draining an area that includes the high mountains of India. The Indus River then flows through Pakistan before emptying into the Arabian Sea, southeast of Karachi, Pakistan.

The flows of the river are highly variable and depend on melting snow from glaciers in the Himalayas and on summer monsoons. About 70% of the total annual runoff occurs between June and September. The Indus is one of the largest sediment-producing rivers in the world.

The river system consists of the main stem Indus – after which India is named – and five major tributaries, all of which flow partially or entirely through India before reaching Pakistan. India is therefore the upper riparian nation on virtually every tributary of significance in the basin. The

major exception is the Kabul River, which begins in Afghanistan and flows through its capital, Kabul, before converging with the Indus River in Pakistan.

The Indus Valley civilization dates back to 3,300 B.C. Modern cities in the Indus River Basin include (in addition to Karachi, the largest city in Pakistan): Islamabad, capital of Pakistan; Faisalabad, Rawalpindi, Multan and Hyderabad, Pakistan.

TABLE 15. The Indus River at a Glance.

Length:	1,800 miles (2,900 kilometers)
Basin Size:	418,000 square miles (1.1 million square kilometers)
Average Discharge:	142 MAF per year (5,554 m ³ s)

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

TABLE 16. Countries in the Indus River Basin.

Country:	% of the Basin:
Pakistan	52
India	34
Tibet/China	7
Afghanistan	6
Disputed (China/India)	<1
Nepal	<1
TOTAL	100

Source: U.N. Environment Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 63.

Water Uses

The Indus River is the most important source of food production and agriculture, primarily in Pakistan, which has the largest contiguous irrigation system in the world. The river is also an important source of power generation for both Pakistan and India. In the 1850s, the British East India Company introduced modern irrigation and built a complex system of canals to move water in what was then India, irrigating a huge area of about 26 million acres (10.5 million hectares).

TABLE 17. Major Reservoir and Hydroelectric Projects in the Indus River Basin. [Ranked by amount of reservoir storage].

Name:	Country:	River:	Storage: (MAF)	Power: (MW)
Tarbela	Pakistan	Indus	8.50*	3,478
Bkakra-Nangal	India	Sutlej	5.72	1,000
Pong	India	Beas	5.60	396
Mangla	Pakistan	Jhelum	4.60*	1,000
Nathpa-Jhakri	India	Sutlej	2.84	1,530
TOTAL			27.26	7,404

* The accumulation of silt has significantly reduced the reservoir storage capacity of these two dams in Pakistan. The gross capacity of Tarbela Dam was 11.6 MAF. It is now 8.5 MAF, a loss of almost 27% since 1974. At Mangla Dam, the reservoir capacity has shrunk from 5.88 MAF to 4.82 MAF, a loss of 18% since 1967. At current rates of siltation, the dams may cease to meet their original missions in less than 100 years.

MAF = million acre feet

MW = megawatts (million watts) of generating capacity.

Source: Compiled from data available at www.wapda.gov.pk/htmls/water-dams-mangla.html and www.wapda.gov.pk/htmls/water-dams-tarbela.html. See also Large Dams: India's Experience, a report published by the World Commission on Dams (2000), and available at www.dams.org.

In addition to the above dams, there is an extensive system of diversion structures and canals in Pakistan. Known as the Indus Basin Irrigation System ("IBIS"), it consists of an extensive network of barrages and canals with a total length of 35,000 miles (56,000 kilometers). IBIS has the ability to deliver 105 MAF: two-thirds from the Indus River System, one-third from groundwater. In Pakistan, IBIS irrigates 36 million acres (14.5 million hectares).¹⁵²

Pakistan's population has increased dramatically – from 50 million in the mid-1960s to 170 million now. As a result, the water initially stored behind dams intended for irrigation is now used in part for municipal supplies. Salinity in the Indus River Basin of Pakistan is a growing problem.¹⁵³

Treaties and Agreements

Pakistan is a relatively new nation, formed in 1947 after "partition" with India.¹⁵⁴ It is the second largest Muslim nation in the world, after Indonesia. The topography, ecology and existing irrigation infrastructure on the Indus River were largely ignored when Pakistan was

¹⁵² For more information on IBIS, see www.waterinfo.net.pk.

¹⁵³ A number of reports in the public domain discuss salinity and infrastructure maintenance. See, e.g., M. Aslam and S.A. Prathapar, *Strategies to mitigate secondary salinization in the Indus Basin of Pakistan: A selective review*, Research Report No. 97, International Water Research Institute (2006). See also John Briscoe et al., *Pakistan's Water Economy: Running Dry*, Country Water Resources Assistance Strategy, World Bank (2006).

¹⁵⁴ The British Parliament approved Partition on July 18, 1947, but the boundary line between the two nations was not clearly delineated.

created. The canal system of irrigating lands, originally built by the British, was divided into two to meet a political compromise. As a result, 80% of the land irrigated by the Indus River and its tributaries became part of Pakistan. But the headwaters of the entire river system remained in India.

Not surprisingly, the Indus River was a source of tension between the two nations within weeks after Pakistan was established. Partition literally divided one set of canals between the West Punjab in Pakistan and the East Punjab in India, with India receiving control of upstream rivers that supplies both West and East Punjab. In 1948, India unilaterally closed canals in its territory on two rivers, the Ravi and Sutlej, cutting off Pakistan's supply to water to irrigate the fertile land in the West Punjab. A month later, India agreed to re-open the canals as part of an Inter-Dominion Agreement but it asserted its right to control the entire water supply of the Ravi, Sutlej and Beas River (what are now known as "Eastern Rivers").¹⁵⁵

Atlantic Monthly summarized the situation this way:

This 1,800 mile-long-river rises in the Himalayas of Tibet, is fed by six tributaries, and now forms a sort of unwieldy international fire hose with India, at the headwaters, controlling the spigot, and Pakistan, down-country, at the unpredictable nozzle. Further complicating this, the canals and barrages built under British rule to serve a unified area were, under partition, left pretty much on the Pakistani side of the border.¹⁵⁶

After years of negotiation, India and Pakistan in 1960 signed the Indus Waters Treaty.¹⁵⁷ The treaty is a bilateral agreement between these two countries, which occupy 86% of the basin. The two other basin nations, China and Afghanistan, did not participate in the negotiations and did not sign the treaty. The World Bank (formally the International Bank for Reconstruction and Development) was a third-party signatory and arranged for seven countries to help contribute money.



FIGURE 8. Marshall Khan (left) of Pakistan and Jawaharlal Nehru of India at the signing of the Indus Waters Treaty, 1960.

[Source: <http://www.bharat-rakshak.com/SRR/Volume13/sridhar.html>]

¹⁵⁵ *Inter-Dominion Agreement Between the Government of India and the Government of Pakistan*, India-Pak., May 4, 1948, available at www.internationalwaterlaw.org/regionaldocs/punjab-canal.html.

¹⁵⁶ *An Atlantic Report: India and Pakistan*, ATLANTIC MONTHLY, November 1960, available at www.theatlantic.com/doc/print/196011/india-pakistan.

¹⁵⁷ *The Indus Waters Treaty*, India-Pak., Sept. 19, 1960, 419 U.N.T.S. 126. Indian Prime Minister Jawaharlal Nehru and Pakistan President Field Marshall Mohammad Ayub Khan signed for their respective countries in a ceremony in Karachi, Pakistan.

The role of the World Bank dates back to a 1951 article in *Colliers* magazine by David Lilienthal, former New Deal advisor to President Franklin Roosevelt and former head of the Tennessee Valley Authority and the Atomic Energy Commission. Lilienthal suggested that the World Bank intervene in the Indus River dispute and fund infrastructure improvements that would benefit India and Pakistan. The World Bank did so, and facilitated the eight-year-long process to reach conclusion on treaty terms.¹⁵⁸

The Indus Waters Treaty remains in effect today and is the major governing treaty for the basin. It divides the Indus River system into three Eastern Rivers (the Sutlej, Ravi, and Beas), to which India has “unrestricted use,” and three Western Rivers (the Indus, Jhelum, and Chenab), for the “unrestricted use” of Pakistan.¹⁵⁹ These allocations were both subject to certain exceptions. Pakistan agreed not to interfere with the waters of the Eastern Rivers; India retained the right to build upstream, non-storage dams on the Western Rivers.¹⁶⁰ Unlike treaties in other basins that divide the river by flow, the Indus Waters Treaty gave some tributaries to India and others to Pakistan. Both nations rebuffed efforts by the World Bank to administer the Indus River Basin as a single unit.

Under the treaty, Pakistan agreed to build works during a “transition period” to replace canals on which it had relied to move water from the Eastern Rivers.¹⁶¹ During this transition period, India guaranteed to supply Pakistan with a minimum amount of water – but only until Pakistan had completed its infrastructure replacements. To help defray the costs of building this infrastructure, India agreed to pay a fixed sum of money to Pakistan.¹⁶² In addition, the World Bank and other donors gave or loaned Pakistan \$1.3 billion.¹⁶³ The money allowed Pakistan to build Tarbela Dam on the Indus River and Mangla Dam on the Jhelum River. The dams created sufficient storage to replace two thirds of the water lost to Pakistan when India received control of the three Eastern Rivers. About 100,000 people were displaced during construction.

¹⁵⁸ For additional information on the role of the World Bank in the Indus River Treaty, see the *Foreword* by Sir William Iliff, in N.D. GULHATI, *INDUS WATERS TREATY: AN EXERCISE IN INTERNATIONAL MEDIATION* (Allied Publishers 1973). See also EDWARD S. MASON & ROBERT E. ASHER, *THE WORLD BANK SINCE BRETTON WOODS* (Brookings Institution 1973) at 610-627, and SALMON & UPRETY, *supra* note 11, at 44-61.

¹⁵⁹ *Indus Waters Treaty* art. II (1): “All the waters of the Eastern Rivers shall be available for the unrestricted use of India, except as otherwise expressly provided in this Article.” See also Article III (1): “Pakistan shall receive for unrestricted use all of those waters of the Western Rivers which India is under obligation to let flow”

¹⁶⁰ See *Id.* art. II (2), which contains the exceptions on the Eastern Rivers. Article III (2) contains the exceptions on the Western Rivers.

¹⁶¹ *Id.* Under Article II (2)(9), the Transition Period is defined as extending from 1960 until 1970, with a possible three-year extension. Article IV(1) of the treaty addressed Pakistan’s activity during the Transition Period: “Pakistan shall use its best endeavors to construct and bring into operation . . . that part of a system of works which will accomplish the replacement, from the Western Rivers and other sources, of water supplies for irrigation canals in Pakistan, which . . . were dependent on water supplies from the Eastern Rivers.”

¹⁶² India paid Pakistan 62 million Pounds Sterling. *Indus Waters Treaty* art. V(2).

¹⁶³ *The Indus Basin Loan*, Pak.-World Bank, Sept. 19, 1960, 444 U.N.T.S. 207. See also *The Indus Basin Development Fund*, Sept. 19, 1960, 444 U.N.T.S. 259. The signatories included: Australia, Canada, Germany, New Zealand, the United Kingdom, and the United States. The treaty is also found at 12 U.S.T. 19.

The World Bank's negotiator described the painstaking approach to the treaty negotiations: "One had to use cajolery. An international treaty where each side gets what it wanted must be a bad treaty. And certainly, in this instance, each is not getting all it wanted."¹⁶⁴

But the treaty made clear that it created no precedent for either India or Pakistan:

[N]othing contained in this Treaty . . . shall be construed as constituting a recognition or waiver (whether tacit, by implication or otherwise) of any rights or claims whatsoever of either of the Parties other than those rights or claims which are expressly recognized or waived in this Treaty.

Nothing in this Treaty shall be construed by the Parties as in any way establishing any general principle of law or any precedent.¹⁶⁵

Governance

The Indus Waters Treaty created a two-member Permanent Indus Commission, with a commissioner from India and Pakistan.¹⁶⁶ The Commission has the authority to resolve disputes arising out of the Treaty.

If either of the countries has a question regarding treaty interpretation, the matter can be referred to the Permanent Indus Commission. If the Commission is unable to answer the question, the matter can be referred to a "neutral expert" hired by the World Bank. The neutral expert's determination on all matters within his or her competence is final. If the matter is not within the expert's determination, or if the expert concludes that the matter is a "dispute" (as opposed to simply a difference), then the parties may call for the establishment of a special Court of Arbitration, composed of seven members. Each country appoints two members, while the Secretary General of the U.N. appoints the remaining three members.¹⁶⁷

In 2005, Pakistan invoked the Indus Treaty's dispute resolution mechanism to protest India's construction of Baglihar Dam on the Chenab River, 60 miles (97 kilometers) upstream from the Pakistani border. The river is one of the Western Rivers under the treaty whose flow is allocated to Pakistan, subject to India's right to build upstream non-storage facilities. From Pakistan's perspective, the issues surrounding Baglihar Dam related to its size and ability to store water. From India's perspective, the dam was designed to generate power and did not violate the treaty. The neutral expert from the World Bank was selected to review Pakistan's complaint; he delivered his report in 2007, sustaining some of Pakistan's objections and rejecting others.¹⁶⁸ Both countries have accepted the findings.

¹⁶⁴ ATLANTIC MONTHLY, November 1960, *supra* note 156.

¹⁶⁵ *Indus Waters Treaty* art. XI.

¹⁶⁶ *Id.* art. VIII.

¹⁶⁷ *Id.* art. IX, and Annexure F (Neutral Expert) and Annexure G (Court of Arbitration).

¹⁶⁸ See the report of Professor Raymond Lafitte of the Ecole Polytechnique in Lausanne, Switzerland, entitled *Expert Determination: Baglihar Hydroelectric Plant*, available at <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,contentMDK:2032>.

Allocations *within* Pakistan have also proved problematic for many years. Between 1976 and 1993, there was no formal allocation system within the country that specified which provinces received how much water from the Indus River. The creation of the Indus River System Authority in 1993 allowed representatives from both the federal government and the provinces within Pakistan to agree on an equitable intra-country allocation.¹⁶⁹

2.4.2 The Ganges-Brahmaputra-Meghna River System

What's in a Name? Ganges is a derivative of the Hindu name *Ganga*. The Brahmaputra River is known as the *Tsangpo* in China and the *Jamuna* in Bangladesh.

The Ganges River system includes three large rivers: the Ganges, the Brahmaputra, and the Meghna. The total basin population is 600 million and contains the largest concentration of poor people in the world.

The Ganges River begins in the Himalaya Mountains of Nepal and northern India. It flows southeast through India, where it drains roughly 30% of the country, and then Bangladesh.

The Brahmaputra River begins even farther to the north. Its headwaters are in Tibet. From there, the river flows east into China. Eventually, the river changes direction, breaking through a deep (16,000 feet/4,900 meter) gorge. It then abruptly turns southwest, flowing through northeastern India and then Bangladesh. The Brahmaputra joins the Ganges River near the town of Goalanda, Bangladesh, upstream of the capital of Dhaka. The combined Ganges-Brahmaputra River is known as the Padma River.

Farther downstream, the river is joined by the Meghna River at Chandpur, Bangladesh.¹⁷⁰ The Padma-Meghna River then empties into the Bay of Bengal. Of all the rivers in the world, only the Amazon and the Congo have average annual flows larger than the Ganges-Brahmaputra-Meghna River system.

The river and its tributaries in this part of the lower basin have changed routes dramatically, even in the last 1,000 years. They meander across a delta that is immense in size, varying between one and five miles (1.6 to 8 kilometers). Until the 10th or 12th century, the Ganges River flowed south into the Hugli River in what is now India, and then emptied into the Bay of Bengal near Calcutta. Over time, the river changed its route, and now flows east, not south. As a result, the Hugli River is considerably smaller – a change that prompted India in the 1970s to build Farakka Dam on the Ganges River to re-divert water back into the bed of the Hugli River.

¹⁶⁹ The four provinces are: Balochistan, Punjab, Sindh, and the North-West Frontier Province (“NWFP”).

¹⁷⁰ The Meghna River begins in Bangladesh from tributaries that have their source in the hilly areas of northeastern India.

TABLE 18. The Ganges-Brahmaputra-Meghna River System at a Glance.

Length:	1,800 miles (2,900 kilometers) for the Brahmaputra 1,560 miles (2,510 kilometers) for the Ganges
Basin Size:	644,000 square miles (1.7 million square kilometers)
Average Discharge:	985 MAF per year (38,525 m ³ s)

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

TABLE 19. Countries in the Ganges-Brahmaputra-Meghna River Basin.

Country:	% of the Basin:
India	58
China	20
Nepal	9
Bangladesh	7
Bhutan	2
Disputed (China/India)	4
Myanmar (Burma)	<1
TOTAL	100

Source: U.N. Environment Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 59.

Water Uses

With its fertile soil and broad delta, the Ganges River is the backbone for agriculture in northern India and Bangladesh. Chief crops include rice, sugarcane, lentils, oils seeds, potatoes, and wheat. Three holy towns along the river attract pilgrims to the waters. One of the major industries in the region is leather tanning. Industry and untreated human waste contribute to serious pollution.

Existing dams on the Ganges-Brahmaputra Rivers can store 46.5 MAF (57.5 BCM). The largest dam in the Ganges River Basin is Rihand, on the Son River, a tributary in India. Another large dam, Tehri, is on the Bhagirathi River, another tributary. Other dams are located in the upper basin in Nepal, which is the source of three major tributaries (the Mahakali, Gandaki and Kosi Rivers). The undeveloped hydroelectric potential of the tributaries in Nepal is huge – by some

estimates as much as 83,000 MW.¹⁷¹ Nepal, according to some estimates, contributes more than 40% of the annual flow of the Ganges River and 70% of its flow in the dry season.¹⁷²

India has proposed linking the Ganges River with the dry areas of the country in the south and west. The “interlinking of rivers” scheme involves connecting 37 rivers. Most of these rivers, like the Ganges, begin in the Himalayan Mountains. If built, the “National River Linking Project” would be one of the largest inter-basin transfer projects in the world.¹⁷³

Treaties and Agreements

There are two sets of important agreements on the Ganges River. The first set is between India and Bangladesh and deals with the operation of Farakka Dam in the lower basin. The second set is between India and Nepal, and addresses river governance, power sharing, and other issues on tributaries in the upper basin.

The Farakka Dam Treaty

The major controversy in the lower Ganges River Basin – and the subject of multiple agreements between India and Bangladesh – is Farakka Barrage (Dam). In 1951, India announced its intention to build this dam at the head of the Ganges River Delta in West Bengal, India, only 11 miles (17.7 kilometers) upstream from the border with East Pakistan (now Bangladesh).¹⁷⁴

India began construction on the Farakka Dam in 1961 and placed it in operation in 1975. The dam diverts water into a canal for irrigation and then into a channel of the Hugli River, which flows into Calcutta, India. The dam, even more than 30 years after its completion, is still a source of tension between India and Bangladesh. Bangladesh believes the dam prevents water from flowing to its territory and has caused serious damage to the water table, reducing irrigation and domestic supplies.

In 1972, India and Bangladesh signed a “Statute of the Indo-Bangladesh Joint Rivers Commission” to work together “in harnessing the rivers common to both countries for the benefit of the peoples of the two countries.”¹⁷⁵ But the treaty was vague and did not require India to adopt or change the operation of Farakka Dam to benefit Bangladesh. It was the only agreement signed by the two countries prior to completion of the dam.

In 1976, Bangladesh took its case to the United Nations. It sponsored a resolution calling on India to share more water and consider the interests of Bangladesh in the operation of Farakka

¹⁷¹ Muhammad Rahaman, *Water versus power: the role of dams in geopolitics of Ganges Basin*, a research paper, available at www.riversymposium.com/index.php?element=rahaman+m.m.

¹⁷² *Id.* at 4.

¹⁷³ For details about India’s National River Linking Project, see <http://nrlp.iwmi.org>.

¹⁷⁴ Bangladesh was created in 1971 out of the territory of East Pakistan. For an historical perspective from the Bangladesh perspective, see B. M. ABBAS, *THE GANGES WATER DISPUTE* (Vikas Publishing 1982).

¹⁷⁵ See Chapter 1 of the *Statute of the Indo-Bangladesh Joint Rivers Commission*, Nov. 24, 1972, India-Bangl., available at <http://internationalwaterlaw.org/regionaldocs/indo-bangladesh.html>.

Dam. The resolution failed to pass. The following year, India and Bangladesh signed a water treaty for a five-year period during which they agreed to seek a long-term solution to the allocation of water from Farakka Dam.¹⁷⁶

Then, in 1982, India and Bangladesh signed the “Indo-Bangladesh Memorandum of Understanding” in which they acknowledged the 1977 agreement “had not proved suitable for finding a satisfactory and durable solution” to the problems at Farakka Dam.¹⁷⁷ To address the river management issues on an interim basis, both nations agreed to a temporary allocation of water for the 1983-1984 dry season. But the memorandum then expired, and India operated Farakka Dam in 1985 with no binding legal document in place. A second memorandum addressed dam operations between 1985-1988, but that document also expired, and there was no legal agreement between 1989 and 1996, when India and Bangladesh signed a treaty on sharing the Ganges River at Farakka Dam.

The Ganges Water Treaty remains in force today and expires in 2026. It establishes a formula for sharing water, as shown in the table below.¹⁷⁸ In the first scenario, the river is dry and flows are 70,000 cfs per year (1,982 m³/s) or less. Each nation receives half. In the second scenario, Bangladesh has a fixed allocation of 35,000 cfs (991 m³/s) and India receives the rest (the “balance of flow”). In the third scenario, India receives 40,000 cfs (1,132 m³/s) and Bangladesh receives the rest.

TABLE 20. Allocation of Water in the Ganges River at Farakka Dam under the 1996 Treaty.

Availability of Water at Farakka:	Share to India:	Share for Bangladesh:
70,000 cusecs* or less	50%	50%
70,000 to 75,000 cusecs	Balance of Flow	35,000 cusecs
75,000 cusecs or more	40,000 cusecs	Balance of Flow

* Cusec = cubic feet per second, commonly abbreviated cfs.

Source: *The Ganges Water Treaty*.

The treaty also called on both governments to attempt to reach water-sharing agreements on other “common rivers.”¹⁷⁹

¹⁷⁶ *Agreement: Sharing of the Ganges Water*, India-Bangl., Nov. 5, 1977, 17 I.L.M. 103.

¹⁷⁷ Indo-Bangladesh Memorandum of Understanding, India-Bangl., Oct. 7, 1982, available at www.ecolex.org/ecolex/ledge/view/RecordDetails?id=TRE-002126&index=treaties.

¹⁷⁸ *Treaty on Sharing the Ganges Water at Farakka*, India-Bangl., Dec. 12, 1996, 36 I.L.M. 519 (1996) (“*Ganges Water Treaty*”).

¹⁷⁹ *Id.* art. IX.

The Mahakali River Treaty

The Mahakali River – called the Sarda in India – forms the border between western Nepal and India.¹⁸⁰ Both countries signed the Mahakali River Treaty in 1996.¹⁸¹ The treaty addresses the allocation of power from two existing dams – the Sarda Dam and the Tanakpur Barrages – and the allocation of power from the proposed Pancheshwar Project.¹⁸² The treaty lasts for 75 years¹⁸³ and requires both countries to operate the dams as a single project to yield “the maximum total net benefits.”¹⁸⁴ The treaty created the Mahakali River Commission of representatives from both nations to collect information, make common recommendations, and “examine any differences arising between the Parties concerning the interpretation and application of this Treaty.”¹⁸⁵

The Gandaki River Treaty

The Gandaki River also originates in Tibet, flows through central Nepal and then empties into the Ganges River. The basin drains a large part of Nepal west of the capital city of Kathmandu. The Gandaki River, like the Kosi River, caused serious flooding problems in its natural condition. In 1959, India and Nepal signed an agreement to build a dam on the Gandaki River for flood control, irrigation, and power generation.¹⁸⁶ India paid for the dam as well as two large canal systems for irrigation. The treaty contains a schedule by month for the release of water to India for its irrigation canals.¹⁸⁷ The Gandaki Project now irrigates approximately 143,000 acres (58,000 hectares) in Nepal and 4.6 million acres (1.85 million hectares) in India. The dam itself lies entirely within Nepal but close to the border with India. Under the treaty, India is required to generate power and share it with Nepal.¹⁸⁸

¹⁸⁰ *Treaty Between the East India Co. (Great Britain) and the Rajah of Nepal*, Dec. 2, 1815, India-Nepal, 65 Parry 351 (“*the Sagauli Treaty*”). The treaty established the border between India and Nepal.

¹⁸¹ *The India-Nepal Treaty Concerning the Integrated Development of the Mahakali River*, Feb. 12, 1996, 36 I.L.M. 531 (1997) (“*Mahakali River Treaty*”).

¹⁸² The Sarada Dam was completed in 1920. The Tanakpur Dam was finished in 1993. For background information about these dams and the treaty negotiations, see TRILOCHAN UPRETI, *INTERNATIONAL WATERCOURSES LAW AND ITS APPLICATION IN SOUTH ASIA* (Pairavi Prakashan Publishers 2006) at 180-256.

¹⁸³ *Mahakali River Treaty* art. 12.

¹⁸⁴ *Id.* art. 3.

¹⁸⁵ *Id.* art. 9.

¹⁸⁶ *Agreement between Nepal and India on the Gandak Irrigation and Power Project*, Dec. 4, 1959, available at <http://www.internationalwaterlaw.org/regionaldocs/gandak-project.html>.

¹⁸⁷ *Id.* See annex to the treaty.

¹⁸⁸ *Id.* art. 8. For an analysis of the Gandaki River Treaty, see SALMAN & UPRETI, *supra* note 11, at 83-95.

The Kosi River Treaty

The Kosi, which originates in Tibet, is Nepal's largest river, and the largest tributary of the Ganges. The drainage basin is the area east of Kathmandu, Nepal. It flows into India in the state of Bihar, where frequent and severe floods have earned the river the nickname, the "sorrow of Bihar." In 1954, India and Nepal signed an agreement to build a dam on the Kosi River to control flooding, generate electricity, and provide water for irrigation.¹⁸⁹ The dam, which straddles the border between Nepal and India, was finished in 1963. The two countries revised the power and water-sharing agreement in 1966.¹⁹⁰ An Indo-Nepal Kosi Project Commission implements the agreement and seeks to resolve disputes.¹⁹¹

Governance

There is no commission for the entire Ganges River Basin. River governance is very fragmented between the upstream states of Nepal and India, as well as between Bangladesh and India on the lower river. Since 1972, the Indo-Bangladesh Joint Rivers Commission, created by the Statute enacted that year, has met annually to discuss problems and undertake joint investigations between India and Bangladesh on the lower part of the Ganges River. The Commission does not have the power to allocate water.

2.4.3 The Mekong River

What's in a Name? In Tibet, the river is known as *Dza-chu*. In China, the river is called *Lancang Jiang* ("turbulent river"), and in Thailand, *Mae Nam Khong*.

The Mekong River begins in China and flows through Myanmar (Burma), Thailand, Laos, Cambodia, and Vietnam before emptying into the Mekong Delta in Vietnam. Along its route, the river serves as the border between Laos and Myanmar and then between Laos and Thailand. Approximately half of the river's length is in China. The watershed in China is commonly referred to as the Upper Basin. The Lower Basin is the area south of the China border.

TABLE 21. The Mekong River at a Glance.

Length:	2,700 miles (4,350 kilometers)
Basin Size:	311,000 square miles (806,000 square kilometers)
Average Discharge:	282 MAF per year (11,030 m ³ s)

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

¹⁸⁹ *Agreement on the Kosi Project*, India-Nepal, April 25, 1954, available at <http://www.internationalwaterlaw.org/regionaldocs/kosi-river1.html>.

¹⁹⁰ *Revised Agreement on the Kosi Project*, India-Nepal, Dec. 19, 1966, available at http://www.mowr.gov.np/pdf_files/koshi_treaty.pdf.

¹⁹¹ *Id.* art. 15. For a detailed description of the Kosi River Treaty, see SALMAN & UPRETY, *supra* note 11, at 65-82.

When the Mekong River reaches Phnom Penh, Cambodia (the largest city in the basin), it flows north (upstream) during certain seasons into a tributary, the Tonle Sap River, and then into Tonle Sap Lake, the largest in southeast Asia. For most of the year, Tonle Sap Lake is only 3 feet (.9 meters) deep, but during the monsoon seasons the depth typically increases to 27 feet (8 meters), making the lake one of the most productive inland fisheries in the world. When the high waters of the Mekong River recede, the lake shrinks in size and the waters of the Tonle Sap River flow south again, providing half of the flow to the Mekong Delta in Vietnam.

TABLE 22. Countries in the Mekong River Basin.

Country:	% of the Basin:
Laos	25
Thailand	25
China	22
Cambodia	20
Vietnam	5
Myanmar (Burma)	3
TOTAL	100

Source: U.N. Environment Programme, *ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS* at 69.

Water Uses

About 60 million people live in the basin and rely on the river for some beneficial use. The river irrigates approximately 28 million acres (11.3 million hectares) of rice but is also used for transportation, industrial and domestic water supply, and power generation. The lower Mekong River Basin is home to one of the most productive river fisheries in the world, with 1,200 different species.

China has built large dams in the Upper Mekong River Basin with a total generating capacity of about 2,850 MW, and several more are under construction. Dams in the Lower Mekong River Basin can generate 1,560 MW and store approximately 11.6 MAF (13.3 BCM). Among the large dams now being built is Nam Theun II in Laos.

Proposals for large upstream dams could increase the hydropower capacity in the basin by 10-17,000 MW, with most of the large structures in China.

TABLE 23. Existing Large Dams in the Lower Mekong River Basin.
[Ranked by generating capacity]

Country:	Name of Dam:	Generating Capacity: (MW)	Year Built:
Vietnam	Yali	720	2000
Laos	Theun Hinboun	210	1998
Laos	Nam Ngum	150	1985
Laos	Huay Ho	150	1999
Thailand	Pak Mun	136	1997
Laos	Nam Leuk	60	2000
Laos	Xeset	45	1991
Thailand	Sirindhorn	36	1968
Thailand	Ubolratana	25	1966
Thailand	Chulabhorn	15	1971
Thailand	Dray Ling	13	1995
TOTAL		1,560	

Significant reservoir storage is available at only three of the above dams (Nam Ngum, Ubolratana, and Sirindhorn).

MW = megawatts (million watts) of generating capacity.

Source: *Modelled Observations on Development Scenarios in the Lower Mekong Basin*, a Final Report prepared by Geoff Podger et al., for The World Bank (2004) at 12.

Treaties and Agreements

The major accord on the Mekong River was signed in 1995 by Thailand, Laos, Cambodia, and Vietnam.¹⁹² China and Myanmar – both Upper Basin nations – are not members but are considered “dialogue partners” who share information with the four Lower Basin members.

In signing the agreement, the four Lower Basin nations pledged to cooperate in “all fields of sustainable development, utilization, management and conservation of the water and related resources of the Mekong River,” including irrigation, hydropower, navigation, flood control, fisheries, timber floating, recreation, and tourism.¹⁹³

The key provision of the 1995 agreement calls for the “reasonable and equitable utilization” of the Mekong River, a term that reflects the 1966 Helsinki Rules prepared by the International Law

¹⁹² *Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin*, April 5, 1995, 34 I.L.M. 864 (1995) (“*Mekong River Agreement*”).

¹⁹³ *Id.* art. 1.

Association.¹⁹⁴ The Mekong River agreement, however, does not define “reasonable and equitable utilization” and instead refers those matters to a Joint Committee, composed of one member from each participating state.¹⁹⁵ The Joint Committee has the authority to draft rules for water use and inter-basin diversions.¹⁹⁶

The Mekong River agreement requires the parties to notify and consult with each other but does not contain details. The parties also agree to “make every effort to avoid, minimize and mitigate harmful effects that might occur to the environment, especially the water quantity and quality.”¹⁹⁷ The agreement is sometimes referred to as an “umbrella” agreement; it is a framework that allows the parties to sign bilateral or multilateral agreements among themselves.

Governance

The Mekong River Commission, created by the 1995 agreement, promotes sustainable management and development in the Lower Basin.¹⁹⁸ The Commission provides basin-wide information and monitors development activity. It is now the primary international body that oversees development.¹⁹⁹ It can enter into agreements with donor agencies, such as the World Bank. The Commission oversees programs in fisheries; agriculture, irrigation and forestry; water resources and hydrology; navigation; and tourism.

¹⁹⁴ See section 3.3.2 at page 114 of this report for a discussion of the Helsinki Rules. The term “reasonable and equitable utilization” had also been used in the 1992 Helsinki Convention (Europe) on Watercourses and Lakes. The term was used subsequently in the 1997 U.N. Convention on the Law of the Non-navigational Uses of International Watercourses, which is the only multilateral agreement to adopt “equitable and reasonable utilization” as the primary principle for allocating water. See section 3.3.3 at page 116 for a discussion of the U.N. Convention.

¹⁹⁵ *Mekong River Agreement* art. 21.

¹⁹⁶ *Id.* art. 24 (creation of Joint Committee) and art. 26 (authority to prepare rules for water utilization and inter-basin diversions).

¹⁹⁷ *Id.* art. 7.

¹⁹⁸ *Id.* art. 18a. The Commission is composed of three permanent bodies: a Council, a Joint Committee, and a Secretariat. *Id.* art. 12.

¹⁹⁹ The Mekong River Commission was originally created in 1957 to investigate the construction of infrastructure (such as dams) in the basin. The current Commission, created under the 1995 agreement, has significantly expanded duties. The United Nations and the U.S. Bureau of Reclamation provided financial assistance to prepare an initial development plan for the basin.

2.5 AUSTRALIA



FIGURE 9: Map of the Murray-Darling River

2.5.1 The Murray-Darling River

What's in a Name? The Murray River is named after Sir George Murray, a Scottish soldier and politician who served as Lieutenant-Governor of Upper Canada. The Darling River is named after Sir Ralph Darling (1772-1858), a British Colonial Governor of New South Wales.

The Murray-Darling River system drains about 14% of Australia's entire land area and is the most important waterway in the country. The basin encompasses a diverse set of natural environments and climates, from the rainforests of southern Queensland to the rolling hills of the southeast and the dry lands in the far western plains. Approximately two million people live in the basin and another one million depend heavily on its water. The largest city in the basin is Canberra, the nation's capital. The City of Adelaide, South Australia, located near the river's mouth but outside the basin, depends on the river for 40% of its water supply.²⁰⁰

Despite the size of the basin – roughly equivalent to the combined area of California and Texas – the flow of water is very modest and reflects the fact that Australia is the most arid continent in the world. The vast majority of the basin – 86% of the total area – is so dry it contributes virtually no runoff at all, except in periods of extreme rainfall. Furthermore, the variability in weather patterns, from drought to flood, exceeds those found elsewhere in the world. In prolonged periods of drought, the river was reduced to a chain of waterholes and would have almost certainly ceased to flow entirely in 1939, 1945, 1968, and 1983, were it not for Hume Dam and other structures on the upper river in the eastern part of the basin.²⁰¹

The Murray River has its headwaters in the Snowy Mountains – also known as the “the Australian Alps” – in the southeastern corner of the country. From there, it flows northwest, toward the interior. For most of its journey in this part of the basin, the Murray River forms the boundary between two Australian states: New South Wales and Victoria. Further downstream, the Murrumbidgee River empties into the Murray River. Later, the Darling River, which has its headwaters in southern Queensland, empties into the Murray River at the town of Wentworth, New South Wales.

The Murray-Darling River then flows west for approximately 62 miles (100 kilometers) before it crosses into the state of South Australia. The river continues west for a brief stretch but then abruptly heads south toward the ocean. The city of Adelaide pumps water from this part of the river. Water in the area is also used for irrigation. As the river nears its mouth, it flows into two Lower Lakes (contiguous shallow bodies of water called Lake Alexandrina and Lake Albert).²⁰² The Goolwa Barrages prevent the sea from intruding.²⁰³ Downstream of the Goolwa Barrages, the Murray-River empties into the Southern Ocean in an area known as the Coorong.²⁰⁴

²⁰⁰ Australia's two largest cities, Sydney (population 4.3 million) and Melbourne (population 4 million), are located in the wetter, more fertile coastal strip just outside the Murray-Darling Basin.

²⁰¹ Background information on the Murray River was obtained from the Murray Darling Basin Commission web site, www.mdbc.gov.au/about.

²⁰² Lake Alexandrina is 220 square miles (570 square kilometers) and was originally a semi-tidal estuary until the construction of the Goolwa Barrages in the 1920s. The barrages kept out tides and raised the lake for steam navigation. The lakes are the reserve water supply for the city of Adelaide.

²⁰³ There are five Goolwa Barrages. The furthest upstream is about 5 miles (8 kilometers) from the mouth of the river. The barrages were built between 1935 and 1940. Prior to construction, the tidal influence (and the

Water diversions total 10.5 MAF, equivalent to about 13,000 GL. When the Murray-Darling River empties into the Southern Ocean, its average annual flow is one of the lowest of any major river system in the world. Ninety-five percent of the water in the basin has been diverted for irrigated agriculture. The remaining water goes for municipal supplies, stock, and other uses.

TABLE 24. The Murray-Darling Rivers at a Glance.

Length:	1,609 miles (2,589 kilometers) for the Murray River
	1,702 miles (2,739 kilometers) for the Darling River
Basin Size:	425,000 square miles (1.1 million square kilometers)
Average Discharge:	290,000 AF per year (358,000 m ³ s)

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

TABLE 25. States in the Murray-Darling River Basin.

Country:	% of the Basin:
New South Wales	56
Queensland	24
Victoria	14
South Australia	6
ACT	<1
TOTAL	100

Source: Australian Bureau of Statistics, *available at* <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4610.0.55.007>.

Water Uses

The Murray-Darling River basin is used for irrigation, domestic water supply, power generation, navigation, recreation, and fish and wildlife habitat.

The river irrigates about 3.6 million acres (almost 1.5 million hectares), which constitutes 42% of Australia's farm land.

Dams on the two rivers and the upstream Snowy Mountains Hydro-Electric Scheme supply about 4,000 MW of generating capacity. The Snowy Mountains Scheme is the largest

intrusion of salt water) could be detected as far as 155 miles (250 kilometers) upstream during low river flows. *See* www.mdbc.gov.au/rmw/river_murray_system/barrages.

²⁰⁴ The Coorong is a large lagoon and wetland listed by Australia under the Ramsar Convention of 1971. It extends from the mouth of the Murray River east along the coast for 85 miles (140 kilometers).

engineering project ever undertaken in Australia and has two purposes: 1) to generate electricity; and 2) to divert water from the Snowy River²⁰⁵ into the headwaters of both the Murray River and a tributary, the Murrumbidgee River.²⁰⁶

On average, the Snowy River Scheme releases 1 MAF (1.26 GL) each year into the Murray River, increasing average downstream flows by 5%, though this number does not tell the complete story: in dry years, releases from the Snowy Mountains Scheme can contribute up to 33% of the river flow.²⁰⁷ The increased water downstream is shared equally by New South Wales and Victoria.

TABLE 26. Largest Dams in the Snowy Mountains Hydro-Electric Scheme.
[Ranked by generating capacity]

Dam:	Year Built:	Generating Capacity: (MW)
Tumut 3	1973	1,500
Murray 1	1967	950
Murray 2	1969	550
Tumut 1	1959	330
Tumut 2	1962	286
Blowering	1969	80
Guthega	1955	60
TOTAL		3,756

* All dams are in New South Wales. Some of the structures are outside of the Murray-Darling Basin but are included in the table because they serve as reservoirs for water released downstream in the Murray River.

MW = megawatts (million watts) of generating capacity.

Source: Snowy Mountains Hydro-Electric, *available at* <http://www.snowyhydro.com.au>.

²⁰⁵ In its natural state, the Snowy River flowed south from the southern slopes of the Great Dividing Range and emptied into the Tasman Sea. The Great Dividing Range contains Australia's most substantial mountains and runs the entire length of the eastern coastline. The Snowy Scheme re-routed 99% of the water from the Snowy River so that it headed northwest, on the dry side of the Great Dividing Range, and into the Murray-Darling River Basin.

²⁰⁶ The Snowy Mountain Scheme was built over 25 years (1949-1974) and consists of 16 major dams, seven power stations, a pumping station, and 140 miles (225 kilometers) of tunnels, pipelines, and aqueducts. Only two percent of the entire construction is visible above ground. The area is located in Kosciuszko National Park. Snowy Hydro Limited – formerly known as Snowy Mountains Hydro-Electric Authority – owns and manages the system of dams and related facilities. It is a government corporation owned jointly by the Commonwealth (13%), New South Wales (58%), and Victoria (29%). Efforts to privatize the corporation failed in 2005, when the Commonwealth abandoned its previously-stated intent to divest itself of its interests in the corporation.

²⁰⁷ The Snowy Mountains Scheme is required to release water according to the terms of its license from the Commonwealth Government. The 5% and 33% figures come from the Murray Darling Basin Commission web site, www.mdbc.gov.au/rmw/river_murray_system/dartmouth_reservoir/hum_and_dartmouth_dams_op. Approximately 54% of this water (550,000 AF/680,000 ML) on average comes from runoff that would have entered the Murray River system without the Snowy Mountains Scheme. The additional amount of water (470,000 AF/580,000 ML) is diverted by the Snowy Mountains Scheme from the Snowy River into the Murray River.

TABLE 27. Largest Reservoirs in the Murray-Darling River Basin.
[Ranked by amount of reservoir storage]

Dam:	Location:	Owner:	Storage:	
			(GL*)	(MAF)
Eucumbene	NSW	Snowy	4,800	3.9
Dartmouth	Vic	G-M	3,906	3.2
Eildon	Vic	Vic	3,334	2.7
Hume**	NSW	Joint	3,038	2.5
Goolwa	SA	SA	2,000	1.6
Menindee Lakes	NSW	NSW	1,678	1.4
Blowering**	NSW	Snowy	1,631	1.4
Copeton	NSW	NSW	1,361	1.1
Wyangala	NSW	NSW	1,220	1.0
Burrendong	NSW	NSW	1,188	.9
Burrinjuck	NSW	NSW	1,026	.8
TOTAL			25,182	20.5

* GL = gigaliter (a billion liters). MAF = million acre feet.

** Hume Dam is the re-regulating storage reservoir on the Murray River. The Murray-Darling Basin Commission controls its operation. The dam fills in winter and spring, and is drawn down in summer during irrigation season. Hume Dam also stores the increased flow of water diverted into the basin by the Snowy Mountains Scheme. Blowering Dam serves a similar purpose on the Murrumbidgee River, a tributary to the Murray River.

Snowy = Snowy Mountain Hydroelectric

NSW = New South Wales

Vic = Victoria

SA = South Australia

G-M = Goulburn Murray Water, a state corporation that is the largest rural water authority in Victoria. G-M owns and operates Dartmouth Dam on behalf of the Murray-Darling Basin Commission, which controls its operations.

Joint = Owned jointly by New South Wales and Victoria

Source: Murray-Darling Basin Commission: Basin Water Storage, *available at*
<http://www.mdbc.gov.au>.

In addition to irrigation and power, the river is also navigable for small ships past the confluence of the Murray and Darling Rivers, a distance of about 590 miles (970 kilometers) from its mouth. Thirteen navigation locks allow houseboats, tourist cruise boats, and other recreational vessels to use the river.

Treaties, Agreements and Legislation

There are no treaties because the Murray-Darling River crosses no international borders, but the management of the basin poses interesting cross-border issues that are similar to transboundary problems elsewhere.

Managing the flow of the Murray River was a challenge for the colonies of New South Wales, Victoria, and South Australia even before Australia became a federation. Prior to adoption of the Constitution in 1901, Australia consisted of a group of independent British colonies. A severe drought forced the colonies (now states) to cooperate and put aside their autonomy.²⁰⁸

Even with the Constitution, which created the federation of Australian states, the activity and management of the river were decentralized and the role of the new Commonwealth (federal) government was limited. The 1901 Constitution stated:

The Commonwealth shall not, by any law or regulation of trade or commerce, abridge the right of a State or of the residents therein to the reasonable use of the waters of rivers for conservation or irrigation.²⁰⁹

As a result, each state had its own water management agency. Water law was primarily a provincial, not a federal matter, though the federal government had jurisdiction over infrastructure, river trade, and navigation.²¹⁰

It was not until 1915 that the River Murray Waters Agreement was signed by the governments of New South Wales, Victoria, and South Australia, as well as the new Commonwealth government. The agreement created an interstate commission, the River Murray Commission (“RMC”), to coordinate and promote common activities.²¹¹

The 1915 agreement required the two upstream states, New South Wales and Victoria, to provide a specified amount of water to South Australia, the downstream state. The agreement also required New South Wales and Victoria to share the upstream waters equitably.²¹² This basic framework, which exists to this day, creates a certain tension: South Australia, the lower riparian state, receives a minimum quantity of water each month. New South Wales and Victoria do not – they divide the waters between themselves, subject to meeting South Australia’s needs. The agreement did not address the reliability of water supply for New South Wales and Victoria.

²⁰⁸ The colony (later the state) of Victoria, for example, adopted an Irrigation Act in 1886. New South Wales followed the Victorian lead and did so in 1896. Both of those acts vested control of water within the states and meant that individuals, associations, and corporations no longer had unfettered vested property rights in water. The government was now empowered to approve water access and entitlements.

²⁰⁹ AUSTRALIA CONST. § 100.

²¹⁰ AUSTRALIA CONST. § 96 (infrastructure/works) and § 98 (river trade/navigation).

²¹¹ For historical information, see www.mdbc.gov.au/about/history_mdbc.

²¹² The equitable sharing requirement applied to New South Wales and Victoria above the town of Albury, New South Wales. Downstream of Albury, however, each state could freely use the water from tributaries in its territories.

The 1915 agreement obligated the signatory states to build certain infrastructure:

- A major storage reservoir (Hume Dam) above Albury, New South Wales, on the upper Murray River;
- Lake Victoria as a storage reservoir on the lower Murray-Darling River, near the border with South Australia, where it would regulate downstream flows; and
- Small weirs and locks along the lower Murray River and the lower Murrumbidgee River.

The infrastructure to create Lake Victoria, one of the basin's most important water storage reservoirs, was completed in 1926. Hume Dam was finished in 1936. The effect of these two infrastructure projects was to create a basic river management scheme. Because Hume Dam (and later Dartmouth Dam, completed in 1979) are located upstream of Albury, water in the reservoirs are shared equitably between the two states, subject to their joint obligation to supply South Australia with a fixed quantity of water. Below Albury, however, each state retained jurisdiction over its own tributaries; they did not have to share this water with each other, though they could also use this water to meet their obligations to South Australia.

The Commission, which implemented the River Murray Waters Agreement, met for the first time in 1917. Its staff was very small and its duties were limited: it could not address water allocation issues on tributaries, for example, nor could it address water quality problems, such as salinity.²¹³

In 1963, the three states and the Commonwealth signed the Menindee Lakes Storage Agreement. The agreement authorized New South Wales to build dams to better manage Menindee Lakes on the lower portion of the Darling River before it empties into the Murray River.²¹⁴ Under the agreement, New South Wales added flows in the Darling River above the lakes as shared waters under the Murray-Darling River Basin agreement. Hence, storage of these waters in Menindee Lakes now benefits both New South Wales and Victoria. This addition to the "common pool" of water allowed Victoria to meet its quota of water for South Australia by relying in part on supplies in the Menindee Lakes reservoirs rather than upstream sources within its own border.

The agreements, however, did not address other problems that surfaced as diversions for irrigation increased. By the late 1960s, for example, the River Murray Commission had undertaken the first comprehensive salinity investigations in the basin.²¹⁵

²¹³ During the period when the states were building the initial infrastructure in the basin (e.g., between 1919 and 1939), the Commission consisted of a part-time secretariat and 2 to 3 staff. Even by the 1970s, the staff consisted of nine employees. See Brian Haisman, *The Murray-Darling River Basin Case Study*, World Bank, December 2004, at 52 ("World Bank Background Paper").

²¹⁴ There are four Menindee Lakes: Lake Wetherell, Lake Pamamaroo, Lake Cawndilla and Lake Menindee. The lakes cover 175 square miles (453 square kilometers). The Menindee Lakes Agreement initially expired seven years later, but was subsequently extended and eventually made permanent.

²¹⁵ Much of the Murray-Darling River Basin is a naturally saline environment. In 1829, the explorer Charles Sturt, who discovered the Darling River, found the water too salty to drink. The salts come from the weathering of rocks and from groundwater. Human activities have exacerbated salinity levels. One study estimated that 15 billion trees were removed over time from the basin, thus seriously diminishing the amount of transpired water. See *World Bank Background Paper*, *supra* note 213, at 13. When water was pumped for irrigation, it brought large amounts of soluble salts to the surface, sterilizing productive land and increasing river salinity from

In 1987, the states and the Commonwealth governments – faced with multiple interstate problems – signed a Murray-Darling Basin Agreement “to promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling River Basin.”²¹⁶ The agreement created the Murray-Darling Basin Commission, which assumed the duties of the River Murray Commission, as well as new responsibilities. But this agreement proved limited, too, in its ability to allocate water and resolve environmental problems.

Then, in 1992, the parties signed a new Murray-Darling River Basin Agreement that remains in effect to this day.²¹⁷ In addition to the four original signatories (New South Wales, Victoria, South Australia, and the Commonwealth), there are two additional members. The state of Queensland became a signatory in 1996, and the Australian Capital Territory (“ACT”) formalized its participation by signing a Memorandum of Understanding in 1998. The agreement created an expanded Murray-Darling Basin Commission as an unincorporated joint venture between the states and the Commonwealth to manage the river.

The current version of the Murray-Darling Basin Agreement contains similar water allocation provisions to the original 1915 Agreement. New South Wales and Victoria are still obligated to supply a fixed quantity of water (1.5 MAF/1,850 GL per year) each year to South Australia. Of this amount, roughly 62% is for consumption, with the remaining 38% of the supply dedicated to dilute saline areas. Those numbers are reduced during drought.

New South Wales and Victoria continue to share water above Albury, New South Wales, and to retain jurisdiction over tributaries downstream of Albury (subject to the 1963 Menindee Lakes Agreement). Finally, New South Wales and Victoria agreed to share the management and operation of the Hume and Dartmouth Dams. Dartmouth Dam, on the Mitta Mitta tributary in Victoria, is the largest reservoir in the entire basin, and holds 40% of the basin’s storage. The dam is managed by Goulburn-Murray Water, a state-chartered rural water authority, on behalf of the Murray-Darling Basin Commission. Hume Dam, downstream on the main stem of the river, is jointly owned by New South Wales and Victoria.²¹⁸ Hume Dam is the main “regulating”

irrigation runoff.

²¹⁶ The 1987 Murray-Darling Basin Agreement, cl. I.

²¹⁷ The 1992 *Murray-Darling Basin Agreement* is available at www.mdbc.gov.au/about/the_mdbc_agreement. It contains eight “Schedules” and numerous protocols that implement the schedules:

- A: Works (Infrastructure)
- B: Murray-Darling Basin
- C: Basin Salinity Management
- D: Application of Agreement to Queensland
- E: Transferring Water Entitlements and Allocations (Water Trading)
- F: Cap on Diversions
- G: Effect of Snowy Scheme
- H: Application of the Agreement to the Australian Capital Territory (“ACT”)

²¹⁸ In the 1980s, Victoria turned over the management of Hume Dam to New South Wales but retained responsibility for adjacent lands and recreation.

storage that allows operators to change the flow of the river; it is mostly drained during the irrigation season and refills later when the rains come.²¹⁹

In the mid-1990s, rapid increases in diversions forced the Murray-Darling Basin Commission to implement a “Cap” (annual limit) on withdrawals. The Cap applied initially to three states: New South Wales, Victoria, and South Australia. It is defined as “the volume of water that would have been diverted under 1993/1994 levels of development.” The Cap is not a fixed formula but is flexible and adjusted annually based on climate conditions. The wetter the year, the higher the Cap. The Cap does not apply to ground water. The Cap was adopted because it was clear to the states and the Commission that water entitlements for irrigation and other uses, if fully developed, would soon absorb the entire river flow in average conditions and make salinity conditions worse downstream.²²⁰

The Murray-Darling Basin Ministerial Council imposed a Cap on the Australian Capital Territory (“ACT”) in May 2008. Queensland is still negotiating its share of the Cap, though the Commission has imposed a moratorium on withdrawals there since 2000.²²¹

In 1998, the Murray-Darling Basin Commission authorized intrastate and interstate water trading, a significant reform endorsed by the influential Council of Australian Governments (“COAG”). Individuals and corporations – not the states – do the actual trading. Each of the states within the basin has “unbundled” its water rights, which means that water and land have been separated. To a water user, this means they do not have to own the land in order to own the water – in other words, they can buy and sell water independently from land.

Legislation in the states of Australia has defined water rights and use in two parts. First, there is an “entitlement” which prescribes the owner’s share of a particular water source (e.g., an owner holds a 100 ML entitlement of Murray River water in the state of Victoria). The volume on the entitlement does not mean the owner is able to use that much each year. Rather, it is the individual states that define how much of the entitlement is usable in any year. Victoria, for instance, may announce that a water user has access to only 50% of its entitlement because of drought conditions. This annual process of identifying how much water can be used is the “allocation” process. It is the second part of the process of defining usable water rights. Unlike the process of defining entitlements, the definition of allocation is based primarily on how much water is actually available in reservoirs for use.

Because water consists of these two components, water trading in Australia occurs at two levels. Water “entitlement” trading (also called permanent trading) involves the buying and selling of water shares while water “allocation” (temporary trading) is the buying and selling of the annual allocations.

²¹⁹ Hume Dam was enlarged in 1961 to hold extra water released by the Snowy Mountains Scheme. It now takes about 25 days for water behind Hume Dam to reach the border with South Australia.

²²⁰ See Schedule F of the *Murray-Darling Basin Agreement* for the “Cap” for the three States, available at www.mdbc.gov.au/about/the_mdbc_agreement.

²²¹ Queensland and the ACT divert less than 7% of the total water diverted in the Basin.

Governance

The current Murray-Darling Basin Agreement created two separate entities, each with its own duties. As a result, governance remains somewhat fragmented.

- The Murray-Darling Basin Ministerial Council, composed of up to 18 members (three ministers from each signatory who have “prime responsibility for matters relating to water, land and the environment”).²²² The Council establishes the major policies for the basin. Its decisions must be unanimous;²²³
- The Murray-Darling Basin Commission, composed of 12 members (two from each signatory), serves as the executive arm of the Council, implements the Council’s directives, and also advises the Council.²²⁴ The Commission is neither a federal nor a state agency – it is a partnership between the various government agencies.

The Murray-Darling Basin Commission and its technical staff control river operations in most of the basin. The Commission’s operational division, known as “River Murray Water,” manages water storage and delivery, salinity mitigation, and navigation.

River Murray Water operates the following major infrastructure:

- Hume Dam;
- Dartmouth Dam;
- Menindee Lakes;²²⁵
- Lake Victoria;²²⁶ and
- Barrages (5) and weirs (16) for diversions and salinity control.

The Commission, acting through River Murray Water, therefore “runs” the river even though it does not own all of the infrastructure.²²⁷

²²² *Murray-Darling Basin Agreement*, Part III.

²²³ *Id.* Part III.

²²⁴ *Id.* Part IV.

²²⁵ If Menindee Lakes fall below a certain level (389,000 AF/480 GL), then New South Wales, not the Murray-Darling Basin Commission, retains control of the water for its own uses, and it will do so until storage in the lakes increases to a level that exceeds the storage in Lake Victoria and the amount needed to supply South Australia, *or* the levels exceed 1.36 MAF (1,680 GL). *See* Murray-River Basin Agreement, Part X, art. 92.

²²⁶ Lake Victoria has a capacity of 549,000 AF (677 GL). The lake’s strategic position on the Murray-Darling River near the border with South Australia allows it to play a key role in controlling flows across the state border to meet the allocations specified in the Murray-Darling Basin Agreement. Because the lake is downstream of all the major tributaries and all the other storage reservoirs (Hume Dam, Dartmouth Dam, Menindee Lakes), the Murray-Darling Basin Commission operates Lake Victoria on a daily basis to provide water supply to the city of Adelaide and to control salinity in the Lower Lakes. Lake Victoria is also used to reduce flow problems at the “Barmah Choke,” a narrow stretch of the Murray River upstream that flows through the Barmah-Millewa red gum forest, a key ecological area in the basin. Water stored in Lake Victoria is used to relieve the operators of Hume Dam from trying to pass through large quantities of water through the Choke.

²²⁷ The Menindee Lakes infrastructure, for example, is owned by New South Wales but leased in perpetuity to the Murray-Darling Basin Commission. The infrastructure at Lake Victoria is owned by South Australian Water

The other Commission division, the “Living Murray Initiative,” purchases and manages water for environmental flows, pursuant to an initiative, approved by the Commission in 2002, which called for the expenditure of \$150 million in public funds to buy water for release at certain times of year to benefit six ecological areas in the basin, including the Barmah-Millewa red gum forest.

In 2007, Parliament approved the Water Act 2007 that will significantly change river governance. The Act created a new entity, the Murray-Darling Basin Authority, with powers to prepare a basin-wide plan, allocate water, purchase water for environmental flows, and make new investments in infrastructure. The Act requires that the basin-wide plan establish limits on both surface and ground water withdrawals and create new rules for trading water. The Act creates a new position, the Commonwealth Environmental Water Holder, to manage water for environmental purposes. The new Murray-Darling Basin Authority will report to the Commonwealth Minister for Climate Change and Water, and will consist of a full-time chair and four part-time members representing each of the States (New South Wales, Victoria, South Australia, and Queensland).

Under the 2007 Water Act, the Commonwealth Minister may, if he or she chooses, make certain unilateral decisions regarding river operations and need not obtain consensus from state ministers, as is the case now with the Ministerial Council. The Water Act therefore federalizes the operation of the Murray-River Basin to an extent not seen in prior agreements.

It is not clear what happens to the existing Murray-Darling Basin Commission under the new law. The Commonwealth government has said it is committed to merging the two organizations but that task will require negotiation with the states.

Meanwhile, the drought continues. As of August 2008, Commission officials describe the situation as “grim” and said that there was not enough water to prevent the two large Lower Lakes, Alexandrina and Albert, from falling to unprecedented low levels.²²⁸ Water in both lakes is now extremely acidic, and there is concern that the lack of water (and poor water quality) will damage the Coorong wetlands at the river mouth. Upstream farmers and other users face the prospect of very low allocations for water throughout the basin.

Corporation. Both Hume and Dartmouth Dams can produce power from turbine generators owned by private corporations, though the capacity is modest compared with the upstream Snowy Mountains Scheme. Hume Dam can generate 50 MW; Dartmouth can produce 150 MW. The Murray-Darling Basin Commission regulates the flow of water at those locations.

²²⁸ See *Grim Forecast for Lower Lakes*, ADELAIDE NOW, August 9, 2008, at <http://www.news.com.au/adelaidenow/story/0,22606,24153863-2682,00.html>. See also *Not Enough Water to save Murray Lower Lakes: Wong*, ABC NEWS, August 6, 2008, <http://search.abc.net.au/search/click.cgi?url=http://www.abc.net.au/news/stories/2008/08/06/2325546.htm&rank=1>.

2.6 SOUTH AMERICA



FIGURE 10: Map of the Amazon and La Plata (Parana) River

2.6.1 The Amazon River

What's in a Name? The river is known as the *Rio Amazonas* in both Spanish and Portuguese.

The Amazon River is the second longest in the world. Only the Nile River is longer (and only by 132 miles or 211 kilometers). The Amazon contains more water than any other river in the world with a total flow greater than the next top ten rivers combined. The Amazon River produces about 20% of all the freshwater that flows into the world's oceans. During the rainy season, the river is up to 28 miles (45 kilometers) wide at its mouth.

The river basin covers 40% of South America. Its source is on the Andean Plateau in Peru (18,000 feet/5,486 meters high), not far from the Pacific Ocean. From there the river flows east until it empties into the Atlantic Ocean. Much of the river basin is rainforest supported by an extremely wet climate. More than one-third of all the species in the world live in the rainforest of the Amazon River Basin. Despite its size, the basin is not heavily populated: only 26 million people live in this region. The two largest cities are: Manaus (1.4 million) and Belem (1 million).

TABLE 28. The Amazon River at a Glance.

Length:	4,000 miles (6,400 kilometers)
Basin Size:	2.4 million square miles (6.1 million square kilometers)
Average Discharge:	5,430 MAF per year (212,375 m ³ s)
Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2 nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm .	

TABLE 29. Countries in the Amazon River Basin.

Country:	% of the Basin:
Brazil	63
Peru	17
Bolivia	12
Colombia	6
Ecuador	2
Venezuela	<1
Guyana	<1
Suriname	<1
TOTAL	100

Source: U.N. Environmental Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 164.

Water Uses

The Amazon River Basin remains in large part in its natural condition, with the exception of large pockets of cattle ranches in the southern part and some industrial activity. Brazil currently produces between 80-90% of its electricity from dams in the Amazon and the La Plata River Basins.²²⁹

Treaties and Agreements

The first treaty on the Amazon River was signed in 1642 between Great Britain and Portugal regarding navigation and commerce.²³⁰ Other navigation treaties followed. But it was not until 1978 that eight nations (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela) signed the Amazon Cooperation Treaty, the only major multi-purpose agreement for the entire basin.²³¹ The organization created by the treaty is known as ACTO (in English) and OTCA (in Spanish).²³² The purpose of the Amazon Treaty is to “promote the harmonized development” of the Amazon River Basin while preserving the environment and conserving natural resources.²³³ The Treaty is essentially a development agreement and not a water allocation agreement. In addition to the Amazon Treaty, there are a number of subsidiary accords, including a letter of understanding between countries in the adjacent La Plata River Basin.²³⁴ Because of its massive flow and the remote territory through which it passes, the Amazon does not face river management problems, such as those encountered in Europe.

Governance

The governing body under the Amazon Treaty is the Amazon Cooperation Council, composed of representatives from each state. A permanent Secretariat (administrator) was established in 2002 in Brasilia, Brazil’s capital. The major duty of the Amazon Cooperation Council is to ensure compliance with treaty objectives and purposes, and to adopt working rules for cooperation.²³⁵ In addition, there are a number of special Amazon commissions created under the auspices of the Council:

- Health
- Indigenous Affairs
- Environment
- Transportation, Infrastructure and Communications

²²⁹ For more information on the electricity sector in Brazil, see the U.S. Energy Information Administration’s Country Analysis Brief on Brazil, available at www.eia.doe.gov/cabs/Brazil/Electricity.html.

²³⁰ *Treaty of Peace and Amity*, Gr. Brit.-Port., Jan. 29, 1642, 2 Herstlet 1.

²³¹ *Treaty for Amazonian Cooperation*, July 3, 1978, 1202 U.N.T.S. 51 (“*Amazon Cooperation Treaty*”).

²³² For the home page of the Amazon Cooperation Council, see www.otca.info/en.

²³³ *Amazon Cooperation Treaty* art 1.

²³⁴ For a list of special agreements and programs, see www.otca.info/en/programs-projects/index.php.

²³⁵ *Amazon Cooperation Treaty* art. XXI.

- Tourism
- Education
- Science and Technology

Within each signatory nation, there is a Permanent National Commission (“PNC”) in charge of implementing the decisions made by the Amazon Cooperation Council and each nation’s Ministry of Foreign Affairs. The PNCs receive financial support from the Inter-American Development Bank and other sources.

2.6.2 The La Plata River

What’s in a Name? In Spanish, the river is the *Rio de la Plata* or Silver River.

The La Plata River is short – only 180 miles (290 kilometers) long – but that statistic is misleading. The La Plata is the name of the river only after the confluence of its two largest tributaries: the Parana and the Uruguay Rivers, which each extends upstream into central South America. The La Plata River and its tributaries drain about 20% of the continent. The basin includes almost all of southern Brazil, a large part of Uruguay, all of Paraguay, and a significant part of northern Argentina. The La Plata River empties into the Atlantic Ocean east of Buenos Aires, Argentina.

Three major river systems contribute to the flow of the La Plata River:

- The Paraguay River has its headwaters in Brazil. The river drains the Pantanal, one of the world’s largest wetlands, a gently-sloping landscape of meandering streams and lakes. The Paraguay flows through Asuncion, Paraguay, and eventually empties into the Parana River.
- The Parana River also begins in the mountains of central Brazil, at the confluence of the Paranaibi and Grande Rivers. After the Parana River is joined by the Paraguay, it flows southwest into Argentina. The Parana River then merges with the Uruguay River, the third of the major river systems.
- The Uruguay River also has its source in Brazil, but to the east of the headwaters of the Parana and Paraguay Rivers. It, too, flows southwest, before meeting the Parana River.

The Parana-Uruguay Rivers, combined into a single formidable waterway, are called the La Plata River. The La Plata River serves as the border between Uruguay and Argentina, until it empties into the Atlantic Ocean. The La Plata River delta is 137 miles (220 kilometers) wide, one of the largest estuaries in the world. Americo Vespucci was the first to explore the delta in 1501 and 1502, but he did not navigate upstream.

About 100 million people now live in the basin. Major cities along the river include the capitals of four countries: Buenos Aires, Argentina; Brasilia, Brazil; Asuncion, Paraguay; and Montevideo, Uruguay. The basin also contains more than 50 other cities with more than 100,000 inhabitants.

TABLE 30. The La Plata River at a Glance.

Length:	3,032 miles (4,880 kilometers) (Parana River)
	1,584 miles (2,550 kilometers) (Paraguay River)
	990 miles (1,593 kilometers) (Uruguay River)
	180 miles (290 kilometers) (La Plata River)
Basin Size:	1.1 million square miles (2.9 million square kilometers)
Average Discharge:	480 MAF per year (18,746 m ³ s)

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

TABLE 31. Countries in the La Plata River Basin.

Country:	% of the Basin:
Brazil	47
Argentina	28
Paraguay	14
Bolivia	8
Uruguay	4
TOTAL	100

Source: U.N. Environment Programme, ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS at 166.

Water Uses

The La Plata River and its tributaries are used primarily for transportation, water supply, and power generation. The La Plata River Basin contains Itaipu Dam on the Parana River, owned jointly between Paraguay and Brazil, the largest hydropower facility in the world.²³⁶ Another large dam, Yacyreta, is owned jointly between Paraguay and Argentina.²³⁷ A third dam, Salto Grande, is owned jointly by Uruguay and Argentina.

²³⁶ The Three Gorges Dam on the Yangtze River in China will be larger: it will have the capacity to produce 22,500 MW of power when completed in 2009. The Itaipu Dam has the capacity to produce 12,600 MW. The Grand Coulee Dam in Washington State, in contrast, has the capacity to produce 6,500 MW and is the largest dam (measured in terms of power production) in the United States. Construction of the Itaipu Dam was the subject of a separate treaty. *Treaty Concerning the Hydroelectric Utilization of Parana River Water*, Braz.-Parag., Apr. 26, 1973, 923 U.N.T.S. 57 (in Spanish and Portuguese only).

²³⁷ Paraguay, one of the world's largest exporters of electricity, has an ownership interest in both the Itaipu and Yacyreta Dams. In 2004, Paraguay consumed 16% of the output of the Itaipu Dam (with the remaining 84% of the output going to Brazil). Paraguay consumed only 1% of the output of the Yacyreta Dam (with the remaining 99% of the output going to Argentina). For the U.S. Department of Energy's Energy Information Administration

The five countries in the basin have proposed the Hidrovia Plan to build a 2,134 mile-long (3,442 kilometer) canal between central-south Brazil through land-locked Paraguay and then into Uruguay, thus linking the heart of the continent with the Atlantic Ocean. The canal (10-feet/3-meters deep) would allow cargo ships to navigate upstream to and from Caceres, Brazil (west of Brasilia) and would allow for extensive inland development.

Treaties and Agreements

A number of infrastructure treaties address the construction of large dams at specific locations.²³⁸ Only one agreement addresses the entire basin: the 1969 Treaty of the River Plate Basin.²³⁹

Signatories include all of the basin nations: Argentina, Bolivia, Brazil, Paraguay and Uruguay. They agreed to cooperate on facilitating navigation and increasing “the rational utilization of water resources” by “multipurpose and equitable development,” as well as by conserving animal and plant life.²⁴⁰ The treaty created an Intergovernmental Coordinating Committee (“CIC”) as the “permanent body for the Basin,” whose duties included promoting and coordinating joint activities.²⁴¹ The treaty does not allocate water.

In 1971, the foreign ministers in the La Plata River Basin adopted the Declaration of Asuncion, to create a commission for establishing rules for sharing international rivers.²⁴² The Declaration said States that share sovereignty over contiguous rivers (e.g., border rivers) must sign bilateral agreements before they make use of these waters. On successive rivers, which flow from one country into another, there is no dual sovereignty. “Each State may [therefore] use the waters in accordance with its needs provided that it causes no appreciable damage to any other State of the Basin.”²⁴³

(“EIA”) reports, see www.eia.doe.gov/cabs/Paraguay_Uruguay/Electricity.html. Argentina, the downstream State, expressed concerns about the impact of the Itaipu Dam on its plans to build Yacyreta Dam with Paraguay. The countries ultimately settled the dispute. See *Agreement between Argentina, Brazil and Paraguay Concerning the Hydroelectric Facilities of Corpus and Itaipu*, Oct. 19, 1979, 2216 U.N.T.S. 212, 19 I.L.M. 1980, available at http://untreaty.un.org/unts/144078_158780/4/2/12149.pdf.

²³⁸ See, e.g., *Agreement Concerning the Utilization of the Rapids of the Uruguay River in the Salto Grande Area*, Arg.-Uru., Dec. 30, 1946, 671 U.N.T.S. 26.

²³⁹ *The Treaty on the River Plate*, Apr. 23, 1969, 875 U.N.T.S. 3 (“*La Plata River Basin Treaty*”).

²⁴⁰ *Id.* art 1.

²⁴¹ *Id.* art. 3. The creation of the CIC preceded the treaty by two years. In 1967, Argentina, Bolivia, Brazil, Paraguay, and Uruguay established the *Comite Intergubernamental Coordinador de los Paises de la Cuenca del Plata* (the Intergovernmental Coordinating Committee of the River Plate Basin Countries or “CIC”) to study the basin and establish a framework for joint development for the river basin. The *La Plata River Basin Treaty* formalized its duties. See home page of the *Comite Intergubernamental Coordinador de los Paises de la Cuenca del Plata*, www.cicplata.org. The CIC is located in Buenos Aires, Argentina.

²⁴² *Declaration of Asuncion on the Use of International Rivers*, adopted at the Fourth Meeting of the Ministers of Foreign Affairs of the States of the River Place Basin, June 1-3, 1971, Y.B. INT’L L. COMM’N, vol. 2, pt. 2, p.324 (1976).

²⁴³ *Id.*

In 1975, Argentina and Uruguay signed a bilateral agreement, the “Statute of the River Uruguay,” to govern natural resources and industrial activity along the downstream river where it serves as their border.²⁴⁴ The Statute, among other things, states that each country undertake “to protect and preserve the aquatic environment, and in particular, to prevent its pollution.”²⁴⁵ The Statute also states that “each Party shall be liable to the other for damage inflicted as a result of pollution caused by its own activities or by those carried out in its territory by individuals or legal entities.”²⁴⁶

The Statute established a special Administrative Commission of the River Uruguay (“CARU”) to regulate and coordinate these activities.²⁴⁷ CARU is based in Paysandu, Uruguay, and is governed by 10 commissioners, five from each country. Its duties are to oversee navigation, pilotage, fishing and other matters, including the management of two international bridges that cross the river.

Governance

Interpretation of the 1975 Statute of the River Uruguay remains controversial: litigation is now pending before the International Court of Justice.²⁴⁸ The catalyst was Uruguay’s approval of permits for two pulp mills along the river. Argentina argued that Uruguay breached its obligations under the Statute by failing to prevent pollution and mitigate the harm caused to Argentina’s interests, including tourism, and by failing to consult with Argentina in advance of permitting the plants.²⁴⁹ The case, filed in 2006, has produced tension between the two countries, including protests, blockades of bridges, and the intervention of church officials who attempted to mediate the dispute.²⁵⁰ One pulp plant was subsequently abandoned; the other is currently operating.

²⁴⁴ *Statute of the River Uruguay*, Arg.-Uru., Feb. 26, 1975, 1295 U.N.T.S. 340.

²⁴⁵ *Id.* art. 41(a).

²⁴⁶ *Id.* art. 42.

²⁴⁷ *Id.* Ch. VIII, art. 49-57.

²⁴⁸ For a docket of the case, see *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, available at www.icj-cij.org/docket/index.php?p1=3&p2=3&code=au&case=135&k=88.

²⁴⁹ Argentina alleged that Uruguay violated article 7 of the Statute of the River Uruguay by failing to submit matters to CARU for a preliminary evaluation. Uruguay responded by saying it had shared extensive information with Argentina about the plants and their environmental controls but that Argentina did not have a veto over Uruguay’s activities.

²⁵⁰ For a history of the dispute, see the Wikipedia article at: http://www.en.wikipedia.org/wiki/Cellulose_plant_conflict_between_Argentina_and_Uruguay.

2.7 NORTH AMERICA



FIGURE 11: Map of the Colorado (USA/Mexico), Columbia (USA/Canada), Nelson-Saskatchewan (USA/Canada), and Mississippi (USA) River

2.7.1 The Colorado River (USA/Mexico)

What's in a name? The name Colorado means “red-colored” in Spanish, a name given to the river because of the large amount of red silt it carried.

From its source on the western slopes of the Rocky Mountains, the Colorado River flows through some of the most arid and dramatic scenery in the United States before it empties into the Gulf of California in Mexico. Approximately 98.6% of the basin lies in the United States; the remaining 1.4% is in Mexico.

Until 1921, the Colorado River officially began at the confluence of the Grand River and the Green River in Utah, where its largest tributaries meet. But a Congressional resolution changed the name of the Grand River to the “Colorado River,” and the river now formally begins in Rocky Mountain National Park, Colorado.²⁵¹

²⁵¹ The name change took place with House Joint Resolution 406 of the 66th Congress on July 25, 1921. See also Colorado River Water Conservation District, *Many years ago, the Colorado River was just Grand*, SUMMIT

In its lower stretches, particularly the portions of the basin in Utah, Nevada and Arizona, the landscape is extremely dry. Early explorers found the area too harsh and predicted it would remain uninhabitable. “It seems intended by nature that the Colorado River, along the greater portions of its lonely and majestic way, shall be forever unvisited and undisturbed,” one member of the U.S. Corps of Topographical Engineers predicted in 1857.²⁵²

TABLE 32. The Colorado River at a Glance.

Length:	1,450 miles (2,333 kilometers)
Basin Size:	271,000 square miles (703,000 square kilometers)
Average Discharge:	13-15 MAF at Lee Ferry, Arizona; negligible flows into the Colorado River Delta.
Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2 nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm .	

The table below shows the major tributaries of the Colorado River and the amount of water they contribute to its flow.

TABLE 33. Major Tributaries of the Colorado River.
[Ranked by average annual flow (discharge)]

Tributary Basins:	Size:		Discharge:
	(Sq. Miles)	(Sq. Kilometers)	(Acre Feet)
Green River	45,000	116,000	4,400,000
Gunnison	8,100	21,000	1,892,000
San Juan	23,166	60,000	1,662,000
Salt*	13,510	35,500	647,000
Little Colorado	26,640	69,000	166,000
Virgin	5,100	13,200	174,000
Gila	58,000	150,000	128,000
Bill Williams	5,400	14,000	110,000

* The Salt River is a tributary of the Gila River – both rivers have extremely variable flows.

Source: RIVERS OF NORTH AMERICA (Arthur C. Benke & Colbert E. Cushing eds., Elsevier Press 2005).

The Colorado River drains a portion of seven states: Colorado, New Mexico, Utah and Wyoming, which lie in the Upper Basin; and Arizona, California and Nevada, which lie in the Lower Basin.²⁵³ The dividing point on the river between the two basins is Lee Ferry, Arizona,

DAILY NEWS, Dec. 23, 2003, available at <http://www.summitdaily.com/article/20031223/OPINION/312230302>.

²⁵² LAWS OF THE RIVERS, *supra* note 5, at 68.

²⁵³ A small part of Arizona also lies in the Upper Basin.

located above Hoover Dam but below Glen Canyon Dam. Average annual flows at Lee Ferry range between 13-15 MAF. So much of the river is diverted downstream in the United States and Mexico that there is no consistent flow into the delta at the Gulf of Mexico.

Water Uses

The Colorado River is the most diverted of the major river systems in the United States. It is a source of drinking water and municipal supply for 28 million people in the United States and 2 million people in Mexico.²⁵⁴ But the primary use is for irrigated agriculture, which diverts roughly two-thirds of the river's supply. This water irrigates about four million acres (1.6 million hectares) of agricultural land in the United States and 500,000 acres (200,000 hectares) in Mexico.²⁵⁵ With the exception of Morales Diversion Dam in Mexico, all of the major infrastructure on the Colorado River is located upstream in the United States.

TABLE 34. Major Dams in the Colorado River Basin.
[Ranked by amount of reservoir storage]

Dam:	Sate:	Owner:	Capacity (MW):	Reservoir (MAF):
Hoover	AZ-NV	USBR	2,100	28.2
Glen Canyon	AZ	USBR	1,288	24.3
Flaming Gorge	UT	USBR	153	3.8
Davis	AZ-CA	USBR	240	1.8
Navajo	NM	USBR	None	1.7
Wayne Aspinal*	CO	USBR	287	.97
Parker	AZ-CA	USBR	110	.65
Fontenelle	WY	USBR	10	.35
Taylor Park	CO	USBR	None	.11
TOTAL			4,188	61.88

* The Wayne Aspinal Project consists of three dams managed together as a single project.

USBR = U.S. Bureau of Reclamation

MAF = million acre feet.

MW = megawatt (million watts) of generating capacity.

Source: U.S. Army Corps of Engineers, National Inventory of Dams, available at <http://crunch.tec.army.mil/nidpublic/webpages/nid.cfm>.

The largest dams on the Colorado River are Hoover Dam – which straddles the border between Arizona and Nevada (south of Las Vegas) – and the Glen Canyon Dam, located upstream in

²⁵⁴ LAWS OF THE RIVERS, *supra* note 5, at 69.

²⁵⁵ *Id.*

Arizona. The dams in the Colorado River Basin can store about four times the average annual flow of the river.

Congress authorized the construction of Hoover Dam in the Boulder Canyon Project Act of 1928, in which, among other things, Congress also approved construction of the All-American Canal to deliver water from the lower river near the Mexican border to the Imperial Valley in southern California.²⁵⁶

Treaties and Agreements

In 1944, the United States and Mexico signed a water allocation treaty on the Colorado River. It remains in effect today and is the only agreement that apportions water between the two countries on the river.²⁵⁷ The treaty guaranteed Mexico 1.5 MAF per year,²⁵⁸ though that amount could go up in years if the United States determined there was sufficient surplus water to deliver to Mexico. Similarly, if an “extraordinary drought” or serious accident made it “difficult” for the United States to meet the guaranteed 1.5 MAF, then “water allocated to Mexico will be reduced in the same proportion as consumptive uses in the United States are reduced.”²⁵⁹ Mexico currently diverts its entire apportionment at Morales Diversion Dam for agriculture and municipal supplies.

The treaty authorized the International Boundary and Water Commission (“IBWC”) to resolve disputes between the two nations.²⁶⁰ The treaty did not address the water quality (i.e., levels of salinity) of deliveries from the United States to Mexico.

In 1972, however, Congress enacted amendments to the Clean Water Act, which required states to adopt plans, approved by the U.S. Environmental Protection Agency, to control salinity.²⁶¹ The IBWC then issued a number of “minutes” that addressed cross-border issues, including salinity.²⁶² In response to IBWC actions, Congress in 1974 enacted the Colorado River Basin Salinity Control Act, in which, among other things, Congress authorized the U.S. Bureau of Reclamation to build the Yuma Desalting Plant in Arizona and other salinity control projects to improve water quality in the Lower Colorado River Basin.²⁶³

²⁵⁶ *The Boulder Canyon Project Act*, 43 U.S.C. § 617, 45 Stat. 1057 (1928).

²⁵⁷ *Treaty Relating to the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande*, Feb. 3, 1944, U.S.-Mex., 3 U.N.T.S. 313 (“U.S.-Mexico Water Treaty”). The treaty is also found at 59 Stat. 1219.

²⁵⁸ *Id.* art 10(a).

²⁵⁹ *Id.* art. 10(b).

²⁶⁰ *Id.* art. 2.

²⁶¹ *The Clean Water Act*, Pub. L. No. 92-500, 86 Stat. 816 (1972).

²⁶² See section 7.5.2 at page 188 this report for additional information on the International Boundary and Water Commission.

²⁶³ *The Colorado River Basin Salinity Control Act*, 43 U.S.C. §§ 1571-1599 (1974).

Governance

Management of the Colorado River is fragmented. There is no single river authority or commission with basin-wide responsibilities. The Colorado River Compact, signed in 1922, divided the river between the Upper Basin and Lower Basin, and required the Upper Basin to provide on average 7.5 MAF per year to the Lower Basin.²⁶⁴ But the negotiators for the states could not reach agreement on an equitable apportionment *between* states.²⁶⁵

In 1948, the four Upper Basin states signed an interstate compact that resolved this issue as it applied to them.²⁶⁶ The Upper Colorado River Compact allocated water between them by percentages, based on each state's contributions to the flow of the river.

TABLE 35. State Allocations in the Upper Colorado River Basin Compact.

State:	% of the Basin:
Colorado	51.75
Utah	23.00
Wyoming	14.00
New Mexico	11.25
TOTAL	100.0

Source: Article 3 of the Upper Colorado River Compact of 1948.

The Lower Basin states, however, remained at odds with each other over “who gets what” from the Colorado River. In 1952, Arizona filed a petition in the U.S. Supreme Court, asking it to resolve the matter. Eleven years later, the Supreme Court issued its landmark opinion.²⁶⁷ The Supreme Court held that that Boulder Canyon Project Act of 1928 constituted a Congressional scheme to apportion water in the Lower Basin. The Supreme Court held that neither the law of prior appropriation nor the 1922 Colorado River Compact was relevant to deciding the long-standing dispute among the states in the Lower Basin. Instead, the Supreme Court concluded that the Boulder Canyon Project Act constituted the “law of the river” and allocated water as shown in the table below.

²⁶⁴ *The Colorado River Compact of 1922*, 70 Cong. Rec. 324 (1928), ratified by Congress, 45 Stat. 1057 (1922). Article III creates the obligation of the Upper Basin states to supply a fixed amount of water on average to the Lower Basin states. The compact lasts in perpetuity.

²⁶⁵ Secretary of Commerce (and later President) Herbert Hoover served as the U.S. representative to the negotiations. When the states could not reach agreement on the apportionment of the waters among themselves it was Hoover who suggested they divide the basin into two. The essential terms of the compact were referred to as the “Hoover Compromise.”

²⁶⁶ *The Upper Colorado River Compact*, Pub. L. No. 81-37, 63 Stat. 31 (1948). Article III contains the individual state allocations. The compact lasts in perpetuity.

²⁶⁷ *Arizona v. California*, 373 U.S. 546 (1963).

TABLE 36. Lower Basin Allocations Per U.S. Supreme Court Opinion.

State:	Allocation:
California	4.4 MAF (and 50% of the surplus)
Arizona	2.8 MAF (and 46% of the surplus)
Nevada	.3 MAF (and 4% of the surplus)
TOTAL	7.5 MAF

Source: *Arizona v. California*, 376 U.S. 340, 342 (1964) (Decree).

Each state’s entitlement had the same priority, though Arizona subsequently accepted a lower priority in exchange for Congressional authorization of the Central Arizona Project, a large federally-funded infrastructure project that brought water to the arid central and southern part of the state.²⁶⁸

The Supreme Court also held that the U.S. Secretary of Interior has the authority to promulgate “shortage criteria” pursuant to the 1928 Act for the Lower Basin.²⁶⁹ As a result, the Bureau of Reclamation, which is the lead agency within the Department of Interior, assumes an increased role in managing the Colorado River in the Lower Basin.

In 2007, the Secretary of Interior approved interim shortage guidelines for the Lower Basin that spell out, among other things, the reduction in water deliveries that the three states (Arizona, California, and Nevada) would suffer if water levels at Lake Mead, the storage reservoir behind Hoover Dam, reached certain pre-established levels.²⁷⁰ The shortage guidelines also addressed the management of Lake Powell, the reservoir behind Glen Canyon Dam in the Upper Basin, and development of additional water supplies, particularly for Nevada.

2.7.2 The Columbia River (USA/Canada)

What’s in a Name? Captain Robert Gray named the Columbia River after his ship, *Columbia Rediviva*.

Captain Robert Gray, a Boston trader and the first American to circumnavigate the globe, entered the estuary of the Columbia River in 1792, to explore the river and its delta. A decade later, Meriwether Lewis and William Clark explored the lower reaches of the river in 1805 and 1806 as part of their expedition. But it was a British fur trader, David Thompson, who first navigated the river from source to mouth. In 1846, the United States and Great Britain signed the Oregon

²⁶⁸ *Colorado River Basin Project Act*, 43 U.S.C. § 1501 (1968). The Act authorized the U.S. Bureau of Reclamation to build the Central Arizona Project but limited Arizona’s diversions during drought to assure California’s annual use of 4.4 MAF from the Colorado River.

²⁶⁹ *Arizona v. California*, 373 U.S. at 593-594.

²⁷⁰ See Record of Decision, *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations of Lake Powell and Lake Mead*, available at www.usbr.gov/lc/region/programs/strategies.html

Treaty, making the 49th parallel the boundary between the two nations and thereby dividing the waters of the Columbia River: the northern third of the river (measured in terms of miles) remained under British control.²⁷¹

TABLE 37. The Columbia River at a Glance.

Length:	1,243 miles (2,001 kilometers)
Basin Size:	258,000 square miles (668,000 square kilometers)
Average Discharge:	192 MAF (7,509 m ³ s) into the Pacific Ocean

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

TABLE 38. Major Tributaries of the Columbia River in the United States.
[Ranked by average annual flow (discharge)]

Tributary:	Basin Size:		Discharge:
	(Sq. Miles)	(Sq. Kilometers)	(Acre Feet)
Snake	108,000	281,000	40,000,000
Willamette	11,580	30,000	23,446,000
Clearwater	12,000	31,000	11,071,000
Flathead	8,500	22,000	8,693,000
Cowlitz	3,424	8,870	6,673,000
Spokane	6,178	16,000	5,753,000
Yakima	6,178	16,000	2,608,000
Grande Ronde	3,861	10,000	2,250,000
John Day	8,100	21,000	1,534,000
Methow	1,853	4,800	1,151,000
Owyhee	11,200	29,000	307,000

Source: RIVERS OF NORTH AMERICA (Arthur C. Benke & Colbert E. Cushing eds., Elsevier Press 2005).

The river that Captain Gray named after his ship begins on the western slopes of the Rocky Mountains in British Columbia, Canada, and enters the United States in a remote part of Washington State. From there, the river flows in a southerly and somewhat circuitous path until it is joined by the Snake River. The river then heads west, forming the boundary between

²⁷¹ *Treaty Establishing the Boundary in the Territory in the Northwest Coast of America Lying Westward of the Rocky Mountains*, U.S.-Gr. Brit., June 15, 1846, TS 120, 12 Bevans 95 (“Oregon Treaty”). The treaty is also found at 9 Stat. 869.

Washington State and Oregon. In its natural state, prior to the mid-1800s, the Columbia River sustained one of the world's largest salmon and steelhead populations.²⁷²

There are 10 major sub-basins of the Columbia River in the United States.

The Columbia River drains an area roughly the same size as France. Of all the rivers in the continental United States, only the Mississippi River carries more water at its mouth. Only 10% has been diverted along the way, mostly for irrigated agriculture.

Water Uses

The dominant use of the Columbia River is power generation. For 40 years, between the 1930s and 1970s, the federal government and other entities in Canada and the United States built large dams on the main stem and tributaries of the river.

The first federal dam on the main stem of the river in the United States was Bonneville, which straddles the river on the Washington State-Oregon border, 40 miles east of Portland, Oregon.²⁷³ The largest structure in the basin is Grand Coulee Dam in Washington State, which has a 151 mile-long (243 kilometer) reservoir that ends at the U.S.-Canadian border.²⁷⁴

There are now 31 federal dams and more than two dozen large dams owned by other entities in the basin in the United States. As a result, the Columbia River has the capacity to generate 31,656 MW of electricity, more than any other river in the United States.²⁷⁵

In addition, British Columbia Hydro, a crown corporation in Canada, has built four dams on the upper river. Reservoir storage in both the United States and Canada totals 60 MAF, half of which is in Canada. Most of the Canadian storage (15 MAF) is behind a single dam, Mica, on the northern part of the river in the province of British Columbia.²⁷⁶

²⁷² Between 10 and 16 million salmon migrated upstream each year, according to some estimates. For more information on Columbia River history, see the on-line history section prepared by the Northwest Power and Conservation Council, available at www.nwccouncil.org/history/Default.asp.

²⁷³ The administration of Franklin Roosevelt began the construction of federal dams on the Columbia River at about the same time that Congress, at the president's request, approved the Tennessee Valley Authority ("TVA") that built dams on the Tennessee River in the South.

²⁷⁴ Completed in 1941, at about the time of the Japanese attack on Pearl Harbor, the Grand Coulee Dam soon became essential to the region's contribution to the war effort by generating large amounts of electricity that served aluminum plants and other military industries. Largely forgotten in some histories is the fact that the dam was built primarily for irrigation. Power generation was only a means to pay for the irrigation infrastructure. In the late 1940s, after the war ended, the federal government built a network of dams and canals to move water onto 500,000 acres of semi-arid land in eastern Washington State.

²⁷⁵ LAWS OF THE RIVERS, *supra* note 5, at 47.

²⁷⁶ Other large storage dams in the Columbia River Basin in Canada are Keenleyside Dam, with a reservoir capacity of 7.1 MAF (but a comparatively small generating capacity of 185 MW), and Duncan, with a reservoir capacity of 1.4 MAF but no power capabilities. Revelstoke Dam on the river below Mica Dam produces a significant amount of power. All of these dams are also owned by B.C. Hydro.

In the United States, the federal dams are owned by the U.S. Army Corps of Engineers or the U.S. Bureau of Reclamation. The power is marketed by another federal agency, in this case the Bonneville Power Administration, with headquarters in Portland, Oregon.²⁷⁷

Three counties in Washington State – Douglas, Grant, and Chelan – have established public utility districts that built and own large dams on the main stem of the Columbia River in eastern Washington State.

TABLE 39. Dams on the Main Stem of the Columbia River in the United States.
[Ranked by generating capacity]

Dam:	State:	Owner:	Capacity (MW):	Reservoir (MAF):
Grand Coulee	WA	USBR	6,779	5.19
Chief Joseph	WA	USACE	2,458	.52
John Day	WA-OR	USACE	2,160	.53
The Dalles	WA-OR	USACE	1,808	.28
Rocky Reach	WA	Chelan	1,212	.38
Bonneville	WA-OR	USACE	1,093	.28
McNary	WA-OR	USACE	980	1.35
Wanapum	WA	Grant	831	.59
Priest Rapids	WA	Grant	788	.19
Wells	WA	Douglas	774	.33
Rock Island	WA	Chelan	620	.13
TOTAL			19,503	9.77

USACE = U.S. Army Corps of Engineers
 USBR = U.S. Bureau of Reclamation
 Chelan = Chelan County Public Utility District
 Grant = Grant County Public Utility District
 Douglas = Douglas County Public Utility District
 MW = megawatt (million watts) of generating capacity
 MAF = million acre feet

Source: U.S. Army Corps of Engineers, National Inventory of Dams, available at <http://crunch.tec.army.mil/nidpublic/webpages/nid.cfm>

²⁷⁷ For the home page of the Bonneville Power Administration, see www.bpa.gov.

The dams on the Columbia River also provide flood control, irrigation, navigation (particularly on the lower main stem of the river and the lower Snake River, allowing vessels and barges to travel to Lewiston, Idaho), and irrigation.

Four major federal irrigation projects in the Pacific Northwest provide water from the Columbia River and its tributaries to about 2.2 million acres (890,000 hectares). The major projects include the Columbia Basin area, where water is pumped from behind Grand Coulee Dam in eastern Washington State to a high, arid plateau; the Yakima Project, also in eastern Washington State; the Boise Project in Idaho; and the Palisades Project in eastern Idaho and parts of Wyoming. The Columbia River is also used for municipal purposes, but this usage is limited: there are few cities along its path.²⁷⁸

For many years, the Columbia River was used to cool water for nuclear reactors that built nuclear weapons during both World War II and the Cold War. The reactors are now shut down, but a federal reservation at Hanford, eastern Washington, contains the largest repository of nuclear waste from military and commercial uses in the nation.

Treaties and Agreements

The chief treaty on the Columbia River between the United States and Canada relates to power generation and flood control. It was signed in 1961 and took effect in 1964.²⁷⁹ The Columbia River Treaty provided for the construction of four dams – three in Canada and one in the state of Montana – for hydropower, storage, and flood control.²⁸⁰ The International Joint Commission (“IJC”) helped develop the Columbia River Treaty principles, but the Treaty itself was negotiated primarily by the province of British Columbia, the Canadian federal government, and the United States.²⁸¹

²⁷⁸ LAWS OF THE RIVERS, *supra* note 5, at 48-49. The Puget Sound area, which includes the City of Seattle and its suburbs, is the most populous region in the Pacific Northwest, but is located outside of the Columbia River Basin. The largest metropolitan area in the basin is Portland, Oregon, and its suburbs, but its major water source is not the Columbia River itself but a reservoir on the slopes of Mt. Hood.

²⁷⁹ *Treaty relating to the Cooperative Development of the Water Resources of the Columbia River Basin*, U.S.-Can., Jan. 17, 1961, 542 U.N.T.S. 244 (“*Columbia River Treaty*”). The treaty is also found at 15 U.S.T. 1555. Ratification of the treaty was delayed pending negotiation of several protocols, which, among other things, required American utilities to pay money to Canada. See section 9.3.2 at page 209 for more information about the negotiation of this treaty.

²⁸⁰ The Canadian dams are Mica, Hugh Keenleyside (formerly Arrow) and Duncan. The U.S. dam is Libby, built on the Kootenai River, a tributary that begins in Canada, enters the United States in Montana and returns to Canada, where it flows into the Columbia River in central British Columbia.

²⁸¹ The IJC began its work on Columbia River development issues in 1945 and completed the project only in 1959, two years before the two countries signed the treaty. In the meantime, a flood on the lower river in 1948 had destroyed Vanport, then Oregon’s second largest city, which triggered new studies focusing on flood control and power generation. In the mid-to late 1950s, three public utility districts in Washington State built their own dams on the mid-Columbia River, downstream of Grand Coulee Dam.

Although only 15% of the Columbia River Basin is in Canada, the Canadian portion of the Columbia River supplies about 38% of the total average annual volume measured downstream and 50% of the peak flood waters.²⁸²

The Columbia River Treaty does not have an expiration date. Instead, either country may terminate the treaty 60 years after the exchange of diplomatic notes that implemented the agreement – which means on or after September 16, 2024 – with a minimum of 10 years advance written notice.²⁸³



FIGURE 12. Prime Minister Diefenbaker (left) of Canada and U.S. President Eisenhower signing the Columbia River Treaty, January 17, 1961. [Source:<http://files.dunau.com/lrf/LRF2007Presentations/RobynMackayPresentation.ppt#284,3>, In the Beginning]

Governance

There is no single river authority or river commission on the Columbia River with plenary authority. Instead, the river is managed by multiple federal and local agencies, which have agreed to coordinate their operations as if the dams were owned by a single entity.

In the United States, the Northwest Power and Conservation Council, an agency created by an interstate compact, prepares a power plan and a salmon restoration plan.²⁸⁴ Nonetheless, decision-making on salmon issues remains fragmented. The Council has no authority over ocean harvest and fishing. To date, the federal government has spent \$9 billion on efforts to preserve and restore fish and wildlife in the Columbia River Basin, and the current program costs about

²⁸² See U.S. Army Corps of Engineers & the Bonneville Power Administration, *Columbia River Treaty: History and 2014/2024 Review (2008)*, available at www.bpa.gov/Corporate/pubs/Columbia_River_Treaty_Review_-_April_2008.pdf. The downstream volumes are measured at The Dalles, Oregon (east of Portland, Oregon).

²⁸³ *Columbia River Treaty* art. XIX.

²⁸⁴ The Council is located in Portland, Oregon. For its home page, see www.nwcouncil.org.

\$700 million per year. Much of the money has been spent on physical infrastructure to ease the return of salmon upstream and the passage of salmon downstream.

Despite the amount of money spent, there are 13 threatened and endangered species of fish in the Columbia River Basin. To help move young salmon downstream, the federal government has shifted flows of the river from winter to spring, thus reducing the amount of water behind the dams available for power in the heating season. Litigation is now pending in federal district court in Oregon over the adequacy of the federal government's Biological Opinion, prepared pursuant to the Endangered Species Act. The Biological Opinion addresses, among other things, water flows for juvenile salmon and other river operations.²⁸⁵

2.7.3 The Nelson-Saskatchewan River System (USA/Canada)

What's in a Name? The Nelson was named after Robert Nelson, a ship master who died while accompanying Sir Thomas Button, who was exploring the river's mouth at Hudson Bay in 1612. The Saskatchewan means "swift-flowing river" in Cree.

The Nelson-Saskatchewan River Basin is one of the largest in Canada: it stretches 1,300 miles (2,000 kilometers) from the eastern slopes of the Rocky Mountains to the western edge of the Great Lakes Basin. Eighty-six percent of the basin is in Canada;²⁸⁶ the remaining 14% of the basin is in the United States.²⁸⁷

The total population of the entire basin is approximately five million. The largest cities in Canada are: Calgary and Edmonton, Alberta; Regina and Saskatoon, Saskatchewan; and Winnipeg, Manitoba. In the United States, the largest cities are Fargo, North Dakota, and Grand Forks, North Dakota, in the basin of the Red River of the North (the largest tributary in the United States).²⁸⁸

At the center of the drainage basin in Canada is Lake Winnipeg, one of the largest lakes in North America.²⁸⁹ It is the 10th largest freshwater lake in the world.²⁹⁰ The area was once part of Lake Agassiz,²⁹¹ a huge glacial lake that extended over 140,000 square miles (363,000 square

²⁸⁵ The federal agencies involved in Columbia River salmon issues have established a web site, *see* www.salmonrecovery.gov.

²⁸⁶ Canadian provinces in the basin are: Alberta, Saskatchewan, Manitoba and Ontario.

²⁸⁷ The U.S. states in the basin are: Montana, North Dakota and Minnesota.

²⁸⁸ The river is known in Canada as the Red River. In the United States it is called the Red River of the North to distinguish it from another Red River, a tributary of the Mississippi River that forms the border between Oklahoma and Texas.

²⁸⁹ Lake Winnipeg is slightly smaller than one of the Great Lakes, Lake Erie, and slightly larger than another Great Lake, Lake Ontario.

²⁹⁰ Lake Winnipeg occupies 9,460 square miles (24,500 square kilometers).

²⁹¹ The lake is named after Louis Agassiz (1807-1873), the Swiss-American geologist and zoologist who first proposed the existence of the Ice Age and who scientifically described the movement of glaciers.

kilometers). Geologists believe the lake shrunk at the end of the last ice age 7,500 years ago, leaving in its place Lake Winnipeg and nearby lakes in modern-day Manitoba and Minnesota.

TABLE 40. The Nelson-Saskatchewan River System at a Glance.

Length:	1,202 miles (1,949 kilometers) (Saskatchewan River)*
Basin Size:	707,000 square miles (1.8 million square kilometers)
Average Discharge:	60 MAF (2,347 m ³ s) into Hudson Bay

* This distance is the total length of the Saskatchewan River from its source in the eastern slopes of the Rocky Mountains to Lake Winnipeg, and includes the longest tributary (the South Saskatchewan River).

Source: THE ATLAS OF CANADA, available at
<http://atlas.nrcan.gc.ca/site/english/learningresources/facts/rivers.html>.

The Saskatchewan and Winnipeg Rivers account for 75% of the annual inflows into Lake Winnipeg. The Saskatchewan River system drains most of the western basin. The Winnipeg River system drains the southern and southeastern part of the basin.

The Saskatchewan River system is composed of the North Saskatchewan and South Saskatchewan Rivers:

- The source of the North Saskatchewan River is in Banff National Park, Alberta. From there, the river flows east through Edmonton, Alberta, and into the province of Saskatchewan.
- The source of the South Saskatchewan River is also in Banff National Park, where the Bow River begins. The Bow River flows through Calgary, Alberta, and then joins the Oldman River. At their junction, the river is called the South Saskatchewan.

Both branches – the North and South Saskatchewan Rivers – join together to form the main stem of the Saskatchewan River near the city of Prince Albert in central Saskatchewan. From there, the Saskatchewan River continues until it empties into the northwest corner of Lake Winnipeg.

The southern end of Lake Winnipeg receives rivers from a variety of directions. From the southeast comes the Winnipeg River, which drains Lake of the Woods, a body of water that straddles the border between Canada and the United States. From the west come both the Souris River – which begins in Canada, flows into the United States and then flows back into Canada – and the Red River of the North.

The Red River of the North begins in Minnesota, drains a small part of South Dakota, a substantial part of North Dakota, and most of northwestern Minnesota. Along the way, the Red River passes through two cities of North Dakota – Fargo and Grand Forks – before crossing into Canada. The city of Winnipeg, Manitoba, is located at the confluence of the Red and Assiniboine Rivers. From there, the Red River flows north into Lake Winnipeg. The Red River Basin is remarkably flat: the slope of the river from North Dakota into Manitoba averages less than one foot per mile.²⁹²

²⁹² During the floods of 1997, the river ran its banks and formed a lake 25 miles (40 kilometers) wide in Manitoba. Clay soils with low absorptive capacity contribute to the flood problems.

Also draining into Lake Winnipeg is the Dauphin River that drains Lake Manitoba, which in turn is connected to Lake Winnipegosis and Cedar Lake. Other smaller rivers, including the Bloodvein and Manigatogan, feed into the eastern side of the lake.

The Nelson River drains Lake Winnipeg from the north and runs 400 miles (644 kilometers) until it empties into Hudson Bay.

Water Uses

Water in the Nelson-Saskatchewan Basin is used for agriculture, municipal uses, hydropower, and industry. In Alberta, water is used primarily for hydropower and municipal supply for Calgary, Edmonton, and other cities, as well as for irrigation (1.25 million acres/500,000 hectares). In Saskatchewan, the primary use is hydropower and irrigation. In Manitoba, the primary use is municipal supply and hydropower. Manitoba Hydro, a crown corporation, is the sole owner of the major dams in the province.

TABLE 41. Major Dams in Alberta and Saskatchewan (Nelson-Saskatchewan River Basin). [Ranked by generating capacity]

Dam:	River:	Owner:	Year Built:	Capacity: (MW)
Brazeau	Brazeau River	Trans Alta*	1965	355
E.B. Campbell	Saskatchewan	SaskPower *	1964	288
Nipawin	Saskatchewan	SaskPower *	1986	255
Coteau Creek	S. Saskatchewan	SaskPower *	1958	186
Bighorn	N. Saskatchewan	Trans Alta*	1972	120
Spray	Bow River	Trans Alta*	1951	103
Island Falls	Churchill River	SaskPower *	1959	101
Gardiner	S. Saskatchewan	SWA**	1967	**
TOTAL				1,408

* TransAlta is a publicly-traded company with headquarters in Calgary, Alberta. Saskatchewan Power (“SaskPower”) is a crown corporation located in Regina, Saskatchewan. SWA is the Saskatchewan Watershed Authority.

** Gardiner Dam, owned by the Saskatchewan Watershed Authority, is a companion structure to Coteau Creek. The generating capacity of Coteau Creek (186 MW) reflects the contribution of Gardiner Dam, an upstream storage reservoir.

MW = megawatts (million watts) of generating capacity.

Source: Compilation of data available from the web sites of TransAlta, www.transalta.com, and Saskatchewan Power, www.saskpower.com.

TABLE 42. Major Dams in Manitoba (Nelson-Saskatchewan River Basin).
[Ranked by generating capacity]

Dam:	River:	Owner:	Year Built:	Capacity: (MW)
Limestone	Nelson	Manitoba Hydro	1990	1,340
Kettle	Nelson	Manitoba Hydro	1974	1,232
Long Spruce	Nelson	Manitoba Hydro	1979	1,010
Grand Rapids	Saskatchewan	Manitoba Hydro	1968	479
Kelsey	Nelson	Manitoba Hydro	1961	223
Seven Sisters	Winnipeg	Manitoba Hydro	1952	165
Jenpeg	Nelson	Manitoba Hydro	1979	132
Great Falls	Winnipeg	Manitoba Hydro	1929	131
Pine Falls	Winnipeg	Manitoba Hydro	1952	88
Pointe du Bois	Winnipeg	Manitoba Hydro	1926	78
McArthur	Winnipeg	Manitoba Hydro	1955	55
Slave Falls	Winnipeg	Manitoba Hydro	1948	67
TOTAL				5,000

MW = megawatts (million watts) of generating capacity.

Source: Manitoba Hydro, www.hydro.mb.ca/corporate/facilities_operations.shtml.

In 1966, the province of Manitoba and the federal government of Canada allowed Manitoba Hydro to use the lake as a supplemental reservoir for downstream dams on the Nelson River. Work on the Lake Winnipeg Regulation Project began in 1970 and was completed in 1976. The purpose of the project is to increase the outflow of Lake Winnipeg (and connecting lakes in the Nelson River Basin) to generate power during the cold months of winter.

Manitoba Hydro also built part of the Churchill River Diversion Project, north of Lake Winnipeg. For part of its route, the Churchill River runs parallel to the Nelson River (separated by approximately 100 miles/161 kilometers) before also emptying into Hudson Bay. The Churchill Diversion Project moves water into a tributary of the Nelson River and then into the Nelson River itself. The initial phase of the project, built to increase hydropower generation on the Nelson River, was completed in 1977. Manitoba Hydro has proposed additional dams in the area; several are now under construction.²⁹³

Treaties and Agreements

Because the Nelson-Saskatchewan River System includes a portion of the United States, the 1909 Boundary Waters Treaty applies to the obligations of the United States and Canada to each

²⁹³ See the home page of Manitoba Hydro, www.hydro.mb.ca.

other. The treaty did not apportion water in the Nelson-Saskatchewan River Basin. Instead, it created a framework for preventing and resolving disputes between the two countries.²⁹⁴

The Saskatchewan River Basin lies almost entirely in Canada,²⁹⁵ but the Winnipeg River Basin includes Lake of the Woods, Rainy Lake, and Rainy River, which all drain into parts of the United States. Lake of the Woods and Rainy Lake are the subject of separate treaties signed after the Boundary Waters Treaty. The operation of these lakes and rivers is controlled by the International Joint Commission (“IJC”).²⁹⁶ The IJC also monitors water quantity and water quality in the Red River of the North.

The chief domestic agreement in Canada for the Nelson-Saskatchewan Basin is the Master Agreement on Apportionment, a federal-provincial accord signed in 1969. The Agreement is administered by the Prairie Provinces Water Board (“PPWB”).²⁹⁷ The Agreement governs waters flowing east from the Rocky Mountains across Canada’s three prairies provinces of Alberta, Saskatchewan, and Manitoba.²⁹⁸

In addition, the PPWB regulates a small portion of the Milk River Basin, which is part of the Missouri River watershed. The Milk River is the northernmost tributary of the Missouri River (and hence the most northern part of the entire Mississippi River drainage). The portion of the Milk River that crosses the international border is apportioned according to the terms of the 1909 Boundary Waters Treaty. But two tributaries of the Milk River – the Lodge and Middle Creeks – cross from Alberta into Saskatchewan and are therefore apportioned according to the PPWB’s authority.

In 1948, the three provinces and the federal government signed the first agreement for the cooperative management of inter-provincial rivers. The agreement created the PPWB, which had limited duties: to recommend the best use of interprovincial waters and suggest allocations. Then, in 1969, faced with growing demands for water, the provinces and the federal government signed a broader accord called the Master Agreement on Apportionment.²⁹⁹ This agreement

²⁹⁴ See section 7.3.1 at page 168 of this report for a discussion of the Boundary Waters Treaty.

²⁹⁵ Only 695 square miles (1800 square kilometers) of the Saskatchewan River Basin lies in the United States (Montana), equivalent to .16% of the basin.

²⁹⁶ Two private companies own dams that straddle the border at Ft. Francis, Ontario and International Falls, Minnesota, below the outlet of Rainy Lake, and upstream at the outlet of Namakan Lake. The IJC controls the levels of both lakes. See section 7.3.2 at page 173 for a discussion of the IJC authority under the Boundary Waters Treaty. See section 7.3.1 at page 171 for a summary of the treaties on Lake of the Woods and Rainy Lake.

²⁹⁷ For the home page of the Prairie Provinces Water Board, see <http://www.mb.ec.gc.ca/water/fa01/index.en.html>. The PPWB is composed of one representative from each of the three provinces and two from the federal government (both appointed by the Governor General in Council on the recommendation of the Minister of Environment.) One of the federal members serves as chair of the PPWB.

²⁹⁸ The PPWB’s jurisdiction, however, does not include diversions occurring entirely within Manitoba, where canals move water from the lower Churchill River into the Nelson River for increased hydropower production. The PPWB, however, oversees the apportionment of the upstream Churchill River when it flows between Saskatchewan and Manitoba.

²⁹⁹ The Master Agreement on Apportionment is available at <http://www.mb.ec.gc.ca/water/fb01/fb00s05.en.html>.

reconstituted the PPWB with four parties and established the legal framework that is still in effect today.

Governance

The Master Agreement on Apportionment, administered by the Prairie Provinces Water Board, contains a comparatively simple formula for sharing the eastward-flowing transboundary rivers. In general, Alberta is required to pass one-half of the natural flow of each watercourse into Saskatchewan on an annual basis. Saskatchewan, in turn, is required on an annual basis to provide Manitoba with one-half of the water flowing into Saskatchewan from Alberta, plus one-half of the natural flow arising in Saskatchewan.³⁰⁰

The mission of the Prairie Provinces Water Board is to:

- Ensure that inter-provincial waters are protected and to equitably apportion the waters in accordance with the formula contained in the Master Agreement;
- Provide a forum for the exchange of information to prevent or resolve conflicts; and
- Promote cooperation in the management of interprovincial waters.³⁰¹

The Master Agreement also addresses water quality. In 1992, the parties amended the Master Agreement to include a water quality accord that became Schedule E. Water quality objectives were established for 11 inter-provincial river reaches. The parties agreed to “consider water quality problems” and refer them for resolution to the five-member PPWB.³⁰² The PPWB also considers transboundary groundwater issues referred to it by the parties.³⁰³ The PPWB is now in the process of developing a groundwater agreement.

2.7.4 The Mississippi River (USA)

What’s in a Name? Mississippi derives from the old Ojibwe word *missi-zibi*, meaning “Great River” or *gichi-zibi*, meaning “big river.”

The Mississippi River is the third largest river basin in the world. Only the watersheds of the Amazon and the Congo River are larger.

The river drains 40% of the continental United States, from the eastern slopes of the Rocky Mountains to the western slopes of the Appalachian Mountains. The basin includes parts of 31 states and a small part of two Canadian provinces (Alberta and Manitoba). About 12 million

³⁰⁰ *Id.* The inter-provincial allocation is accomplished in two separate “schedules,” or appendices, to the *Master Agreement*. Schedule A apportions water between Alberta and Saskatchewan (a 50-50% split). Schedule B apportions water between Saskatchewan and Manitoba (a 50-50% split of Saskatchewan’s share).

³⁰¹ For the mission of the PPWB, see www.mb.ec.gc.ca/water/fb01/fb00s02.en.html.

³⁰² *Master Agreement* art 6 and Schedule E.

³⁰³ *Id.* art. 6.1.

people live in the corridor of the river, and 84 million people (30% of the U.S. population) live in the basin.

In 1541, Hernando de Soto became the first European to see the mouth of the river, which he called *Rio de Espiritu Santo* (“River of the Holy Spirit”). The French explorers Louis Joliet and Jacques Marquette explored the upper inland river but it was not until 1682 that Rene Robert Cavelier, Sieur de LaSalle claimed the entire Mississippi River Valley for France. One hundred years later, France lost its claim on the Mississippi River and other parts of North America as a result of the French and Indian War. The Treaty of Paris gave England and Spain these rights, though France later re-acquired large portions of the basin in the secret treaty of San Ildefonso in 1800. Three years later, the United States bought the territory from France in the Louisiana Purchase.³⁰⁴

TABLE 43. The Mississippi River at a Glance.

Length:	3,710 miles (5,973 kilometers)*
Basin Size:	1.2 million square miles (3.2 million square kilometers)
Average Discharge:	442 MAF (17,287 m ³ s) into the Gulf of Mexico

* The distance of the Mississippi River is measured from the headwaters of the Missouri River (its largest tributary) to the mouth in the Gulf of Mexico.

Source: THE WATER ENCYCLOPEDIA (Lewis Publishers 2nd ed. 1990) and WATER RESOURCES E-ATLAS, http://www.iucn.org/about/work/programmes/water/wp_resources/wp_resources_eatlas/index.cfm.

TABLE 44. Major Tributaries of the Mississippi River.
[Ranked by size by average annual flow (discharge)]

Tributary:	Size:		Discharge:
	(Sq. Miles)	(Sq. Kilometers)	(Acre Feet)
Ohio*	146,00	377,000	150,109,000
Upper Mississippi	189,000	490,000	91,431,000
Tennessee-Cumberland	59,000	152,000	73,176,000
Arkansas-Red-White	254,000	657,000	72,485,000
Missouri	529,000	1,371,000	50,011,000
Lower Mississippi	126,000	327,000	**

* The data for the Ohio River exclude two tributaries, the Tennessee and Cumberland Rivers, which are listed separately above.

** The discharge of the Lower Mississippi River is not measured separately.

Source: RIVERS OF NORTH AMERICA (Arthur C. Benke & Colbert E. Cushing eds., Elsevier Press 2005).

³⁰⁴ For background information on the history of the Mississippi River, see http://en.wikipedia.org/wiki/Mississippi_River.

The Mississippi River begins in Lake Itasca, a tiny body of water only 30 feet (48 meters) deep in central Minnesota, and ends as a torrent in Louisiana, where it empties into the Gulf of Mexico. The flow of the Mississippi River exceeds that of any river in North America, with much of it laden with silt.

The Mississippi River is composed of six subbasins: the Upper Mississippi River, the Missouri River, the Ohio River, the Arkansas-Red-White Rivers, the Tennessee River and the lower Mississippi River.

Water Uses

The Mississippi River and its tributaries are the largest commercial waterway in the United States. There are 12,350 miles of navigable river and canals in the basin that allow barge traffic to travel between Louisiana and Minnesota; up the Illinois River to the Great Lakes; up the Missouri River from St. Louis to Sioux City, Iowa; up the Ohio River to western Pennsylvania; and up the Arkansas River to Tulsa, Oklahoma. No other river system in the nation contains the scale of investment for navigation and flood control. The river moves 500 million tons of goods a year, including 60% of the nation's corn and 45% of its soybeans. The largest ports in the world (in tonnage) are the Port of New Orleans and the Port of South Louisiana.³⁰⁵

Although the U.S. Army Corps of Engineers owns a series of locks and dams on the main stem of the river, these structures only allow for barge and tow traffic to move up and down the river. Very little hydropower is generated on the main stem of the Mississippi River. Rather, it is on the tributaries that the federal government has built some of the nation's largest dams. The Tennessee Valley Authority ("TVA") owns 30 dams in the Tennessee River Basin, and the Army Corps owns 9 dams on the nearby Cumberland River. Both rivers are tributaries to the Ohio River (itself a tributary to the Mississippi River). The combined output of the Tennessee-Cumberland system is 6,233 MW with total storage of 23.1 MAF.³⁰⁶

In addition, the Army Corps and U.S. Bureau of Reclamation own 2,485 MW on the main stem of the Missouri River with a storage capacity of 75 MAF. The entire Missouri River Basin system has the capacity to store 141 MAF.³⁰⁷ The Army Corps and Bureau of Reclamation also own 838 MW on the Arkansas River with a total storage of 8.7 MAF.³⁰⁸

The Army Corps also built a mammoth system of dams, levees, floodways, pumping stations, and other infrastructure to control flowing in the Lower Basin of the Mississippi River. The system, known as the "Mississippi River and Tributaries Project," extends between Cape Girardeau, Missouri (north of the confluence with the Ohio River) and southern Louisiana. The project includes 44 flood control lakes and reservoirs, 59 pumping stations, 8,375 miles of

³⁰⁵ LAWS OF THE RIVERS, *supra* note 5, at 125-26.

³⁰⁶ TVA is a federal corporation established in 1933. 16 U.S.C. § 831. For information about infrastructure on the Tennessee-Cumberland rivers, *see* LAWS OF THE RIVERS, *supra* note 5, at 166.

³⁰⁷ LAWS OF THE RIVERS, *supra* note 5, at 135.

³⁰⁸ *Id.* at 152-153.

levees, and other infrastructure. The project is about 90% complete and is expected to be finished in 2032 at current levels of federal funding.

About 50 cities depend on the main stem of the Mississippi River for their water supply – about 18 million people. In addition, there are hundreds of industries along the path of the river and its tributaries, including 31 nuclear power plants.

Treaties and Agreements

The main stem of the Mississippi River lies entirely in the United States, and there is no treaty that allocates or manages this water. The Missouri River, however, which is the longest tributary of the Mississippi River, is different. Several of its tributaries, specifically the Milk and St. Mary Rivers, cross the international border into Canada and are the subject of treaties and orders issued by the International Joint Commission (“IJC”).³⁰⁹

Governance

The Army Corps of Engineers is the prime manager of the main stem of the Mississippi River, a responsibility it has held since the 1800s. But there is no basin-wide management or planning authority or commission that addresses issues in the entire basin. The basin is too large, the duties of federal, state, and local agencies are too fragmented. Water usage, for example, is monitored by each state. There is no central data base of water withdrawals from the Mississippi River. Environmental regulations and requirements vary considerably from state to state.

The Mississippi River Commission, established by Congress in 1879, has the responsibility to develop plans to improve the lower river, to foster navigation and prevent destructive floods.³¹⁰ Its focus is a huge infrastructure project known as the Mississippi River and Tributaries Project.

The tributaries of the Mississippi River have their own autonomy and history. On the Missouri River and Arkansas River, for example, governance is shared by federal agencies, such as the Army Corps of Engineers, the Bureau of Reclamation and the states. On the Tennessee River, it is the TVA, a federal corporation created in 1933, which owns the dams and manages the river.

Because the dams and locks on the main stem of the Mississippi River do not store water, there are no interstate compacts or management agreements that address ‘who gets what’ from the river. There are, however, a number of interstate compacts on tributaries of the Mississippi River. Six water allocation compacts on tributaries of the Missouri River (a tributary of the Mississippi River), for example, address river management and flow requirements:

³⁰⁹ For details about these rivers, *see* section 7.3.1 at page 168 of this report for more about the Milk and St. Mary Rivers.

³¹⁰ For the home page of the Mississippi River Commission, *see* www.mvd.usace.army.mil/mrc/about/index.php.

- The South Platte,³¹¹
- The Republic River,³¹²
- The Bell Fourche River,³¹³
- The Yellowstone River,³¹⁴
- The Upper Niobrara River, and³¹⁵
- The Kansas-Nebraska Blue River.³¹⁶

There are also interstate compacts on the Arkansas River (1949, 1965 and 1972) as well as on a tributary, the Canadian River (1952).³¹⁷

³¹¹ *The South Platte Compact*, Pub. L. No. 69-37, 44 Stat. 195 (1926).

³¹² *The Republican River Compact*, Pub. L. No. 78-60, 57 Stat. 86 (1943).

³¹³ *The Belle Fourche River Compact*, Pub. L. No. 78-236, 58 Stat. 94 (1944).

³¹⁴ *The Yellowstone River Compact*, Pub. L. No. 82-231, 65 Stat. 663 (1951).

³¹⁵ *The Upper Niobrara River Compact*, Pub. L. No. 91-52, 83 Stat. 86 (1969).

³¹⁶ *The Kansas-Nebraska Blue River Compact*, Pub. L. No. 92-308, 86 Stat. 193 (1972).

³¹⁷ The Arkansas River Compacts were signed in 1949, 1965 and 1970. See LAWS OF THE RIVERS, *supra* note 5, at 160-162.

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CHAPTER 3

PRINCIPLES OF WATER ALLOCATION UNDER INTERNATIONAL LAW

In this chapter:

- 3.1 Absolute Territorial Sovereignty: The Upstream State Prevails
- 3.2 Absolute Territorial Integrity: The Downstream State Prevails
- 3.3 The Doctrine of Equitable and Reasonable Utilization
 - 3.3.1 The U.S. Supreme Court's Equitable Apportionment Doctrine
 - 3.3.2 The Helsinki Rules
 - 3.3.3 The U.N. Convention on Non-Navigational Uses
 - 3.3.4 The Berlin Rules
- 3.4 International Water Allocation Today

3.0 PRINCIPLES OF WATER ALLOCATION UNDER INTERNATIONAL LAW

Over the years, nations have relied on three general principles to apportion water in shared rivers and lakes. Because the real world does not always fit into neat academic theories, these principles sometimes overlap one another. But an understanding of the three general approaches helps frame the discussion of current international water law as it exists today.

3.1 ABSOLUTE TERRITORIAL SOVEREIGNTY: THE UPSTREAM STATE PREVAILS

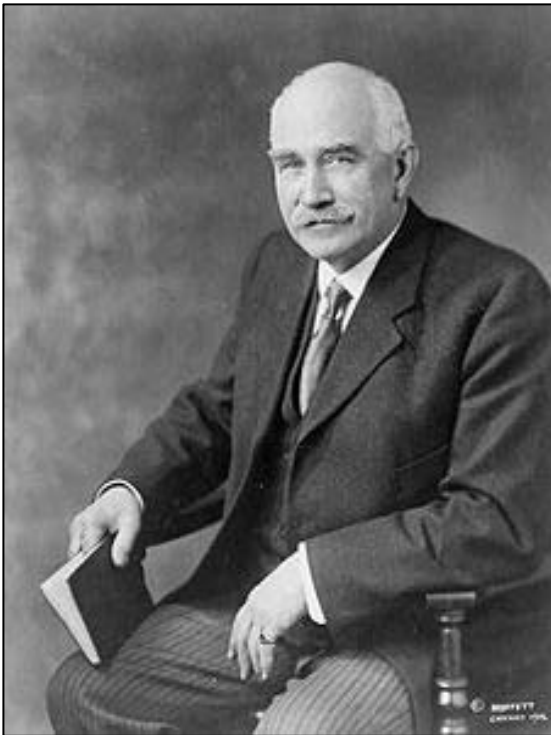


FIGURE 13. Judson Harmon, 42nd United States Attorney General
[Source: http://en.wikipedia.org/wiki/Judson_Harmon]

The principle of absolute sovereignty is premised on a simple but inflexible notion: a sovereign nation enjoys total power over the natural resources within its boundaries. Under this principle, an upstream state may, as a matter of international law, do what it wishes with a river in its territory, without considering the downstream consequences on another nation.

If water were simply a natural resource, like oil or coal or bauxite, most States could – and would – assert that they had an absolute territorial sovereign right to control its use in their territory. Most modern States, in fact, now make this assertion over virtually all natural resources. This principle – of absolute sovereignty – evolved primarily in reaction to the imperialist and colonialist practices of the 16th to 19th centuries, when natural resources were often physically removed, either in raw or refined form, and carried off for use or enjoyment elsewhere.

Today's legal regime is markedly different. A State's right to the use of its own resources – without interference from others – is now well-established and respected as a matter of international law. By 1962, for example, the General Assembly of the United Nations had adopted a resolution on the “permanent sovereignty” of nations “over natural resources.”³¹⁸ But water is a different type of resource: it moves, flows, runs the bank, and plays a far more essential role in our lives than many (if not all) other natural resources. It is one thing for a State

³¹⁸ See Permanent Sovereignty over Natural Resources, G.A. Res. 1803 (XVII), 17 U.N. GAOR Supp. (No.17) at 15, U.N. Doc. A/5217 (1962), available at http://www.unhchr.ch/html/menu3/b/c_natres.htm. Article 1 states: “The rights of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the people of the State concerned.”

to insist that it can do what it wishes with the coal within its borders and another matter to lay claim to an international river.

Yet at times States have invoked the doctrine of absolute territorial sovereignty to address disputes over water. The origins of the doctrine – at least in international water law – are often associated with a legal opinion rendered by U.S. Attorney General Judson Harmon in 1895 in a response to a request from Mexico for more water from the Rio Grande.³¹⁹ The “Harmon Doctrine,” as it came to be known, is often described as a now-discredited notion that the United States owed no duties under international law to Mexico and could divert as much as it pleased from the Rio Grande in the United States.³²⁰

But a closer examination of the Harmon Doctrine tells a more complex story. The legal issue of the United States’ legal obligations to Mexico came to Attorney General Harmon in a round-about way. The Foreign Minister of Mexico, Matias Romero, had written the U.S. Secretary of State, stating that the 1848 Treaty of Guadalupe Hidalgo, which had created the border between the two countries and guaranteed navigation, required the United States to leave water in the river for downstream use by Mexico. Diversions in upstream Colorado and New Mexico in the United States had all but depleted the river when it arrived at the Mexico border near El Paso, Texas, and Ciudad Juarez, Mexico.

Furthermore, Minister Romero argued, principles of international law formed an independent and sufficient basis for asserting the rights of Mexican inhabitants on the banks of the Rio Grande. “Their claim to the use of the water of the river is incontestable, being prior to that of the inhabitants of Colorado by hundreds of years, and, according to the principles of civil law, a prior claim takes precedence in case of dispute.”³²¹

Romero’s argument appeared to rest on the principle that the law of prior appropriations (e.g., Mexico was using the water first and had the right to continue doing so) applied across international boundaries, a claim that was unusual and perhaps unprecedented at that time.³²²

The U.S. Secretary of State referred the legal matter to Attorney General Harmon, who was asked to provide a legal opinion (not a policy analysis) regarding the legal obligations of the

³¹⁹ U.S. Attorney General Opinions, 21 Op. Att’y Gen. 274 (1895) (“*Harmon Opinion*”). Harmon was Attorney General between 1895-1897 under President Grover Cleveland. In 1908, Harmon was elected governor of Ohio on the Democratic ticket. He attempted to win the Democratic Party nomination for president in 1912, but failed. He died at age 81 in 1927.

³²⁰ MCCAFFREY, *supra* note 141, at 78-82. See also A. Dan Tarlock, *Safeguarding International River Ecosystems in Times of Scarcity*, 3 DENVER WATER L. REV. 231, 241 (2000), referring to the “notorious Harmon Doctrine.” See also HERBERT A. SMITH, *THE ECONOMIC USES OF INTERNATIONAL RIVERS* (P.S. King & Sons 1931) at 40-43 and 145-146.

³²¹ Letter from Minister Romero to U.S. Secretary of State Richard Olney, Oct. 21, 1895, described in MCCAFFREY, *supra* note 141, at 78-82.

³²² Even in the United States, federal courts had not yet addressed the implementation of the prior appropriations doctrine across state lines and would not do so for another two and a half decades. In 1922, the U.S. Supreme Court held that the prior use of water from an interstate river in Wyoming had precedence over a later use in Colorado from the same river. *Wyoming v. Colorado*, 259 U.S. 419 (1922).

United States to Mexico. The Secretary of State asked Harmon's opinion on two questions, regarding Mexican claims for monetary damages resulting from diversions of water from the upper Rio Grande in the United States:

- Are the provisions of Article VII (rights of navigation) of the 1848 Treaty of Guadalupe Hidalgo still in force?
- Do principles of international law, apart from any treaty, allow Mexico to assert that obstructions and diversions of water on the Rio Grande in the United States entitle Mexico to halt these activities and receive money damages for past actions?³²³

Harmon began his analysis by noting that five years earlier, Congress had passed a resolution authorizing the U.S. government to negotiate with Mexico "with a view to the remedy of certain difficulties" arising from the "taking of water for irrigation from the Rio Grande."³²⁴ The Secretary of State, acting on behalf of the President, was now in the process of attempting to negotiate a solution. But these negotiations, the Secretary of State had himself written Harmon, "cannot be intelligently conducted unless the legal rights and obligations of the two Governments . . . are first ascertained."³²⁵

The first legal question that Harmon sought to answer concerned the rights of navigation (and by implication the obligation of the United States to leave water in the river) under the 1848 Treaty and reinforced by an 1884 Convention between the two countries.

In his answer, Harmon acknowledged that Article VII of the 1848 Treaty "is still in force" but it applied only to portions of the river that served as the border between Texas and Mexico, and not the upstream parts solely within the United States.³²⁶

Harmon wrote:

Above the head of navigation, where the river would be wholly within the United States, different rules would apply and private rights exist which the [U.S.] Government could not control or take away save by the exercise of the power of eminent domain³²⁷

Mexico's claims therefore found no support in the 1848 Treaty, Harmon concluded.

On the second question – the legal argument of Mexico that international law imposed an obligation on the United States to halt diversions and allowed Mexico to seek damages for upstream diversions that harmed Mexico's agricultural lands – Harmon wrote:

³²³ *Harmon Opinion*, *supra* note 319, at 274.

³²⁴ *Id.* at 274.

³²⁵ *Id.* at 275.

³²⁶ *Id.*

³²⁷ *Id.* at 277-278.

So it is evident that what is really contended for [by Mexico] is a servitude which makes the lower country [Mexico] dominant and subjects the upper country [the United States] to the burden of arresting its development and denying its inhabitants the use of a provision which nature has supplied entirely within its own territory.³²⁸

Harmon acknowledged that nations were prohibited under international law from obstructing a river so that it overflowed in the territory of another nation or from permanently diverting the river, making it come out in a different place in the territory of another nation. But that was not the case here.³²⁹

Harmon said:

The fundamental principle of international law is the absolute sovereignty of every nation, as against all others, within its own territory....³³⁰

Harmon concluded:

It is not suggested [by Mexico] that the injuries complained of are or have been in any measure due to wantonness or wastefulness in the use of water or to any design or intention to injure. The water [in the Rio Grande] is simply insufficient to supply the needs of the great stretch of arid country through which the river, never large in the dry season, flows, giving much and receiving little.

The case presented is a novel one. Whether the circumstances make it possible or proper to take any action from considerations of comity is a question that does not pertain to this Department [the Attorney General]; but that question should be decided as one of policy only, because, in my opinion, the rules, principles and precedents of international law impose no liability or obligation upon the United States.³³¹

Although Harmon is roundly criticized now for his analysis, much of that critical commentary is written in an historical vacuum, as if he were answering the question now, rather than in 1895.³³²

³²⁸ *Id.* at 281.

³²⁹ *Id.* at 280.

³³⁰ *Id.* at 281.

³³¹ *Id.* at 283.

³³² Some commentators have detected the pernicious influence of the Harmon Doctrine in subsequent treaties. See, e.g., Gerald Graham, *International Rivers and Lakes: The Canadian-American Regime*, in, THE LEGAL REGIMES OF INTERNATIONAL RIVERS AND LAKES (Ralph Zacklin & Lucius Caflisch eds., 1981). Graham argues that Article II of the Boundary Waters Treaty of 1909 between the United States and Canada incorporates the Harmon Doctrine because it preserves the exclusive sovereignty of both countries over rivers and lakes in their respective territory (if they are not boundary waters). *Id.* at 8. But this analysis seems misplaced for two reasons. First, the point of Harmon's analysis was that *in the absence of a treaty*, the United States owed no legal obligation in 1895 under international law to leave water in the U.S. portion of the Rio Grande for downstream use by Mexico.

But many scholars support his assertion that international law at that time was not based on the law of prior appropriation – but rather on territorial sovereignty. Professor F.J. Berber, for example, cites a number of authorities who were of the view that territorial sovereignty was the prevailing international rule.³³³

Eleven years later, the United States and Mexico settled the dispute that Harmon had addressed: the two nations sought an equitable division of the water. The 1906 Rio Grande Treaty required the United States to provide 60,000 acre-feet of water each year to Mexico from behind the reservoir of the proposed Elephant Butte Dam in New Mexico.³³⁴

The United States also agreed to build at its own expense the canals to move water from the dam to the international boundary, a distance of approximately 100 miles (161 kilometers).³³⁵ In exchange, Mexico waived claims to water in the United States and to water in the Rio Grande where it serves as the border for 80 miles between El Paso, Texas, and Fort Quitman, Texas.³³⁶ But the treaty expressly stated that the United States did not recognize the prior legal claims of Mexico nor did the treaty create a precedent.³³⁷ The treaty was not based on the mandates of international law but on a voluntary, bilateral compromise.³³⁸

Harmon did not address what kind of treaty terms either the United States should voluntarily accept, if any. Second, Article II of the Boundary Waters Treaty allows for either nation to pursue claims for damages in the courts of the other nation should they be injured by the other nation's interference or diversion. That provision is the antithesis of the Harmon Doctrine and is one of the earliest examples of the "transboundary no harm rule," discussed in more detail in section 6.1 at page 146 of this report.

³³³ F.J. BERBER, *RIVERS IN INTERNATIONAL LAW* (Stevens & Sons Ltd. 1959) at 14-16. Berber, a professor of international law at the University of Munich, Germany, quotes a number of scholars to support the view that throughout much of the 1800s and early 1900s, territorial sovereignty was a common (but not the exclusive) paradigm for resolving international water disputes. Berber cites the opinion of other scholars, such as Kluber ("the independence of states shows itself above all in the free and exclusive use of prerogative water rights to their full extent"), *id.* at 15, and McKay ("waters flowing into boundary waters or across international waters, are, however, generally conceded to be entirely within the jurisdiction of the state through which they flow"), *id.* at 16.

³³⁴ *The 1906 Convention Between the United States and Mexico Concerning the Equitable Distribution of Waters of the Rio Grande*, U.S.-Mex., May 21, 1906. The treaty is also found at 34 Stat. 2953. Article I refers to a proposed storage dam near Engle, New Mexico. The dam was completed in 1916 by the U.S. Bureau of Reclamation and was named Elephant Butte.

³³⁵ *Id.* art. III. The delivery of the water "shall be made without cost to Mexico, and the United States agrees to pay the whole cost of storing the said quantity of water delivered to Mexico, [and] of conveying the same to the international line"

³³⁶ *Id.* art IV.

³³⁷ *Id.* art. V. "The United States, in entering into this treaty, does not thereby concede, expressly or by implication, any legal basis for any claims heretofore asserted which may be hereafter asserted by reason of any losses incurred by the owners of land in Mexico due or alleged to be due to the diversion of the waters of the Rio Grande within the United States; nor does the United States in any way concede the establishment of any general principle or precedent by the concluding of this Treaty. The understanding of both parties is that the arrangement contemplated by this treaty extends only to the portion of the Rio Grande which forms the international boundary . . . and in no other case."

³³⁸ Voluntary agreements over time may give rise to international customary law, but in 1906, the law of international water allocation was still in its infancy.

It is worth noting that several nations have argued for absolute territorial sovereignty in recent times.³³⁹ India, for example, asserted in the late 1950s with Pakistan that it unilaterally reserved its rights to extend the irrigation system on the Indus River within its borders.³⁴⁰

China offered a similar position during the debate in 1997 in the United Nations over the Convention on the Law of the Non-navigational Uses of International Watercourses, and it voted “no” against the proposed agreement. It was one of three States to do so, in part because the Convention “failed to reflect the principle of territorial sovereignty of a watercourse State. Such a State had indisputable sovereignty over a watercourse which flowed through its territory.”³⁴¹ Representatives from Turkey – another “no” vote on the U.N. Convention³⁴² – have made similar statements regarding their right to build large dams on the headwaters of the Tigris and Euphrates Rivers.

3.2 ABSOLUTE TERRITORIAL INTEGRITY: THE DOWNSTREAM STATE PREVAILS

Absolute territorial integrity is premised on the assumption that a downstream nation enjoys an absolute right to as much water as it can use. Under this theory, the upstream nation has a legal obligation to leave as much water in an international river as the downstream nation requires. This right ostensibly supports the downstream State’s remedy to compel the upstream nation to forego uses of the river that would harm the downstream State.

The problem with the absolute territorial integrity doctrine – like the absolute territorial sovereignty doctrine – was articulated succinctly in 1931 by Justice Oliver Wendell Holmes in *New Jersey v. New York*, a case that involved the Delaware River:

A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it. New York [the upstream state] has the physical power to cut off all the water within its jurisdiction. But clearly the exercise of such a power to the destruction of the interest of lower States could not be tolerated. And on the other hand equally little could New Jersey [the downstream state] be permitted to require New York to give up its power altogether in order that the river must come down to it undiminished. Both

³³⁹ The doctrine of absolute territorial sovereignty carries with it the implication that States are free to impose environmental consequences from their use of natural resources on other states. See Stephen C. McCaffrey, *Water, Water Everywhere, But Too Few Drops to Drink: The Coming Fresh Water Crisis and International Environmental Law*, 28 DENV. J. INT’L L. & POL’Y 325, 327, 328 (2000). See also Shashank Upadhye, *The International Watercourse: An Exploitable Resource for the Developing Nation Under International Law*, 8 CARDOZO J. INT’L & COMP. L. 61 (2000).

³⁴⁰ See discussion of the *Indus Waters Treaty* in section 2.4.1 at page 50 of this report.

³⁴¹ See comments of Gao Feng (China), *quoted in* Press Release, General Assembly, General Assembly Adopts Convention On Law Of Non-Navigable Uses Of International Watercourses, GA/9248 (May 21, 1997), available at www.un.org/News/Press/docs/1997/19970521.ga9248.html.

³⁴² The third “no” vote on the U.N. Convention was Burundi.

States have real and substantial interests in the River that must be reconciled as best they may.³⁴³

Both doctrines – absolute territorial sovereignty and absolute territorial integrity – as their names imply, are inflexible: they allow for little compromise. “It’s mine and I want to use it” is not a position that encourages basin-wide planning or innovative mechanisms to share water.

3.3 THE DOCTRINE OF EQUITABLE AND REASONABLE UTILIZATION

A more flexible approach to water allocation is based on the principle of “equitable and reasonable utilization.” This doctrine emphasizes compromise and fairness.

But what does it mean to say that “equity” is one of the important principles of international law? Equity is an elusive concept. An upstream state may believe its diversion is “equitable” and a downstream state may still object on the grounds that the action is not equitable.

The doctrine of “equitable and reasonable utilization” is an intentionally loose approach to the sharing of resources; it allows States (and courts) to balance different and potentially competing criteria, such as population, prior use, expectations, efficiency, and environmental impacts. The “right” of a nation to the equitable and reasonable use of a river does not guarantee it a specific percentage of water. There is no rigid formula. If a river flows through two countries, for example, each State is not entitled to withdraw half (or some other fixed percentage).

The origins of the doctrine can be traced to opinions in national courts in Germany, Switzerland, and the United States.³⁴⁴ But it is in the United States where there is the largest body of law.³⁴⁵

³⁴³ *New Jersey v. New York*, 283 U.S. 336, 342-343 (1931).

³⁴⁴ Professor McCaffrey cites two cases that were also influential in establishing the principle of equitable allocation of rivers. In 1878, a company in the Canton of Zurich, Switzerland, built a dam to produce power for its factory. Downstream mill owners in the Canton of Aargau complained that the dam restricted the flow of water and harmed their businesses. The Swiss Federal Court concluded that “a rule of international law derived from good neighborliness applies. According to that rule, the exercise of a right may not affect the right of a neighbor. The two rights are equal, and, in the event of a conflict, a reasonable arrangement has to be found on the basis of relevant circumstances.” MCCAFFREY, *supra* note 141, at 252, citing *Aargau v. Zurich*, Entsch. Des Schweizerischen Bundesgerichts (1878), vol. IV, at 34. The second case involved a conflict on the upper Danube River. In 1927, two German states (Wurttemberg and Prussia) sued the state of Baden, seeking relief in German courts from a phenomenon called the “sinking of the Danube.” The Danube River flows from the Black Forest toward Baden and then Wurttemberg, but the river lost enough flow in certain times of the year that it disappeared (“sinks”) under the bed and flowed into Lake Constance and the Rhine River Basin. The court enjoined Baden from building works that increased the sinking of the river and similarly enjoined Wurttemberg from building works that attempted to prevent the natural flow of the Danube River into the Rhine River Basin. “The exercise of sovereign rights by every State is limited by the duty not to injure the interests of other members of the international community,” the court concluded. *Wurttemberg and Prussia v. Baden* (The Donauversinkung Case), *German Staatsgerichtshof*, June 18, 1927, *Entscheidungen des Reichsgerichts in Zivilsachen*, vol. 116, Appendix at 18-45. See MCCAFFREY, *supra* note 141 at 241-243, for an analysis of the case.

³⁴⁵ Professor McCaffrey writes: “Indeed, it seems likely that in large measure the doctrine of equitable utilization owes its very existence, as well as its fundamental meaning, to that body of decisional law.” MCCAFFREY, *supra* note 141, at 245.

3.3.1 The U.S. Supreme Court's Equitable Apportionment Doctrine

The U.S. Supreme Court cases on equitable apportionment help form the foundation of the doctrine of “equitable and reasonable utilization” in international law.³⁴⁶ The decisions began in 1902 and continue to the present. They address disputes between states within the United States over interstate water allocation. Because the Supreme Court has original and exclusive jurisdiction over disputes between states,³⁴⁷ it has developed a set of common law principles to guide it in resolving interstate water problems.

The first dispute over an interstate river was precipitated by Colorado's diversions of the Arkansas River before it flowed into Kansas. Colorado, espousing absolute sovereignty, asserted that the Court had no power to resolve the dispute and that it could divert as much water as it pleased under its own laws. The Supreme Court summarized Colorado's arguments this way:

The State of Colorado contends that, as a sovereign and independent state, she is justified . . . in consuming for beneficial purposes all the waters within her boundaries; and that, as the sources of the Arkansas River are in Colorado, she may absolutely and wholly deprive Kansas and her citizens of any use of or share in the waters of that river.³⁴⁸

The Supreme Court rejected Colorado's argument. States, as sovereign entities, have a right to petition the Court, their only practical forum in which to seek relief, the Court concluded:

Bound hand and foot by the prohibitions of the Constitution, a complaining state can neither retreat, agree, or fight with its adversary without the consent of Congress. A resort to judicial power is the only means left³⁴⁹

Subsequent opinions reiterated the principle that states have a right to bring interstate water disputes to the Supreme Court, where the justices will balance competing interests.³⁵⁰

The most recent Supreme Court case concerned the Vermejo River, a small, non-navigable tributary to the Pecos River that runs through Colorado and New Mexico.³⁵¹ New Mexico, the

³⁴⁶ Most commentators consider the terms “equitable apportionment” and “equitable utilization” to mean the same thing. MCCAFFREY, *supra* note 141, at 396: “While the doctrine developed by the United States Supreme Court is styled ‘equitable apportionment’ and deals largely with the allocation of water quantities between U.S. states, there are no significant differences between that doctrine and the broader principle of equitable utilization, insofar as allocation of shared water supplies is concerned.”

³⁴⁷ U.S. CONST., art. III, § 2: “The judicial Power shall extend . . . to Controversies between two or more states In all Cases . . . in which a State shall be Party, the Supreme Court shall have original jurisdiction.” The Judiciary Act of 1789 gave the Court *exclusive jurisdiction* to hear these types of disputes.

³⁴⁸ *Kansas v. Colorado*, 185 U.S. 125, 143 (1902).

³⁴⁹ *Id.* at 144, quoting *Rhode Island v. Massachusetts*, 12 Pet. 726, 9 L.Ed. 1261 (1832).

³⁵⁰ Since these early cases, the Supreme Court has considered equitable apportionment cases on seven other rivers. See section 7.1.4 of this report at page 156 for a table of the cases with citations.

³⁵¹ The Pecos River flows into the Rio Grande.

downstream state, asserted superior rights based on prior use of the Vermejo River to an extent wholly preemptive of the river's proposed new use in Colorado, even though three-quarters of the water in the Vermejo originated in Colorado. The Supreme Court's special master recommended some divestiture of New Mexico's prior use to enable new uses in Colorado, the amount of which should be established on the basis of equitable principles. The Supreme Court upheld the special master's recommendation, but remanded the case back to the special master on the basis that Colorado had not demonstrated factors essential to make the case for the necessary divestiture in New Mexico.³⁵²

The Supreme Court said it would consider "all the relevant factors," including physical and climatic conditions, the consumptive use of the water, the character and rate of return flows, the extent of established uses, the availability of storage, the practical effect of wasteful uses on downstream areas and the damage to the upstream areas as compared with the benefits to downstream areas if a limitation is imposed. Its aim in this process is to secure a just and equitable apportionment "without quibbling over formulas."³⁵³ Colorado ultimately did not make the showing the Supreme Court desired, and it subsequently denied Colorado's equitable claim.³⁵⁴

The Supreme Court has not spoken on this matter since the 1984 case on the Vermejo River. But the Court's approach has been cited favorably by international law scholars and used as the foundation for an effort to adopt "equitable and reasonable utilization" criteria for international rivers and lakes around the world.

3.3.2 The Helsinki Rules

In 1966, the International Law Association ("ILA"), a voluntary association of legal experts whose members specialize in areas of international public law, met in Helsinki, Finland, and published the first set of guidelines that addressed equitable usage of international rivers.³⁵⁵ These "rules," advisory in nature, are called the "Helsinki Rules."³⁵⁶ They were the first attempt to create global standards for nations to use in apportioning rivers and lakes that cross the border or that form the border between two or more countries.

The Helsinki Rules define an "international drainage basin" as "a geographic area extending over two or more States determined by the watershed limits of the systems of waters, including surface and underground waters, flowing into a common terminus."³⁵⁷

³⁵² *Colorado v. New Mexico*, 459 U.S. 176 (1982).

³⁵³ *Id.* at 183, quoting *New Jersey v. New York*, 283 U.S. 336, 343 (1931).

³⁵⁴ *Colorado v. New Mexico*, 467 U.S. 324 (1984).

³⁵⁵ For the home page of the International Law Association, see www.ila-hq.org.

³⁵⁶ The ILA published *The Helsinki Rules on the Uses of the Waters of International Rivers* at 52 INT'L. L. ASSN. 484 (1966) ("*Helsinki Rules*"), available at http://www.internationalwaterlaw.org/intldocs/helsinki_rules.html.

³⁵⁷ *Helsinki Rules* art. II.

According to the Helsinki Rules, “each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.”³⁵⁸ The Helsinki Rules provide that a basin State may not be denied the “present reasonable use of waters” in order to reserve a future use of those waters for another State.³⁵⁹ Furthermore, States should use “all the relevant factors” in apportioning international rivers and lakes, including eleven (11) enumerated factors:³⁶⁰

- The geography of the basin, including the extent of the drainage basin in each basin state;
- The hydrology of the basin, including the contribution of water by each basin state;
- The climate;
- The past and existing utilization of basin waters;
- The economic and social needs of the basin;
- The population that depends on the waters of the basin in each state;
- The comparative costs of alternative means of satisfying the economic and social needs of each basin state;
- The availability of other resources;
- The avoidance of unnecessary waste in the utilization of waters of the basin;
- The practicability of compensation to one or more co-basin states as a means of adjusting (reducing) conflicts among users; and
- The degree to which the needs of the basin state may be satisfied without causing substantial injury to another state in the basin.

The Helsinki Rules do not establish a priority of uses. “A use or category of uses is not entitled to any inherent preference over any other use or category of uses.”³⁶¹ The Helsinki Rules address pollution, but only in a limited way: they require a State to “prevent any new form of water pollution or any increase in the degree of existing water pollution in an international drainage basin which would cause substantial injury in the territory of a co-basin State,”³⁶² and to take reasonable measures to abate this pollution.

Finally, the Helsinki Rules create a general framework for the resolution of disputes by listing a series of mechanisms that a State can invoke, i.e., from giving notice to the other State of its objections to negotiation, to assistance by a third State or organization, then to creating a joint commission of inquiry or an ad hoc conciliation commission, and finally to submitting the dispute to an arbitral tribunal or the International Court of Justice.³⁶³

³⁵⁸ *Id.* art. IV.

³⁵⁹ *Id.* art. VII.

³⁶⁰ *Id.* Art. V.

³⁶¹ *Id.* art. VI.

³⁶² *Id.* art. X.

³⁶³ *Id.* art. XXXVI-XXXIV.

3.3.3 The U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses

In 1970, the U.N. General Assembly requested that the International Law Commission (“ILC”) produce a set of draft rules on the equitable uses of international watercourses, based on the Helsinki Rules of 1966. Unlike the ILA, which is a voluntary body of scholars, the ILC is an official United Nations organization whose job is to codify customary law and draft new treaties.

Twenty-seven years later, the ILC finished its work and prepared a new treaty: the 1997 U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses, which the U.N. General Assembly approved on May 21, 1997, by a vote of 103-3.³⁶⁴ The United States voted “yes,” as did its neighbors, Canada and Mexico. China, Turkey and Burundi voted “no.” Twenty-seven nations, including some of the important riparian nations in the world, abstained.³⁶⁵ In some basins, both the upstream and the downstream countries who are at odds over “who gets what” from the river did not vote. India and Pakistan, for example, who share the Indus River Basin, both abstained. Two nations on the Rhine River, Belgium and France, also abstained. Egypt, the downstream riparian on the Nile, abstained as well.

The U.N. Convention defines a watercourse as “a system of surface and ground waters constituting by virtue of their physical relationship a *unitary whole* and normally flowing into a common terminus.”³⁶⁶ An “international watercourse” is a “watercourse, parts of which are situated in different States.”³⁶⁷

The U.N. Convention clearly adopts a “system” approach to allocation and management problems. It applies to both rivers and lakes, as did the Helsinki Rules, and includes all of the river’s tributaries that flow into the river. But the definition of watercourse is not identical to the Helsinki Rules in one critical aspect: the treatment of groundwater. The U.N. Convention, unlike the Helsinki Rules, requires that surface waters and ground waters form a “unitary whole” in order to be considered a watercourse. If, however, the groundwater supply is not part of a “unitary whole” with surface water, then it would not form an international watercourse.³⁶⁸

³⁶⁴ *United Nations Convention on the Law of the Non-navigational Uses of International Watercourses*, 36 I.L.M. 700 (1997) (“*U.N. Convention*”), available at http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf.

³⁶⁵ In alphabetical order, the nations that abstained are: Andorra, Argentina, Azerbaijan, Belgium, Bolivia, Bulgaria, Colombia, Cuba, Ecuador, Egypt, Ethiopia, France, Ghana, Guatemala, India, Israel, Mali, Monaco, Mongolia, Pakistan, Panama, Paraguay, Peru, Rwanda, Spain, Tanzania and Uzbekistan.

³⁶⁶ *U.N. Convention* art. 2(a) (emphasis added).

³⁶⁷ *Id.* art. 2(b).

³⁶⁸ In many places, the movement of groundwater is not understood as well as surface water. If a downstream State were to argue that groundwater flowing across its border was part of an international watercourse, as defined in the *U.N. Convention*, it must be able to show that the groundwater forms a “unitary whole” with surface water. This is no simple scientific task and may require a technical understanding of groundwater and surface water movement in the upstream State as well as the downstream State.

The U.N. Convention adopts the “equitable and reasonable utilization” approach and standard in allocating international watercourses.³⁶⁹ The Convention states:

Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits there from, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse.³⁷⁰

The U.N. Convention imposes obligations on nations to cooperate with each other in their use of their shared rivers or lakes, to share data on items such as hydrology, meteorology and ecological matters, and to protect the watercourse:

Watercourse States shall participate in the use, development and protection of an international watercourse in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention.³⁷¹

The U.N. Convention requires that States consider “all relevant factors and circumstances” in determining the use of a shared river or lake, and lists seven specific criteria:³⁷²

- Geographic, climate, ecological, and other factors;
- The social and economic needs of the States;
- The population dependent on the watercourse in each State;
- The effects of the uses of the watercourse in one State on the others;
- Existing and potential uses of the watercourse;
- Conservation, protection, development and economy of use of the watercourse and the costs of measures taken to that effect; and
- The availability of alternatives of comparable value to a particular planned or existing use.

The U.N. Convention, like the Helsinki Rules (1966) that preceded them, does not prioritize those factors or rank them. “In the absence of an agreement or custom to the contrary, no use of

³⁶⁹ *U.N. Convention* art 5(1). The Convention changed the term slightly from the Helsinki Rules. The Helsinki Rules referred to “reasonable and equitable share” of the waters, while the U.N. Convention referred to “equitable and reasonable utilization.” See Helsinki Rules art. IV. This shift from “share” to “utilization” comports with the more modern notion of ownership-in-common, as opposed to divisible shares of a river or lake.

³⁷⁰ *U.N. Convention* art. 5(1).

³⁷¹ *Id.* art. 5(2).

³⁷² *Id.* art. 6.

an international watercourse enjoys inherent priority over other uses.”³⁷³ But in the event of a conflict over uses, special regard shall be given to requirements of “vital human needs.”³⁷⁴

The U.N. Convention also imposes an obligation on signatory States not to cause significant harm to other States:

- Watercourse State shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States.
- Where significant harm nevertheless is caused to another watercourse State, the State whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of articles 5 and 6 [equitable and reasonable utilization], in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.³⁷⁵

This article is usually interpreted to mean that the “no harm” rule is subordinate to the “equitable and reasonable utilization” principle. Furthermore, the article does not contain a requirement that an upstream State halt activities that harm a downstream State. Rather, this article attempts to mitigate upstream activities. The Convention does not empower a downstream State, for example, to forbid categorically certain upstream activities in another State that cause pollution of a river.

Finally, it is important to note that the U.N. Convention does not supplant prior agreements, unless the States expressly agree:

In the absence of an agreement to the contrary, nothing in the present Convention shall affect the rights or obligations of a watercourse State arising from agreements in force for it on the date on which it became a party to the present Convention.³⁷⁶

The U.N. Convention creates a series of progressive mechanisms to resolve disputes, from informal to more formal. Ultimately, the parties may seek binding arbitration or refer the matter to the International Court of Justice.³⁷⁷

³⁷³ *Id.* art. 10(1).

³⁷⁴ *Id.* art. 10(2).

³⁷⁵ *Id.* art. 7.

³⁷⁶ *Id.* art. 3(1). Suppose, for example, that the United States and Mexico were to ratify the *U.N. Convention* (something that has not happened to date). Under this provision, Mexico could not assert that the 1944 Mexican Water Treaty was inequitable, and it was therefore entitled to more water from the Colorado River. Nor could the United States make a similar argument on the Rio Grande, where water is apportioned by a 1906 Treaty and the 1944 Mexico Water Treaty. Under Article 3(1) of the *U.N. Convention*, the prior agreements have full force.

³⁷⁷ *Id.* art. 33.

When 35 countries have ratified the Convention, it will enter into force.³⁷⁸ Then, and only then, will it become “enforceable” by and upon on the nations that have signed the agreement. As of this writing, only 16 countries have ratified the U.N. Convention.³⁷⁹ The North American nations – the United States, Canada and Mexico – have not yet ratified the Convention.

China’s opposition to the U.N. Convention is noteworthy because China is the world’s most populous country and it shares international waterways with Russia, North Korea, and many Southeast Asian nations. China’s opposition is, in reality, a significant modern re-assertion of the absolute territorial sovereignty approach. China apparently believes that the U.N. Convention puts too much emphasis on equitable utilization and does not defer sufficiently to the sovereignty, power, or geopolitical position of the upstream State.³⁸⁰ The opposition of Turkey is also significant because it controls the headwaters of the Tigris-Euphrates River.

3.3.4 The Berlin Rules

In 2004, the International Law Association met in Berlin, Germany, to approve a new set of water allocation rules. The “Berlin Rules” were the outcome. The Berlin Rules seek to update and amplify the Helsinki Rules of 1966, as well as the U.N. Convention of 1997. The Berlin Rules state that most of the principles incorporated in the document are “firmly based on generally recognized customary international law.”³⁸¹

The Berlin Rules are broader in their application than either the Helsinki Rules or the U.N. Convention. They apply to all aquifers, even if they are not connected to surface water or recharged by rivers.³⁸² Some of the Berlin Rules apply to all waters, not just transboundary or international waters, and they require states to use integrated management and sustainable management of domestic waters.³⁸³

The Berlin Rules are controversial because they reach into the spheres of domestic law, traditionally viewed as beyond the reach of international rules and decisions.³⁸⁴ Nonetheless, the

³⁷⁸ *Id.* art. 36. Ratification by a regional economic integration organization does not count toward the 35-nation requirement.

³⁷⁹ The 16 nations (in alphabetical order) are: Finland, Germany, Hungary, Iraq, Jordan, Lebanon, Libya, Namibia, the Netherlands, Norway, Portugal, Qatar, South Africa, Sweden, Syria and Uzbekistan. The United States voted to approve the Convention in the General Assembly but has not signed the treaty.

³⁸⁰ See comments of Gao Feng (China), *quoted in* Press Release, General Assembly, General Assembly Adopts Convention On Law Of Non-Navigable Uses Of International Watercourses, GA/9248 (May 21, 1997), *available at* www.un.org/News/Press/docs/1997/19970521.ga9248.html.

³⁸¹ See *Report of Water Resources Law Committee of the ILA, listed in* INTERNATIONAL LAW ASSOCIATION, REPORT OF THE SEVENTY-FIRST CONFERENCE, 335 (2004) (“Berlin Rules”), www.ila-hq.org/en/committees/index.cfm/cid32.

³⁸² *Id.* art. 36.

³⁸³ *Id.* arts. 6 & 7.

³⁸⁴ See ILA Berlin Conference 2004 - Water Resources Committee Report Dissenting Opinion, *available at* http://www.internationalwaterlaw.org/intldocs/ila_berlin_rules_dissent.html.

Berlin Rules have their supporters. “The Berlin Rules set forth a clear, cogent, and coherent summary of the relevant customary international law, incorporating the experience of the nearly four decades since the Helsinki Rules were adopted,” according to Professor Joseph Dellapena, rapporteur for the group.³⁸⁵

3.4 INTERNATIONAL WATER ALLOCATION TODAY

What then is the current status of the law of international water allocation? Where treaties exist, the answer is relatively easy. Water allocation treaties are just like other agreements that are binding on the parties. If a State that is a party to a water allocation treaty wants more water, or better pollution controls on the portion of a river in an adjacent state, it needs to renegotiate the treaty, much like private parties would renegotiate a contract if it was outdated or inadequate for their needs.

Where there is no treaty, however, allocation will be governed, if at all, by “softer” international law. Viewed from a perspective common in the United States – that a “law” is a rule that is enforceable by a court – there is little actual “law” in “soft law”. Thus, if a downstream State believes an upstream State should share more water (but the downstream state has not done so), the downstream State is in a precarious legal position. The downstream State can plead, it can cajole, it can try to generate favorable international press, but, in the end, the two States need to sign an agreement.

The Helsinki Rules and the Berlin Rules, promulgated by the International Law Association, provide no official mandate for resolving this type of dispute. These “rules” are not rules in the conventional sense of the term. They are not binding on states, organizations, or private entities (corporate or individual). Instead, the ILA “rules” are guidelines or standards to be consulted and emulated, if nations wish. To the extent they are followed voluntarily by nations (in the absence of a treaty), they are evidence of customary law.

The primary significance of the Helsinki Rules is that they served as the basis for the 1997 U.N. Convention on the Law of the Non-navigational Uses of International Watercourses. Even though the Convention is not in force, it remains the only treaty approved by the U.N. General Assembly that contains principles of water allocation – the criteria that nations should use – in dividing up international rivers and lakes. The U.N. Convention, however, has only attained 16 nation signatories to date.³⁸⁶ Although it is not yet an enforceable treaty, the U.N. Convention is widely regarded as the most current and respected statement of the law on this subject.

³⁸⁵ Joseph Dellapenna, *The Berlin Rules on Water Resources: The New Paradigm for International Water Law* at 6, available at www.ualg.pt/5cigpa/comunicacoes/Berlin%20Rules%20Summary.doc.

³⁸⁶ This important fact is sometimes omitted, even from otherwise thorough texts. *See, e.g.*, the introduction to the ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS, published in 2002 by the U.N. Environment Programme. The introduction refers to the need to mitigate the likelihood of conflict on the world’s international river and lake basins. The text asserts that principles of international watercourse management have been “codified in the 1997 United Nations Convention” *Id.* at 1. This statement, as we have seen, is only partially accurate. The Convention attempted to codify certain principles but unless the necessary number of nations ratifies the agreement, it creates no binding legal obligations. Whether the Convention codifies customary law is a more complicated question that requires an analysis of whether individual States have accepted the provisions of the Treaty as evidence of law, even though they have not ratified the Convention.

Assertions of absolute sovereignty over water, as seen by China's statements in opposing adoption of the U.N. Convention, are exceptions.

But even if the States in question have ratified the U.N. Convention, it is so general in nature that it is not clear exactly what outcome would result if a downstream State were to litigate the issue. And where would it do so?

The next chapter describes the working of the International Court of Justice, and the sources of law it will examine in resolving disputes brought by nations.

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CHAPTER 4

THE INTERNATIONAL COURT OF JUSTICE

In this chapter:

- 4.1 The Role of the U.N. Charter
- 4.2 Overview of the Court
- 4.3 Jurisdiction
- 4.4 Enforcement of the Court's Opinions
- 4.5 Sources of Law
 - 4.5.1 Treaties
 - 4.5.2 Customary Law
 - 4.5.3 General Principles of Civilized Nations
- 4.6 The Use of Judicial Decisions and Teachings

4.0 THE INTERNATIONAL COURT OF JUSTICE

The International Court of Justice (“the Court”) is the principal judicial organ of the United Nations and was created in 1946. The Court, sometimes referred to as “the World Court,” is located at the Peace Palace in The Hague, Netherlands.³⁸⁷

4.1 THE ROLE OF THE U.N. CHARTER

The U.N. Charter is the “constitution” for the organization. The Charter created a General Assembly open to all members, with one vote per member.³⁸⁸ There are 192 members at present.

The Charter also created a Security Council whose duties are to maintain peace and security, including the establishment of peacekeeping operations, the imposition of international sanctions, and the authorization of military action.³⁸⁹ The Security Council is composed of five (5) permanent members and ten (10) temporary members selected by the General Assembly based on “regional blocs” that serve for two-year terms.³⁹⁰



FIGURE 14. UN Security Council Chamber in New York
[Source: http://en.wikipedia.org/wiki/United_Nations_Security_Council]

The five permanent members of the Security Council are:

³⁸⁷ For the home page of the International Court of Justice, see www.icj-cij.org. The Court is sometimes referred to by the acronym “ICJ.”

³⁸⁸ U.N. Charter, ch. IV, arts. 9-22.

³⁸⁹ *Id.* ch. V, art. 23-32.

³⁹⁰ The regional blocs are as follows: Africa chooses three (3) members; Latin America, the Caribbean, Asian, and Western European blocs each choose two (2) members; and the Eastern European bloc selects one (1) member. One of the members is always an Arab nation, either from Asia or Africa.

- China,
- France,
- Russia,
- United Kingdom, and
- the United States.

The temporary members of the Security Council (as of 2008) are:

- Belgium,
- Burkina Faso,
- Costa Rica,
- Croatia,
- Indonesia,
- Italy,
- Libya,
- Panama,
- Vietnam, and
- South Africa.

The Charter provides that the permanent members of the Security Council have veto power over any resolution, even if it has received a majority of votes.³⁹¹

The Charter requires that parties to a dispute first attempt to resolve the problem by peaceful means:

The parties to any dispute, the continuance of which is likely to endanger the maintenance of international peace and security, shall, first of all, seek a solution by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice.³⁹²

The Charter encourages nations to take disputes to the Court, but they may seek solutions in other tribunals.³⁹³ The Charter also states that the Court shall function according to the terms of the Statute of the International Court of Justice (“ICJ Statute”), which is contained as an annex to the Charter.³⁹⁴ The ICJ Statute contains the Court’s basic rules. All members of the U.N. are *ipso facto* parties to the Statute.³⁹⁵

³⁹¹ For a complete list of resolutions approved by the Security Council since 1946, see www.un.org/sc.

³⁹² U.N. Charter art. 33.

³⁹³ *Id.* art. 95.

³⁹⁴ *Id.* art. 92. For a copy of the Statute of the International Court of Justice, see <http://www.icj-cij.org/documents/index.php?p1=4&p2=2&p3=0>. The ICJ Statute is also found at 59 Stat. 1031, and T.S. No. 993.

³⁹⁵ *Id.* art. 93.

4.2 OVERVIEW OF THE COURT

The Court has two fundamental roles:

- It can settle legal disputes (“contentious issues”) between nations that agree to submit to the Court’s jurisdiction. At present, there are 130 multilateral treaties and 180 bilateral treaties that provide for disputes to be settled by the Court.³⁹⁶
- It can issue advisory opinions on legal matters in response to questions posed by the United Nations or its agencies.³⁹⁷ Only U.N. organizations can submit requests for advisory opinions.³⁹⁸

The Court has no jurisdiction to try individuals, corporations, or non-government entities. It is a civil, not a criminal court.

Hearings before the Court are public unless the parties request a private hearing.³⁹⁹ Its deliberations are private.⁴⁰⁰ The Court publishes an annual report, listing its cases, budget, and other essential information.⁴⁰¹ Opinions are published in English and French, the Court’s two official languages.⁴⁰²

³⁹⁶ For a complete list of treaties granting jurisdiction to the International Court of Justice, *see* its web site at www.icj-cij.org.

³⁹⁷ The following U.N. organizations are authorized to request advisory opinions from the Court on legal questions arising within the scope of their activities:

- International Labour Organization,
- Food and Agriculture Organization,
- United Nations Educational, Scientific and Cultural Organization (“UNESCO”),
- International Civil Aviation Organization,
- World Health Organization,
- World Bank,
- International Finance Corporation,
- International Development Association,
- International Monetary Fund,
- World Meteorological Organization,
- International Maritime Organization,
- World Intellectual Property Organization,
- International Fund for Agricultural Development,
- United Nations Industrial Development Organization, and
- International Atomic Energy Agency.

³⁹⁸ For a complete list of the advisory opinions issued by the International Court of Justice, *see* www.icj-cij.org/docket/index.php?p1=3&p2=4.

³⁹⁹ ICJ Statute art. 54.

⁴⁰⁰ *Id.*

⁴⁰¹ *See* the home page of the International Court of Justice, www.icj-cij.org.

⁴⁰² ICJ Statute art 39(1).

The Statute describes the legal disputes that may be submitted to it for resolution.⁴⁰³

- The interpretation of a treaty;
- Any question of international law;
- The existence of any fact which, if established, would constitute a breach of an international obligation; and
- The nature or extent of the reparation to be made for the breach of an international obligation.

The Court's rulings are binding only on the parties and not on others.⁴⁰⁴ In theory, the Court opinions do not create precedent but as a practical matter, the decisions have precedential value because over time they create a body of customary law, observed by nations, which becomes enforceable.

The Court is composed of 15 judges, elected for nine-year terms by the U.N. General Assembly and the Security Council.⁴⁰⁵ Judges are eligible for re-election. More than one judge may not come from the same State.⁴⁰⁶ One-third of the judges are elected every three years.

The Court generally represents the principal legal systems from around the world. The membership comes from the following regions: Africa (3); Latin America and the Caribbean (2); Asia (3); Western Europe and other states (including the United States)(5); and Eastern Europe (2). Members of the Court may participate in and vote on disputes involving their own country.⁴⁰⁷ The judges receive an annual salary of US \$170,080, with a special supplementary allowance of US \$15,000 for the President of the Court (comparable to the Chief Justice of the U.S. Supreme Court), who is elected by his/her fellow judges for a three-year term. The current Court president is Dame Rosalyn Higgins from the United Kingdom.⁴⁰⁸ The current vice president is Awn Shawkat Al-Khasawneh from Jordan.

The Court has an administrative arm, called a Registry (similar to the Clerk's Office in the United States). The Court is located at The Hague and is the only major organ of the U.N. that is not in New York.

⁴⁰³ *Id.* art. 36.

⁴⁰⁴ *Id.* art. 59.

⁴⁰⁵ *Id.* arts. 3 and 13.

⁴⁰⁶ *Id.* art. 13.

⁴⁰⁷ *See, e.g.*, the opinion of Judge Geza Herczegh (Hungary) in the case of the Gabcikovo-Nagymaros Project (Hungary/Slovakia) (1997), or the opinion of Judge Stephen Schwebel (U.S.) in the case of *Military and Paramilitary Activities (Nicar. v. U.S.)*, 1986 I.C.J. 14 (June 27).

⁴⁰⁸ For a complete list of the Court's members since 1945, *see* www.icj-cij.org/court/index.php?p1=1&p2=2&p3=2.

TABLE 45. Current Members of the International Court of Justice 2008.

Country:	Name:	Year Elected:
China	Shi Jiuyong	1994
France	Ronny Abraham	2005
Germany	Bruno Simma	2003
Japan	Hisashi Owada	2003
Jordan	Awn Shawkat Al-Khasawneh	2000
Madagascar	Raymond Ranjeva	1991
Mexico	Bernardo Sepulveda-Amor	2006
Morocco	Mohamed Bennouna	2006
New Zealand	Sir Kenneth Keith	2006
Russia	Leonid Skotnikov	2006
Sierra Leone	Abdul G. Koroma	1994
Slovakia	Peter Tomka	2003
United Kingdom	Dame Rosalyn Higgins	1995
U.S.A.	Thomas Buergenthal	2000
Venezuela	Gonzalo Parra-Aranguren	1996

Source: The International Court of Justice web site, www.icj-cij.org/court/index.php?p1=1&p2=2&p3=1.

4.3 JURISDICTION

The Court does not have compulsory jurisdiction over nations. As a result, the Court must always ask: “Do we have jurisdiction, and if so, is it limited?”

Professors Thomas Buergenthal (now the U.S. member on the Court) and Professor Sean Murphy summarized the legal system this way:

Viewed in terms of law-making, international law is a primitive legal system. The international community lacks a constitution that can be viewed as a fundamental source of law. There exists no institution comparable to a national legislature with power to promulgate laws of general applicability, nor administrative agencies to produce regulations. Moreover, the International Court of Justice . . . lacks plenary jurisdiction over disputes arising under international law, and the decisions of the Court are legally binding only on the parties to the dispute. They have no precedential value in a formal sense because *stare decisis* is not a rule of international law.⁴⁰⁹

⁴⁰⁹ BUERGENTHAL & MURPHY, *supra* note 27, at 18-19.

Buergethal and Murphy describe the importance of jurisdictional issues:

The doors of the Court are open to a state which is a party to its Statute – that is what adherence to the Statute signifies. But whether the Court may hear a case filed by a state party to the Statute against another state party depends upon whether both [parties] have *in addition* accepted the tribunal's jurisdiction.⁴¹⁰

According to Buergethal and Murphy, the threshold question for the Court is always:

[W]hether its jurisdiction has been accepted by the states parties to the dispute. States are free, as a rule, to accept jurisdiction either before a dispute has arisen or thereafter, to limit their acceptance to certain types of disputes, and to attach various conditions to the acceptance. Jurisdiction issues consequently always loom large in the work of international courts.⁴¹¹

There are three ways for States to accept the Court's jurisdiction:⁴¹²

1. **Specific terms of a treaty.** States may have signed a treaty (bilateral or multilateral) on a certain subject (such as boundaries, oil drilling, genocide, etc.) that expressly gives the Court authority to settle disputes arising under the treaty.⁴¹³
2. **An ad hoc agreement.** States may accept the Court's jurisdiction by signing an ad hoc agreement notifying the Court that they have mutually referred a specific dispute to it, pursuant to a special agreement called a "*compromis*."⁴¹⁴ The parties will define the nature of the dispute and the legal questions they wish the Court to decide.
3. **A unilateral declaration of optional compulsory jurisdiction.** States may recognize the Court's jurisdiction by making a unilateral declaration.⁴¹⁵ To date, 65 nations have done so.⁴¹⁶

⁴¹⁰ *Id.* at 79 (emphasis added).

⁴¹¹ *Id.* at 77-78.

⁴¹² A fourth but seldom used way for the Court to obtain jurisdiction is from a treaty that pre-dates the existence of the International Court of Justice and is based on the jurisdiction of the Permanent Court of International Justice ("PCIJ") (1922-1945). *See* Statute of the ICJ 36(5).

⁴¹³ *Id.* art. 36(1).

⁴¹⁴ *Id.* art. 36(1).

⁴¹⁵ *Id.* art. 36(2).

⁴¹⁶ In alphabetical order, the countries are: Australia, Austria, Belgium, Botswana, Bulgaria, Cambodia, Cameroon, Canada, Commonwealth of Dominica, Costa Rica, Cote d'Ivoire, Cyprus, Democratic Republic of the Congo, Denmark, Djibouti, Dominican Republic, Egypt, Estonia, Finland, Gambia, Georgia, Greece, Guinea, Guinea-Bissau, Haiti, Honduras, Hungary, India, Japan, Kenya, Lesotho, Liberia, Liechtenstein, Luxembourg, Madagascar, Malawi, Malta, Mauritius, Mexico, the Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Senegal, Slovakia, Somalia, Spain, Sudan, Suriname, Swaziland, Sweden, Switzerland, Togo, Uganda, the United Kingdom and Uruguay.

This unilateral declaration provision of the Statute is sometimes referred to, somewhat confusingly, as a voluntary acceptance of the Court's compulsory jurisdiction, or the "optional compulsory jurisdiction." In essence, it means that a nation may choose to accept the Court's jurisdiction over all disputes.⁴¹⁷ This grant of authority, however, may be revoked.

Furthermore, the unilateral declaration process is complicated by the legal doctrines of "reservations" and "reciprocity." A State's unilateral declaration accepting the Court's jurisdiction is applicable "in relation to any other state *accepting the same obligation*."⁴¹⁸ For example, if State A sues State B over a particular matter and State A has filed a reservation to the Court's jurisdiction, then State B, as the defendant, can also make a similar reservation to limit the Court's jurisdiction.

The United States, for example, initially accepted the Court's "optional compulsory" jurisdiction in 1946. But the United States did so with a reservation that preserved its unilateral ability to withhold domestic national security issues it believed were in its own interests. Thus, the United States, acting on its own, could decide as a matter of law whether the dispute was "domestic" or "international."⁴¹⁹

In 1985, the United States withdrew this "optional compulsory" grant of jurisdiction after Nicaragua sued it in the Court over American support for the Contra rebels who were attempting to overthrow the Sandinista government.⁴²⁰

Because of this decision, which has not been reversed, there are only two ways for another nation to bring the United States before the Court:

1. If the United States has signed a treaty that expressly grants jurisdiction to the Court to resolve disputes; and
2. If the United States agrees in an *ad hoc* declaration that a specific dispute should be resolved by the Court even though there is no authorizing language in a treaty that gives the Court this jurisdiction.

⁴¹⁷ The term "compulsory" is a misnomer because nations must voluntarily agree to accept the Court's jurisdiction. The Court's jurisdiction is "compulsory" only in the sense that once a nation voluntarily submits to the Court's jurisdiction, the Court may settle a dispute between it and another nation that has similarly accepted the Court's jurisdiction.

⁴¹⁸ *Id.* art. 36(2) (emphasis added).

⁴¹⁹ This reservation was known as the "Connally Amendment" after U.S. Senator Tom Connally (D-TX).

⁴²⁰ See U.S. Dep't. of State Letter and Statement Concerning the Termination of Acceptance of ICJ Compulsory Jurisdiction (Oct. 7, 1985), reprinted in 24 I.L.M. 1742 (1985), available at http://findarticles.com/p/articles/mi_m1079/is_v86/ai_4076208. The Court proceeded with the case even though the United States declined to appear. It ultimately ruled in Nicaragua's favor. See *Military and Paramilitary Activities (Nicar. v. U.S.)*, 1986 I.C.J. 14 (June 27). Nicaragua withdrew the case in 1991 when Violeta Barrios de Chamorro came to power, replacing the Sandinista government.

4.4 ENFORCEMENT OF THE COURT'S OPINIONS

Decisions of the Court are binding only on the parties.⁴²¹ The principle of *stare decisis* (precedent) does not apply to its opinions. If a State fails to perform the obligation imposed by the Court, the recourse is for the other State to ask the Security Council to make recommendations or decide the appropriate measures.⁴²² If the Security Council declines to enforce an opinion, or if one of the member vetoes the Security Council resolution on enforcement, the matter ends there.⁴²³

The U.S. Supreme Court ruled in 2008 that opinions of the ICJ are not automatically “self-executing” and are therefore not enforceable in courts of the United States in the absence of a statute.⁴²⁴

4.5 SOURCES OF LAW

The Statute identifies three sources of law that judges on the Court can apply to resolve a dispute between two or more nations:⁴²⁵

1. International conventions (i.e., treaties) establishing rules expressly recognized by the contesting states;
2. International custom, as evidence of a general practice accepted as law; and
3. General principles of law recognized by civilized nations.

The Court may also apply judicial decisions and the teachings of the most highly qualified publicists as “subsidiary means for the determination of rules of law.” As explained in more detail below, most scholars and commentators treat this last category not as a source of law but rather as a means to identify international law.

The sources of law listed above “shall not prejudice the power of the Court to decide a case *ex aequo et bono* [according to principles of what is just and fair], if the parties agree.”⁴²⁶ To date, the Court has not exercised its authority under this provision.⁴²⁷

⁴²¹ Statute of the Court art. 59.

⁴²² U.N. Charter art. 94.

⁴²³ Votes on the Security Council must be unanimous. The United States vetoed Nicaragua’s request for the Security Council to force compliance with the Court’s ruling in the dispute over the U.S. support for the Contra rebels in Nicaragua in the 1980s.

⁴²⁴ *Medellin v. Texas*, 128 S.Ct. 1346 (2008).

⁴²⁵ Statute of the Court art. 38.

⁴²⁶ *Id.*

⁴²⁷ The *ex aequo et bono* provision refers to a decision based solely on equity. As explained elsewhere in this report, the Court often relies on equitable principles to inform its decisions in interpreting treaties. This provision of the Court’s Statute, in contrast, applies to a situation in which two nations ask the Court to decide a

There is no express role in the Statute for “soft law,” such as the resolutions and declarations of the U.N. General Assembly or affiliated organizations and advisory commissions. Nonetheless, these resolutions and declarations have an indirect role if they inspire nations to adopt treaties or change their behavior. In and by themselves, however, those resolutions and declarations, no matter how stirring, are not binding on the signatories.

Each of these sources – treaties, customary law, and general principles of law – is discussed in more detail directly below.

4.5.1 Treaties

A treaty is defined broadly to include any bilateral or multilateral agreement, no matter what it is called.⁴²⁸ A treaty is often loosely compared with a contract: both documents assume that the signing parties have undertaken obligations in good faith and that failure to execute the agreement can give rise to litigation or a claim. The cardinal rule of treaty law is *pacta sunt servanda* (“pacts must be respected”).

Until 1980, the details of interpreting treaties were left to nations as a matter of customary law and general principles, without a common approach. The Vienna Convention on the Law of Treaties, adopted in 1969 by the U.N. General Assembly, changed that situation. The Vienna Convention entered into force in 1980.⁴²⁹

The Vienna Convention represents a 20-year effort of the International Law Commission (“ILC”) of the U.N. to codify a standard approach to interpreting treaties.⁴³⁰ The U.S. is not a signatory. So many countries have signed the Convention that its terms probably constitute customary law, and preliminary indications from the Secretary of State suggest the U.S. government itself believes so.⁴³¹

dispute on equity alone, when there is no treaty. The growing emphasis on the doctrine of “equitable and reasonable utilization” therefore raises an interesting “what if” problem. If the “equitable and reasonable utilization” doctrine becomes part of customary law, could two nations that have no treaty between them submit a water allocation dispute to the International Court of Justice for resolution solely on the basis of *ex aequo et bono* principles?

⁴²⁸ In general, the term “treaty” and “convention” are used interchangeably while a “protocol” is usually a supplement to a previous treaty or international agreement. Each creates binding obligations, if signed and ratified. The 1993 U.N. Framework Convention on Climate Change, for example, established a framework (objective) for adopting limits to greenhouse gas emissions. The 1997 Kyoto Protocol adopted the specific enforcement mechanisms and regulatory scheme.

⁴²⁹ *Vienna Convention on the Law of Treaties*, May 23, 1969, 1155 U.N.T.S. 331 (“*Vienna Convention*”).

⁴³⁰ The *Vienna Convention* bears some similarity in concept to the Restatement (Second) of Contracts, which describes, among other things, the general principles that should guide parties and courts in interpreting agreements. See generally RESTATEMENT (SECOND) OF CONTRACTS (1981). The Restatement addresses such principles as: when prior documents may be consulted to interpret terms, the scope of remedies for breach, when contracts are void as being against public policy, and a variety of other matters.

⁴³¹ See Secretary of State web site on Treaties in Force, which cites with approval the *Vienna Convention*’s definition of the term “treaty,” www.state.gov/s/l/treaty/treaties/2007/index.htm. Federal Courts have described the *Vienna Convention* as an “authoritative guide to the customary international law of treaties.” See, e.g., *Avero Belgium Ins. v. American Airlines, Inc.*, 423 F.3d 73, 79-80 (2d Cir. 2005).

a. Scope

The Vienna Convention applies to written agreements among nations, no matter what they are called, but does not affect agreements among nations and international organizations.⁴³² The Convention applies only to treaties concluded after the entry into force in 1980 and does *not* apply retroactively.⁴³³

b. Treaty in Force

The signing of a treaty does not make it come into force, though a nation that has signed a treaty is under an obligation to refrain from acts that would defeat the object and purpose of the treaty.

A signature is the first step, a sign that the state will continue the treaty-making process and will proceed to ratify, accept, or approve the treaty by whatever means its own domestic law requires. Treaties can enter into force by any number of ways, including ratification, acceptance, approval or accession.⁴³⁴ Once a treaty enters into force, it becomes obligatory. Most multilateral treaties specify that a specific number of States must ratify, accept, or approve the treaty before it enters into force. Then – and only then – does the treaty create a binding international obligation.

The Convention states that “every treaty in force is binding upon the parties to it and must be performed by them in good faith.”⁴³⁵ A party may not invoke provisions of its internal (domestic) law as justification for failure to perform a treaty.⁴³⁶

c. Conflicts with International Law

The Vienna Convention states that a treaty is void if it conflicts with a peremptory norm:

A treaty is void if, at the time of its conclusion, it conflicts with a peremptory norm of general international law. For the purposes of the present Convention, a peremptory norm of general international law is a norm accepted and recognized by the international community of States as a whole as a norm from which no

⁴³² *Vienna Convention* arts. 1 & 3.

⁴³³ *Id.* art. 4.

⁴³⁴ The act of ratifying, accepting, or approving a treaty may involve a different process (depending on the State’s domestic law and procedures) but the legal effect is the same. “Ratification” is usually accomplished when the State adopts the treaty according to its own Constitution or laws. For example, in the United States, a treaty is typically ratified when it is approved by two-thirds of the Senate. “Acceptance” and “approval” have the same legal consequence as ratification: they express the consent of the State to be bound by a treaty, but the State does so without a formal ratification process. “Accession” is the act by which a State becomes bound by a treaty after it is already in force.

⁴³⁵ *Vienna Convention* art. 26 (*pacta sunt servanda*).

⁴³⁶ *Id.* art. 27.

derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.⁴³⁷

The Convention does not further define the term “peremptory norm.” Most commentators have concluded that this term is synonymous with *jus cogens* (compelling law) and refers to behavior such as genocide, torture, slavery, and piracy.⁴³⁸

The term does not refer to changing developments in customary law, such as evolving notions of “equity” in allocating international rivers. Those developments do not create new peremptory norms.

d. Interpretation of Treaties

As a general rule, a treaty shall be interpreted in good faith in accordance with the ordinary meaning given to words.⁴³⁹ Recourse to supplementary materials is allowed to confirm the meaning of terms, or when words are ambiguous or obscure, or if the interpretation would lead to a “manifestly absurd or unreasonable result.”⁴⁴⁰

e. Breach, Invalidation, and Termination

Repudiation or violation of a treaty’s essential provisions constitutes a “material breach.”⁴⁴¹ The Vienna Convention states that nations may terminate a treaty only according to the terms of the treaty or the Convention itself.⁴⁴²

There are a few exceptions: the Convention allows nations to invalidate a treaty – to “invoke an error” – but only if the error relates to a fact or situation assumed by that nation to exist at the time when the treaty was concluded, and which formed an essential basis of its consent to be bound by the treaty.⁴⁴³ Other examples include fraud,⁴⁴⁴ corruption,⁴⁴⁵ coercion of a nation by

⁴³⁷ *Id.* art. 53.

⁴³⁸ International law recognizes the concept that some norms – *jus cogens* or “peremptory norms” – are so profoundly basic, persistent, and universal that even treaties are subservient to them. Such norms apply to non-consenting nations and probably the unilateral acts of nations. *Jus cogens* stands in contrast to *jus dispositivium* which is alterable or extinguishable by consent (i.e., by signing a treaty). See Eva M. Kornicker Uhlmann, *State Community Interests, Jus Cogens and Protection of the Global Environment: Developing Criteria for Peremptory Norms*, 11 GEO. INT’L ENVTL. L. REV. 101 at fn. 3 (1998). The term “*jus cogens*” is related to the notion of *erga omnes* (the obligations of States toward each other – literally “toward all”). See generally MAURIZIO RAGAZZI, *THE CONCEPT OF INTERNATIONAL OBLIGATIONS ERGA OMNES* (Clarendon Press 1997). For a skeptical appraisal of the peremptory norms, see Anthony D’Amato, “*It’s a Bird, It’s a Plane, It’s Jus Cogens!*” 6 CONN. J. INT’L L. 1 (1991).

⁴³⁹ *Id.* art. 31(1).

⁴⁴⁰ *Id.* art. 32.

⁴⁴¹ *Id.* art. 60(3).

⁴⁴² *Id.* art. 54-60.

⁴⁴³ *Id.* art. 48.

⁴⁴⁴ *Id.* art. 49.

threat of force,⁴⁴⁶ supervening events that make performance impossible⁴⁴⁷ and fundamental change of circumstance.⁴⁴⁸ Parties may not rely on their own fraud as a basis for these actions.⁴⁴⁹ Furthermore, the right to denounce a treaty as invalid, or to terminate or withdraw from it, must be exercised for the whole treaty, not select parts, unless the treaty or the parties themselves provide otherwise.⁴⁵⁰

4.5.2 Customary Law

Customary law is a second source of international law. But “international custom” does not refer simply to habit or to usual and accustomed behavior. Customary law, according to Article 38 of the Statute, is “evidence of a general practice accepted as law.” The definition therefore consists of two elements: 1) general practice *and* 2) its acceptance as law.

Professors Buerghenthal and Murphy explain:

A practice does not become a rule of customary international law merely because it is widely followed. It must, in addition, be deemed by states to be obligatory as a matter of law. This test will not be satisfied if the practice is followed out of courtesy or if states believe that they are legally free to depart from it any time. The practice must comply with the ‘*opinio juris*’ requirements (short for the Latin *opinion juris sive necessitatis*— a conviction that the rule is obligatory) to transform it into customary international law.⁴⁵¹

Other scholars and commentators agree.⁴⁵² It is important to note that custom need not always involve action (by a nation) but also includes repeated incidents of inaction or acquiescence by a nation.⁴⁵³

The International Court of Justice in the *Asylum* case stated the requirement this way:

⁴⁴⁵ *Id.* art. 50.

⁴⁴⁶ *Id.* art. 52.

⁴⁴⁷ *Id.* art. 61.

⁴⁴⁸ *Id.* art. 62.

⁴⁴⁹ *Id.* art. 69.

⁴⁵⁰ *Id.* art. 44(1).

⁴⁵¹ BUERGENTHAL & MURPHY, *supra* note 27, at 22.

⁴⁵² Professor F. J. Berber, writing in 1959, concluded: “There is far-reaching agreement over the definition of customary law.” BERBER, *supra* note 333, at 46. Customary law, according to various scholars, consists of: “established usages which have come to be regarded as having an obligatory character” (Fenwick) and “a custom when a clear and continuous habit of doing certain actions has grown up under the aegis of the conviction that these actions are, according to international law, obligatory or right” (Oppenheim). *Id.* at 46-47.

⁴⁵³ RESTATEMENT (THIRD) OF FOREIGN RELATIONS § 102 (1987).

In trying to ascertain whether a practice has become a rule of customary law, one must ask how many States follow the practice, which states these are, whether they follow it because of a feeling of obligation to do so, and whether there is any competing or contrary practice.⁴⁵⁴

Customary law typically develops through a process of claim and counterclaim between states, an admittedly “inelegant” process in the words of Professor Joseph Dellapenna, who explains the development of customary law this way:

Suppose there is a field between two villages, with no road across the field. People initially will tend to wonder at will in order to go from one village to the next. Gradually, most people will follow a particular line. Perhaps this is the shortest route, or perhaps it is the easiest route, or perhaps it is the route most convenient to the heaviest walkers – walkers whose tread wears a path more decisively into the landscape. For whatever reason, a definite path will emerge, and gradually it will become a road. Eventually, everyone will agree that this road is the only right way to travel from village to village even though no one can say precisely when this notion took hold. At this point, they will object to others as trespassers if they choose to use a different path to go from village to village -- by which time we have a legal and not merely a factual claim.⁴⁵⁵

The role of resolutions passed by diplomatic conferences or the declarations of international organizations is often misunderstood in this context. They can help codify and clarify customary law, and they can help create future obligations (if ultimately adopted by nations), but they are not sources of law by themselves. Finally, it is important to note that a principle of customary law is not binding on a nation that declares its dissent from the principle during its development.⁴⁵⁶

4.5.3 General Principles of Civilized Nations

A third source of international law – in addition to treaties and customary law – is the general principles of law recognized by “civilized nations.”⁴⁵⁷

This source of law was the subject of considerable controversy when adopted in 1946. Representatives from common law countries (i.e., the United States and Great Britain) supported language that would have given equitable powers to the Court. But representatives from civil code nations (i.e., continental Europe) opposed this broad grant of authority because they feared the Court might simply rely on subjective notions of “equity” if it could not find applicable law to apply. Thus, the language in the Statute refers to “general principles” of law but imposes a

⁴⁵⁴ *The Asylum Case (Colombia v. Peru)*, 1950 I.C.J. 266, 276 (Nov. 20).

⁴⁵⁵ Joseph Dellapenna, *The Customary International Law of Transboundary Fresh Waters*, INT. J. GLOBAL ENVTL. ISSUES 264, 267 (2001).

⁴⁵⁶ RESTATEMENT (THIRD) OF FOREIGN RELATIONS § 102 (1987).

⁴⁵⁷ Statute of the Court art. 38(1).

commonality requirement: general principles of law recognized by other nations around the world.

The Court may still decide cases *solely* on equity if the parties agree,⁴⁵⁸ but this has never happened. Rather, the Court will use equity to resolve treaty interpretations and give the judges flexibility in developing remedies. The best-known opinion to invoke the “general principles” of civilized nations involved an incident in the Corfu Channel in 1946.⁴⁵⁹ In that case, the United Kingdom claimed Albania owed it money when mines in Albanian territorial waters exploded, damaging British warships and killing personnel. The incident occurred when the U.K. and Albania were at peace and when the U.K. ships had a right of free (“innocent”) passage through Albanian waters.⁴⁶⁰

The issue for the Court came down to Albania’s responsibilities to notify the U.K. ships of the existence of the mines and warn them against approaching:

Such obligations are based, not on the Hague Convention of 1907 . . . which is applicable in time of war, but on certain general and well-recognized principles, namely: elementary considerations of humanity, even more exacting in peace than in war; the principle of the freedom of maritime communication and every State’s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.⁴⁶¹

4.6 THE USE OF JUDICIAL DECISIONS AND TEACHINGS

The Court will use “judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law.”⁴⁶² These decisions and teachings are *not* independent sources of law as such – they are a means of interpreting and analyzing the law. “International lawyers look to these authorities as evidence to determine whether a given norm can be deemed to have been accepted as a rule of international law.”⁴⁶³ These authorities include judicial decisions from individual nations, such as the U.S. Supreme Court cases on equitable apportionment and similar decisions in other countries,⁴⁶⁴ and the teachings of “publicists.”

⁴⁵⁸ *Id.* art. 38(2): “This provision [listing sources of law, including general principles of law recognized by civilized nations] shall not prejudice the power of the Court to decide a case *ex aequo et bono*, if the parties agree hereto.”

⁴⁵⁹ *United Kingdom v. Albania*, 1949 I.C.J. 4 (April 9). The case was the first major dispute decided by the Court after it was created in 1946 as the judicial organ of the United Nations.

⁴⁶⁰ Although the U.K. and Albania were technically at peace, an Albanian battery had fired in the direction of two British cruisers prior to the laying of the mines. The Court did not accuse Albania of laying the mines but suggested that Albania had knowingly acquiesced to another nation doing so (the U.K. alleged it was Yugoslavia).

⁴⁶¹ *Id.* at 22.

⁴⁶² Statute of the Court art. 38.

⁴⁶³ RESTATEMENT (THIRD) OF FOREIGN RELATIONS § 102, rptrs, note 1 (1987).

⁴⁶⁴ Professor McCaffrey, for example, cites an 1878 case, *Aargau v. Zurich*, in the Federal Court of Switzerland as an example of a national court articulating the principle of equitable apportionment. MCCAFFREY,

The term “publicists” is mostly commonly interpreted to include not just individual scholars and writers, but also entities, such as the International Law Commission (“ILC”), created by the United Nations to encourage the development and codification of international law, and the International Law Association (“ILA”), a private, voluntary association that drafted the Helsinki and Berlin water allocation rules.

The use of judicial decisions and teachings is subject to Article 59 of the Statute, which states that the decision of the Court has “no binding force except between the parties and in respect to that particular case.”

supra note 141, at 390. The Swiss Court said: “In the case of public waters which extend over several cantons and, therefore, belong to several cantons, it follows from the equality of the cantons that none of them may, to the prejudice of the others, take . . . measures . . . [such] as the diversion of a river or brook, construction of dams”

CHAPTER 5

THE *GABCIKOVO-NAGYMAROS* DECISION

In this chapter:

5.0 The *Gabcikovo-Nagymaros* Decision

5.0 THE *GABCIKOVO-NAGYMAROS* DECISION

Since its creation in 1946, the International Court of Justice has issued only one decision addressing the equitable and reasonable use of water of an international river: the *Gabcikovo-Nagymaros* case, which involved a project on the Danube River.⁴⁶⁵

In 1997, the Court rendered its opinion and found that Hungary had breached its obligations to Slovakia under a 1977 Treaty and that Slovakia had also breached its obligations to Hungary when it built a provisional dam on the river in response to Hungary's actions.⁴⁶⁶

The case involved a large joint infrastructure project that Hungary and Czechoslovakia (prior to its division into the Czech and Slovakia Republics in 1993) had agreed to undertake jointly.⁴⁶⁷ The 1977 Treaty called for both countries to build a series of locks and dams on the Danube River, one system at Gabcikovo (in Czechoslovakia); the other at Nagymaros (Hungary). The purpose of the Gabcikovo-Nagymaros project was to increase and make more efficient the use of "water resources, energy, transport, agriculture and other sectors of the national economy."⁴⁶⁸

The Gabcikovo-Nagymaros Project would generate power, improve navigation, and assist with flood control. Czechoslovakia was responsible for a portion of the project in its territory, just as Hungary was similarly responsible for constructing part of the project within its national boundaries. The infrastructure was designed to operate as a "single and indivisible operational system of works"⁴⁶⁹ on 120 miles of the Danube River lying between Bratislava, the capital of Slovakia, and Budapest, the capital of Hungary.⁴⁷⁰ Portions of the river in this stretch serve as a boundary between both nations.

Both Hungary and Czechoslovakia agreed to participate in joint financing and operation of the structures.⁴⁷¹ They were to prepare and agree to a "Joint Contractual Plan" involving joint operation of the facilities.⁴⁷² But environmental objections not anticipated when the Treaty was

⁴⁶⁵ *The Gabcikovo-Nagymaros Project (Hungary v. Slovakia)*, Judgment, 1997 I.C.J. Reports 7 (September 25) ("the Court Opinion").

⁴⁶⁶ *Treaty Between the Hungarian People's Republic and The Czechoslovak Socialist Republic Concerning the Construction and Operation of the Gabcikovo-Nagymaros System of Locks*, Hung.-Czech., Sept. 16, 1977, 1109 U.N.T.S. 236. The Treaty came into force on June 30, 1978. It did not expressly give the Court jurisdiction to hear disputes. The parties, however, voluntarily submitted to the Court's jurisdiction and submitted joint questions for the Court to answer.

⁴⁶⁷ Slovakia became an independent nation on January 1, 1993 ("the velvet divorce") and is the successor in interest to the 1977 Treaty signed by Czechoslovakia.

⁴⁶⁸ Court opinion para. 15.

⁴⁶⁹ *Id.* para. 15.

⁴⁷⁰ *Id.* para. 16.

⁴⁷¹ *Id.* para. 20.

⁴⁷² *Id.* para. 20.

signed soon came to the fore. As a result of intense criticism in Hungary – with concerns that focused primarily on the project's potential impact on groundwater supplies, the silting of the river, the effect on indigenous fish and wildlife, and other environmental impacts – the Hungarian government unilaterally and abruptly decided in 1989 to suspend work at Nagymaros pending completion of additional scientific studies.⁴⁷³

Making matters more complicated, Hungary's decision to suspend work occurred only three months after it had signed a protocol in February 1989 with Czechoslovakia in which it agreed to accelerate work on its share of the project. The formation of a new government in Hungary brought about the sudden change.

Meanwhile, Czechoslovakia objected to Hungary's decisions, which it said amounted to a breach of the Treaty. Czechoslovakia then sought to build – by itself – a smaller “provisional” dam and lock in its territory, known as “Variant C.” In response, Hungary asked Czechoslovakia to stop construction on Variant C, but Czechoslovakia did not. Hungary then declared in 1992 that the Treaty was terminated. Both nations sought damages from each other for their alleged breach of the Treaty.

Hungary argued that its environmental concerns allowed it to ignore terms of the Treaty when it suspended work in 1989 on the Nagymaros component in its own territory.⁴⁷⁴ Hungary relied on what it called a “state of environmental necessity” in halting the work.⁴⁷⁵ According to Hungary, this “necessity” allowed it to ignore the Treaty because the agreement would cause “grave and imminent” harm to its interests. Hungary said it was entitled to take this unilateral preemptive action under international customary law.⁴⁷⁶

The Court found Hungary's “necessity” argument unconvincing, though it acknowledged that international customary law allowed a country under certain narrow circumstances to claim “necessity” in not conforming to a treaty obligation.⁴⁷⁷ But Hungary could not show it faced a “grave and imminent” harm and therefore was not justified in suspending work, the Court said.⁴⁷⁸ Although Hungary could justifiably argue that the Nagymaros infrastructure would one

⁴⁷³ *Id.* para. 40.

⁴⁷⁴ Hungary also suspended work on a portion of the project at Dunakiliti near Budapest.

⁴⁷⁵ Court Opinion at para. 40.

⁴⁷⁶ Hungary also maintained that it had not terminated the Treaty itself at that point in time, though it acknowledged it had done so later, in 1992, but only after Czechoslovakia unilaterally built the Variant C infrastructure. *Id.* para. 40.

⁴⁷⁷ *Id.* para. 51. The Court could not rely on the 1969 Vienna Convention on Treaties for guidance in addressing whether Hungary could suspend work on its share of the project. Although the Vienna Convention was signed before Hungary and Slovakia signed the 1977 Gabčíkovo-Nagymaros Treaty, the Vienna Convention only came into force in 1980. The Court could not apply its terms retroactively. *Id.* para. 42. Instead, the Court consulted, with agreement from both nations, the draft articles on the International Responsibility of States prepared by the International Law Commission, a U.N. entity. *Id.* para. 50. The draft ILC articles defined a “state of necessity” to mean “the situation of a State whose sole means of safeguarding an essential interest threatened by a grave and imminent peril is to adopt conduct not in conformity with what is required of it by an international obligation to another State.” *Id.* para. 50.

⁴⁷⁸ *Id.* paras. 54, 57 & 59.

day harm the environment, many of the consequences were long-term, not immediate, and some were speculative.⁴⁷⁹ Thus, Hungary's "necessity" argument failed.⁴⁸⁰

The Court also rejected Slovakia's argument that Czechoslovakia had a right to put into operation Variant C of the lock and dam.⁴⁸¹ The Variant allowed Czechoslovakia to appropriate between 80-90% of the water of the Danube before returning it to the river, "despite the fact that the Danube is not only a shared international watercourse but also an international boundary river."⁴⁸²

Hungary's impermissible suspension of work on the Nagymaros component "cannot mean that Hungary forfeited its basic right to *an equitable and reasonable sharing* of the resources of an international watercourse."⁴⁸³ Even though Hungary had failed to perform its obligations under the 1977 Treaty, the response by Czechoslovakia was not a justifiable countermeasure, the Court said.⁴⁸⁴ The countermeasures taken "must be commensurate with the injury suffered, taking account of the rights [of other States] in question."⁴⁸⁵

The Court therefore concluded that Hungary and Czechoslovakia's conduct, and later Slovakia's conduct, had not rendered the Treaty void.⁴⁸⁶ Slovakia was entitled to compensation from Hungary when it abandoned its obligations to build the Nagymaros component of the infrastructure. Hungary was likewise entitled to compensation from Slovakia when it placed Variant C into operation. The Court, however, declined to set a specific value of damages.⁴⁸⁷

⁴⁷⁹ Furthermore, the Court held that Hungary had other alternatives available to it to remedy the environmental damage. *Id.* para. 55.

⁴⁸⁰ *Id.* para. 48.

⁴⁸¹ The Court acknowledged that Czechoslovakia was entitled to proceed with Variant C as a "provisional solution" but it said it was *not* entitled to put the solution into operation once it had been notified that Hungary objected. Court Opinion at para. 88.

⁴⁸² Court Opinion, para. 78.

⁴⁸³ *Id.* para. 78 (emphasis added).

⁴⁸⁴ *Id.* paras. 87 & 88.

⁴⁸⁵ *Id.* para. 85. Those rights, the Court concluded, include the "community of interest" cited by the predecessor tribunal, the Permanent Court of International Justice ("PCIJ") in the 1929 *Oder River* case, which was a dispute over navigation rights. In that opinion, the PCIJ found that a "community of interest in a navigable river becomes the basis of a *common legal right*, the essential features of which are the perfect equality of all riparian States in the use of the whole course of the river and the exclusion of any preferential privilege of any one riparian State in relation to the others," quoting from the *Territorial Jurisdiction of the International Commission of the River Oder*, Judgment No. 16, 1929 P.C.I.J. (Ser. A, No. 23) at.27 (emphasis added). The Court in the *Gabcikovo-Nagymaros* case said international law in recent years "has strengthened this principle" for the non-navigational uses of rivers. For evidence, the Court cited the U.N. General Assembly's recent adoption of the 1997 *Convention on the Law of the Non-navigational Uses of International Watercourses*, even though only a handful of States had adopted the Convention at that time, and the agreement was not (and is not now) in force.

⁴⁸⁶ *Id.* para. 132.

⁴⁸⁷ *Id.* para. 152.

The Court's opinion is significant in several respects. First, the Court clearly elevated environmental concerns and acknowledged that under certain limited circumstances, a nation might indeed argue "environmental necessity" in seeking to ignore portions of a treaty to which it would otherwise be obligated to enforce. But the State would have to show "grave and imminent" harm and convince the Court it had no other choice but to suspend actions required under the Treaty, a difficult burden.

Second, the Court cited the "equitable and reasonable" sharing of a river as a standard for the first time in evaluating conduct by a State. In this case, the principle of equitable and reasonable use prevented Slovakia, as the successor to Czechoslovakia, from operating Variant C and acting as if it was the sole beneficiary of the Danube River. Hungary's refusal to complete its portion of the project did not empower Slovakia to act unilaterally in the manner in which it did.

Third, the Court "breathes new life," in the words of Professor McCaffrey,⁴⁸⁸ into the notion that a river is a "community of interest" – a term used by the Permanent Court of International Justice in 1929 to describe a conflict over navigation on the Oder River.⁴⁸⁹

When all was said and done, both Hungary and Slovakia were bound by the agreement they made in 1977. Neither Hungary's claim of "state of environmental necessity" nor Slovakia's assertion that it could take a unilateral response was sufficient to overcome their mutual obligations to each other.⁴⁹⁰

What impact does the case have on international river disputes? The short answer is that it is not clear. The Court's opinions have no precedential effect. The system of international law is largely consensual: States must voluntarily agree to accept the Court's jurisdiction. In most circumstances, litigation is a slow-moving process, and the adversarial process is not likely to foster a cooperative approach for resolving water allocation problems. Litigating a "community of interests" is something of a contradiction. By the time the Court speaks, the parties may not be in a mood to cooperate with each other.

⁴⁸⁸ MCCAFFREY, *supra* note 141, at 217.

⁴⁸⁹ Court opinion, para. 85.

⁴⁹⁰ Eleven years after the Court opinion in the *Gabcikovo-Nagymaros* dispute, neither Slovakia nor Hungary had settled their claims.

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CHAPTER 6

ENVIRONMENTAL LAW AT THE INTERNATIONAL BORDER

In this chapter:

- 6.1 The Transboundary “No Harm” Principle
 - 6.1.1 The *Trail Smelter* Case
 - 6.1.2 The Espoo Convention on Environmental Impact Assessment
- 6.2 Sustainable Development
- 6.3 The Precautionary Principle
- 6.4 The Ramsar Convention on the Preservation of Wetlands

6.0 ENVIRONMENTAL LAW AT THE INTERNATIONAL BORDER

The first major arbitration case to involve cross-border environmental impacts concerned air, not water, pollution. The rule that emerged from the case is commonly called today the “no harm” principle – now a vital part of cross-border customary law.

6.1 THE TRANSBOUNDARY “NO HARM” PRINCIPLE

6.1.1 The *Trail Smelter* Case

The “no harm” principle has its origins in the *Trail Smelter* case, an arbitration between the United States and Canada. The lead and zinc smelter, located in Trail, British Columbia, only seven miles north of the border, was a major source of pollution in northeastern Washington State. Built originally in 1896, the smelter had been expanded and by the late 1930s, was one of the largest smelting operations in North America. It emitted tons of sulfur dioxide each year.⁴⁹¹

Farmers in Washington State accused the smelter owner of having damaged their property (including trees and grazing land), and they asked the Secretary of State for help in seeking compensation for past injuries and in halting future emissions.

The International Joint Commission (“IJC”), created by the Boundary Waters Treaty of 1909, was the first impartial body to investigate these claims. Although the IJC normally addresses water, not air pollution, Article IX of the Treaty authorizes it to address “other questions or matters of difference” arising between the United States and Canada. It was that broad grant of authority which empowered it in 1928 to investigate and report on the extent of damages caused by the *Trail Smelter*. The IJC held hearings between 1928 and 1930 and filed a report recommending that Canada pay \$350,000 in damages incurred through December 31, 1931.⁴⁹²

But the smelter kept on operating. In 1935, the United States and Canada signed a special convention creating an arbitration Tribunal composed of three members to answer four questions:⁴⁹³

1. Whether damage caused by the *Trail Smelter* has occurred since January 1, 1932, and if so, what indemnity should be paid?
2. If so, whether the *Trail Smelter* should be required to refrain from causing damage in the future, and, if so, to what extent?
3. What measures or regimes should be adopted or maintained by the *Trail Smelter*?

⁴⁹¹ See description of the smelter in the decision of the Tribunal. *Trail Smelter Arbitration (U.S. v. Can.)*, Ad Hoc International Arbitral Tribunal, 1941, 3 U.N. Rep. Int’l Arb. Awards (“UNRIAA”) 1911, 1938 (1941) (“*Trail Smelter Arbitration*”).

⁴⁹² *Trail Smelter Arbitration* at 1918-1919.

⁴⁹³ *Convention for the Trail Tribunal*, U.S.-Can., April 15, 1935, 162 L.N.T.S. 74, 49 Stat. 3245 (1935). Article IV required the tribunal to apply U.S. law and practice as well as international law and practice.

4. What indemnity or compensation should be paid on account of any decisions rendered by the Tribunal?

In 1938, the Tribunal answered the first and fourth questions: it found that the Trail Smelter had damaged U.S. territory between 1932 and 1937 and ordered it to pay \$78,000 as the complete and final indemnity.⁴⁹⁴ The Tribunal postponed a final decision on the second and third questions.⁴⁹⁵

Then, in 1941, the Tribunal answered the two remaining questions.⁴⁹⁶ Under principles of international law, it found that no State had the right to use – or permit the use of – its territory to cause injury by fumes in, or to, the territory of another nation.⁴⁹⁷ “A State owes at all times a duty to protect other States against injurious acts by individuals from within its jurisdiction,” the Tribunal concluded.

The Tribunal therefore found that Canada was responsible for the conduct of the Trail Smelter and had a duty to see that its conduct conformed to its obligations under international law. To prevent future damage, the Tribunal established a “regime of control” for future smelter operations – in effect imposing a \$20 million obligation on the smelter owner.⁴⁹⁸

Over the years, the liability rule articulated in the *Trail Smelter* case became the foundation of numerous international declarations, including the 1972 Stockholm Declaration and the 1992 Rio Declaration.⁴⁹⁹

6.1.2 The Espoo Convention on Environmental Impact Assessment

In 1991, under the auspices of the United Nations Economic Commission for Europe (“UNECE”), a group of nations meeting at Espoo, Finland, approved a convention addressing the obligations of nations to evaluate the transboundary environmental impacts of proposed infrastructure projects and to consult with adjacent States about ways to mitigate impacts.⁵⁰⁰ The

⁴⁹⁴ *Trail Smelter Arbitration* at 1933.

⁴⁹⁵ *Id.*

⁴⁹⁶ *Id.* at 1938.

⁴⁹⁷ The *Trail Smelter* Tribunal could not find a case of international air pollution as precedent and therefore turned to other sources, including opinions of the U.S. Supreme Court that addressed air or water pollution. The Tribunal discussed *Missouri v. Illinois*, 200 U.S. 296 (1921), *New Jersey v. New York*, 283 U.S. 473 (1931), and *Georgia v. Tennessee Copper Company*, 206 U.S. 230 (1907).

⁴⁹⁸ John E. Read, *The Trail Smelter Dispute*, 1 C.Y.I.L. 213 (1963), at 213-229.

⁴⁹⁹ The *Trail Smelter* Arbitration did not end the conflict over the smelter and its pollutants. In 2007, the U.S. Court of Appeals for the Ninth Circuit held that the smelter owner was potentially liable under the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”) (commonly known as the Superfund statute) for slag it had dumped in the Columbia River in Canada and which had accumulated over the years in Lake Roosevelt behind Grand Coulee Dam in Washington State. *Pakootas v. Teck Cominco Metals Ltd.*, 452 F.3d 1066 (9th Cir. 2007), *cert. denied*, 128 S.Ct. 858 (2008).

⁵⁰⁰ *Convention on Environmental Impact Assessment in a Transboundary Context*, Feb. 25, 1991, 1989 U.N.T.S. 309 (“*Espoo Convention*”). The *Espoo Convention* was drafted under the auspices of the U.N. Economic

Convention on Environmental Impact Assessment in a Transboundary Context applies to projects, such as oil refineries, dams, shipyards, canalization, bridges, and even intensive fish farming that have – or may have – international impacts.

Although the agreement – commonly known as the Espoo Convention – does not address water allocation issues, it requires signatory nations to prepare environmental impact assessments (“EIAs”) during the planning stages for projects and to inform neighboring States prior to undertaking major actions. Thirty-nine States have signed and ratified the convention.⁵⁰¹

6.2 SUSTAINABLE DEVELOPMENT

The principle of “sustainability” refers to “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”⁵⁰² The concept was first articulated in the international arena by the Stockholm Declaration of 1972.⁵⁰³ Since then, a number of declarations, statements and planning documents of the United Nations have repeated the principle.⁵⁰⁴ The 1992 Rio Conference on Environment and Development, for example, listed 27 principles of sustainability in its declaration, including the notion that “the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.”⁵⁰⁵

These declarations generally fall into the category of “soft law,” which is not by itself binding on nations, though if enough nations embrace the idea, and if they change their conduct or *behavior* to reflect the principle, then the principle of sustainability may come into force in international law as a customary norm.

Commission for Europe (“U.N.E.C.E.”), established originally in 1947. The signatories to the *Espoo Convention* have proposed a protocol, executed in Kiev, Ukraine, on May 21, 2003, but it is not in force. The UNECE now has 56 members and addresses issues of sustainable economic growth. Non-European countries participate in its activities. For the home page of the United Nations Economic Commission for Europe, see www.unece.org. The UNECE was also the forum for drafting the 1992 U.N. Convention on the Protection and Use of Transboundary Watercourses and Lakes, signed in Helsinki, Finland, which applies to cross-border lakes and rivers in Europe. See section 8.1 at page 196 of this report for more information.

⁵⁰¹ The countries that have ratified the *Espoo Convention* are (in alphabetical order): Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Canada, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Moldova, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine and the United Kingdom. The United States signed the Espoo Convention in 1991 but has yet to ratify it. The *Espoo Convention* bears some similarity to the National Environmental Policy Act of 1969 (“NEPA”), which requires federal agencies in the United States to prepare an Environmental Impact Statement (“EIS”) prior to taking a major action that significantly affects the human environment. 42 U.S.C. § 4321.

⁵⁰² See World Commission on Environment and Development, G.A. Res. 42/187, ¶ 2, U.N. Doc. A/Res/42/187 (Dec. 11, 1987) (“the Brundtland Report”), available at <http://www.un.org/documents/ga/res/42/ares42-187.htm>.

⁵⁰³ *The Stockholm Declaration*, supra note 32.

⁵⁰⁴ *The Rio Declaration*, supra note 33.

⁵⁰⁵ *Id.* Principle 3.

6.3 THE PRECAUTIONARY PRINCIPLE

The “precautionary principle” is defined as the notion that a government taking an action (i.e., building a dam or permitting a pulp mill on an international river) bears the burden of showing that its decision will not cause severe or irreversible harm to the environment. Under the precautionary approach, the burden of proof shifts from opponents or critics of a project to the proponents of development to show that construction and operation will not seriously damage the environment.

The precautionary principle thus builds on the “no harm” rule by imposing the burden on the government or other entity (public or private) that is contemplating a decision. The intent is to avoid the harm before it occurs – rather than take the action and then pay damages, as the Canadian company did in the *Trail Smelter* case.

The precautionary principle evolved out of German socio-legal tradition in the 1930s, *vorsorgeprinzip*, translated as the “foresight” or “responsibility” principle. Several non-binding international declarations have referred to the principle favorably. The World Charter for Nature, for example, adopted by the U.N. General Assembly in 1982, endorsed the “precautionary principle.”⁵⁰⁶



FIGURE 15. UN Conference on Environment and Development in Rio de Janeiro, 1992

[Source: <http://www.mtholyoke.edu/~danov20d/site/history.htm>]

Opinions from the International Court of Justice have also stressed the need to consider the practical effects of human impacts upon the environment. In the 1996 advisory opinion on the use of nuclear weapons, the Court concluded that “the environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn.”⁵⁰⁷

6.4 THE RAMSAR CONVENTION ON THE PRESERVATION OF WETLANDS

This Convention, signed in Ramsar, Iran, in 1971, obligates signatory States to agree to the conservation and wise use of wetlands, and to designate at least one wetland of international

⁵⁰⁶ World Charter for Nature, UN GA RES 37/7 (Oct. 28, 1982), available at <http://www.un.org/documents/ga/res/37/a37r007.htm>.

⁵⁰⁷ *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 I.C.J. 241-242 (July 8).

significance.⁵⁰⁸ Upon receiving a designation, the Treaty's Secretariat adds the wetlands to an international data base.⁵⁰⁹

The obligation of signing States is limited to considering wetlands conservation in their national planning efforts and to promote, as far as possible, "the wise use of wetlands."⁵¹⁰ The Ramsar Convention does not create a regulatory regime and has no punitive sanctions for violations of treaty obligations. The Ramsar Convention is based on mutually-agreed upon expectations and accountability.

Under the Ramsar Convention, each State (called a "Contracting Party") must designate at least one wetland site for inclusion in the List of Wetlands of International Importance.⁵¹¹ The inclusion of a wetlands on the list "does not prejudice the exclusive sovereign rights of the Contracting Party in whose territory the wetland is situated,"⁵¹² but does require each Contracting Party to "consider its international responsibilities for the conservation, management and wise use of migratory stocks of waterfowl"⁵¹³

At present, there are 158 contracting nations, which have designated wetlands containing approximately 61.2 million acres (24.5 million hectares).⁵¹⁴ The last nation to sign the Ramsar Convention was Iraq. The United States ratified the accord in 1986 and has since designated 22 sites, the largest of which is Everglades National Park in Florida. Canada has designated 37 sites, including Queen Maud Gulf in the Northwest Territories and Polar Bear Provincial Park in Ontario. Mexico has chosen 67 sites, including the portion of the Colorado River Delta within its borders.⁵¹⁵

⁵⁰⁸ *Convention on Wetlands of International Importance Especially as Waterfowl Habitat*, Feb. 2, 1971, 996 U.N.T.S. 245 ("Ramsar Convention"), available at <http://www.ramsar.org/key-conv-e.htm>. See art. 2.4. The treaty came into force on Dec. 21, 1975, and for the United States on Dec. 18, 1986, T.I.A.S. No. 11084.

⁵⁰⁹ The Secretariat is located in Gland, Switzerland. For its home page, see www.ramsar.org.

⁵¹⁰ *Ramsar Convention* art. 3.1.

⁵¹¹ *Id.* art. 2.4. Sites are selected by the Contracting Parties, or member States, for designation under the Convention by reference to the Criteria for the Identification of Wetlands of International Importance. The data upon which the List is based are maintained under contract to the Convention Bureau by the Ramsar/Wetland Sites Officer at Wetlands International in Wageningen, the Netherlands. The List shows the site name, date of designation, region within the country, surface area in hectares, and central geographical coordinates of each site.

⁵¹² *Id.* art. 2, §3.

⁵¹³ *Id.* art. 2, §6.

⁵¹⁴ For a list of participating nations, see <http://erc.unesco.org/cp/convention.asp?KO=15398&language=E>.

⁵¹⁵ For a complete list of designated sites, see www.ramsar.org/index_list.htm.

CHAPTER 7

DOMESTIC AND INTERNATIONAL LAW RELEVANT TO THE RIVERS OF NORTH AMERICA

In this chapter:

- 7.1 The Law of Water Allocation in the United States
 - 7.1.1 Treaties
 - 7.1.2 The Role of Congress
 - 7.1.3 Interstate Compacts
 - 7.1.4 The U.S. Supreme Court
 - 7.1.5 Hydropower in the United States
 - 7.1.6 The Role of State Governments
 - 7.1.7 The Role of Native American Tribes
 - 7.1.8 The Administration of Environmental Law
- 7.2 The Law of Water Allocation in Canada
 - 7.2.1 Treaties
 - 7.2.2 The Constitution of Canada
 - 7.2.3 The Role of Parliament
 - 7.2.4 The Role of Common Law
 - 7.2.5 The Supreme Court of Canada
 - 7.2.6 The Role of Provincial Governments
 - 7.2.7 The Role of Territorial Governments
 - 7.2.8 First Nations/Aboriginal Peoples
 - 7.2.9 Hydropower in Canada
 - 7.2.10 Administration of Environmental Laws
- 7.3. Border Water Law Between the United States and Canada
 - 7.3.1 International Treaties and Agreements
 - 7.3.2 The International Joint Commission
 - 7.3.3 The International Role of the U.S. EPA

- 7.3.4 The Governors of the Great Lakes States
- 7.3.5 The Role of NAFTA
- 7.4 The Law of Water Allocation in Mexico
 - 7.4.1 Treaties
 - 7.4.2 The Constitution of Mexico
 - 7.4.3 The Role of Civil Law
 - 7.4.4 The Supreme Court of Mexico
 - 7.4.5 An Overview of Mexican Water Law
 - 7.4.6 Hydropower in Mexico
 - 7.4.7 Administration of Environmental Laws
- 7.5 Border Water Law Between the United States and Mexico
 - 7.5.1 International Treaties and Agreements
 - 7.5.2 The International Boundary and Water Commission
 - 7.5.3 The International Role of the U.S. EPA
 - 7.5.4 Agencies Created by NAFTA

7.0 DOMESTIC AND INTERNATIONAL LAW RELEVANT TO THE RIVERS OF NORTH AMERICA

The international rivers of North America are vast. These waterways stretch from the Nelson-Saskatchewan River system – which drains parts of both Canada and the United States and empties into Hudson Bay – to the arid areas of the Southwest that straddle the United States and Mexico, where the Colorado River and Rio Grande flow.

To understand these rivers and how they are managed, it is necessary to examine both domestic and international law. What follows in this chapter is an examination of the law of water allocation in the United States, Canada, and Mexico and of the specific border law that has developed in the last 150 years between these three nations.

None of the rivers crosses all three borders and thus implicate the domestic law of all three countries. Rather, the international law relevant to North American rivers consists of separate treaties and procedures for the resolution of water allocation and management issues along the U.S.-Canada and the U.S.-Mexico border.

7.1 THE LAW OF WATER ALLOCATION IN THE UNITED STATES

Because some of the most important rivers and lakes in the United States are shared with either Canada or Mexico, we begin our analysis with treaties and how they become part of U.S. domestic law.

7.1.1 Treaties

Under the Constitution of the United States, the President has the “power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur”⁵¹⁶

The scope of this provision is more limited than may at first seem. The term “treaty” in the United States has a more limited meaning than the treaties discussed above: it refers only to a small portion of the international agreements that are binding upon the United States. Under international law, in contrast, the term “treaty” refers to any written agreement between two or more nations (whether it is called a treaty, convention, agreement, protocol, or other name). In the domestic law of the United States, however, there are many binding international agreements that are never approved by the Senate. Professors Buergenthal and Murphy suggest that only five percent of all the international agreements concluded by the United States go through the formal process of obtaining Senate approval as a “treaty.”⁵¹⁷

International agreements that do not require two-thirds approval of the Senate fall into three categories:

⁵¹⁶ U.S. CONST. art. II, § 2, cl. 2.

⁵¹⁷ BUERGENTHAL & MURPHY, *supra* note at 181. Nonetheless, the agreements to which the United States is a party (but which are not approved by the Senate) are still binding on the United States.

1. Agreements concluded by the President (or the executive branch in general) pursuant to existing legislation or prior treaties that contemplate follow-on or implementing agreements. These agreements are sometimes called “treaty-based executive agreements.” The bilateral agreements implementing the NATO Status of Forces Agreement are an example. The Senate concurred in 1951 with the original NATO Treaty,⁵¹⁸ but the President concluded he could sign implementing agreements with individual states without additional Senate approval.
2. Agreements consistent with the President’s constitutional powers. These agreements are sometimes called “sole-executive agreements” because they are based solely on the President’s authority under the Constitution. An agreement to establish diplomatic relations with a country and receive its ambassador – a power expressly described in the Constitution – is an example.⁵¹⁹ So, too, is the authority of the President to waive or settle claims against a foreign nation if done pursuant to presidential authority of normalizing relations between countries.⁵²⁰
3. Agreements subject to approval by Congress as a whole, not just the Senate. These agreements are called “congressional-executive agreements.” The North American Free Trade Agreement (“NAFTA”) of 1992 is an example. Both the House and the Senate approved the agreement, though the Senate did so by less than the two-thirds vote needed to ratify a traditional treaty.

Treaties become part of the law of the land under the “Supremacy Clause” of the Constitution:

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; *and all Treaties made*, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.⁵²¹

If there is a conflict between a federal statute and a treaty, the “later-in-time” principle prevails in the same manner as a conflict between two federal statutes.⁵²²

While treaties to which the United States is a party generally address matters between governments, many agreements affect individuals and corporations. This situation begs the following question: *When, if at all, do these agreements create a right that a private party can*

⁵¹⁸ *North Atlantic Treaty Organization, Status of Forces Agreement*, June 19, 1951, 199 U.N.T.S. 67.

⁵¹⁹ U.S. CONST. art. II, § 3.

⁵²⁰ *See, e.g.*, the U.S. Supreme Court decisions in *United States v. Belmont*, 301 U.S. 324, 330 (1937), and *United States v. Pink*, 315 U.S. 203, 230 (1942).

⁵²¹ U.S. CONST. art. VI, cl.2.

⁵²² A treaty enacted after a statute prevails if it is in conflict, and vice versa (a statute passed after a treaty will prevail if it is in conflict with the treaty). *Chae Chan Ping v. United States*, 130 U.S. 581, 599-601 (1889).

enforce in U.S. courts? To answer that question, courts ask whether the treaty is “self-executing” or not.⁵²³ As a general rule, a treaty is *not* “self-executing” if:⁵²⁴

- the agreement itself manifests an intention that it shall not become effective without the enactment of implementation legislation;
- the Senate, in giving consent to a treaty, or Congress by resolution, requires implementation legislation; or
- implementing legislation is required by the Constitution.

7.1.2 The Role of Congress

Congress plays an essential role in three different (and sometimes overlapping) aspects of interstate river governance:

- First, Congress appropriates money for federal dams. The large network of infrastructure on existing rivers illustrates the extent of the U.S. government’s investment.
- Second, Congress, through its authority over interstate commerce, regulates navigable waterways.
- Third, Congress may, if it wishes, divide an interstate river and allocate water between two or more states, though it has done so rarely. The first time it exercised this power was when Congress enacted the Boulder Canyon Project Act of 1928. Thirty-five years after its passage, the U.S. Supreme Court held in a landmark opinion that the Act constituted a comprehensive scheme to divide waters in the Lower Basin of the Colorado River among three states: Arizona, California, and Nevada.⁵²⁵ Since 1928, Congress has provided a legislative solution in only one other river basin: the 1990 legislation relating to Pyramid Lake and the Truckee and Carson Rivers between Nevada and California.⁵²⁶

7.1.3 Interstate Compacts

The “interstate compact” is the most common way of allocating water on rivers that cross state boundaries within the United States or that serve as the border between two or more states. An

⁵²³ The first U.S. Supreme Court decision to make the distinction between treaties that require implementing legislation and those that do not was *Foster v. Neilson*, 27 U.S. 253 (1829). For a recent opinion, see *Medellin v. Texas*, 128 S.Ct. 1346 (2008), holding that an opinion rendered by the International Court of Justice was not enforceable in state courts in the absence of a federal statute. The case involved efforts to enforce an ICJ opinion, *Case Concerning Avena and other Mexican Nationals (Mex. v. U.S.)*, 2004 I.C.J. 12 (Judgment of March 31), in Texas state courts.

⁵²⁴ RESTATEMENT (THIRD) OF FOREIGN RELATIONS § 111(4) (1987). See, e.g., *Pierre v. Gonzales*, 502 F.3d 109, 119 (2d Cir. 2007).

⁵²⁵ *Arizona v. California*, 373 U.S. 546 (1963).

⁵²⁶ *Truckee-Carson-Pyramid Lake Water Settlement Act*, Pub. L. No. 101-618, Title II, 104 Stat. 3294.

interstate compact is a binding legal instrument, a contract between two or more states, signed pursuant to the Compact Clause of the U.S. Constitution. As a general rule, Congress must consent to each compact that affects the operation of a navigable river.⁵²⁷

7.1.4 The U.S. Supreme Court

The U.S. Supreme Court is the court of last resort to hear appeals interpreting treaties and it has exclusive jurisdiction to hear disputes between states. To date, the Supreme Court has not interpreted the major international treaties that affect water management between either the United States and Canada or the United States and Mexico.

The Supreme Court has, however, considered “equitable apportionment” petitions on eight interstate rivers. To date, it has approved a final apportionment decree for only three: the Delaware River between New York and New Jersey; the Laramie River between Colorado and Wyoming; and the North Platte River between Nebraska and Wyoming. In five other petitions, the Supreme Court held that the complaining state did not provide sufficient evidence to obtain an apportionment decree.

TABLE 46. U.S. Supreme Court’s Equitable Apportionment Cases.

River:	Case:	Initial Supreme Court Decision:
Arkansas	<i>Kansas v. Colorado</i>	185 U.S. 125 (1902)
Laramie	<i>Wyoming v. Colorado</i>	259 U.S. 419 (1922)
Connecticut	<i>Connecticut v. Massachusetts</i>	282 U.S. 660 (1931)
Delaware	<i>New Jersey v. New York</i>	283 U.S. 336 (1931)
North Platte	<i>Nebraska v. Wyoming</i>	295 U.S. 40 (1935)
Walla Walla	<i>Washington v. Oregon</i>	297 U.S. 517 (1936)
Colorado	<i>Arizona v. California</i>	298 U.S. 558 (1963)
Vermejo	<i>Colorado v. New Mexico</i>	459 U.S. 176 (1982)

Source: LAWS OF THE RIVERS: THE LEGAL REGIMES OF MAJOR INTERSTATE RIVER SYSTEMS OF THE UNITED STATES (Colorado River Commission of Nevada 2006) at 25.

7.1.5 Hydropower in the United States

Three federal agencies have built dams on the rivers of the United States for power, flood control, irrigation, navigation, water supply, recreation, and other purposes. The three agencies are: 1) the U.S. Army Corps of Engineers (“USACE”); 2) the U.S. Bureau of Reclamation (“USBR”); and 3) the Tennessee Valley Authority (“TVA”).

⁵²⁷ U.S. CONST. art. I, § 10, cl. 3. “No State shall, without the Consent of Congress . . . enter into any Agreement or Compact with another State, or with a foreign Power”

TABLE 47. Generating Capacity and Reservoir Storage at Federal Dams.

Agency:	No. of Dams:	Capacity: (MW)	Storage: (MAF)
USACE	75	24,420	218.7
USBR	58	14,758	245.0
TVA	39	5,556	18.2
TOTAL	162	44,734	481.9

MW = megawatts (million watts) of generating capacity
MAF = million acre feet.

Source: LAWS OF THE RIVERS: THE LEGAL REGIMES OF MAJOR INTERSTATE RIVER SYSTEMS OF THE UNITED STATES (Colorado River Commission of Nevada 2006) at 37, compiled from web sites of the above federal agencies.

The U.S. Army Corps of Engineers is the oldest of the dam-building agencies. It traces its origins to the American Revolution, when the Continental Congress first established a position within the Army called the “Chief of Engineers.” The first man to hold the position, Colonel Richard Gridley, directed fortifications during the Battle of Bunker Hill in 1775. The Army Corps is not limited by geographical area, though historically, the agency has not built dams for water supply and irrigation. The Corps is part of the U.S. Department of Defense.⁵²⁸

The Bureau of Reclamation was initially created in 1902 as the “U.S. Reclamation Service” to build irrigation and water storage projects in the arid West, “to make the desert bloom.” The Bureau now operates projects in 17 Western States. The Bureau is part of the U.S. Department of Interior.⁵²⁹

The Tennessee Valley Authority (“TVA”), a federal corporation with a limited geographic mission, is authorized to build dams and other projects, and to manage the Tennessee River, which drains parts of seven states. The TVA was created in 1933. Unlike the Army Corps, which has a nationwide mission, and the Bureau of Reclamation, which has responsibilities in the West, the TVA has discrete duties primarily in a single watershed, the Tennessee River Basin. The TVA also owns and operates coal and nuclear power plants.⁵³⁰

7.1.6 The Role of State Governments

Despite the role of the federal government in building dams and regulating commerce on navigable rivers, the 50 states also play an important role in water policy and allocation.

As a general rule, each state is the trustee of the water within its boundaries. The state does not own the water outright. Rather, the state holds the water in trust for the public and administers a system of water rights. These water rights vest either in an adjacent property owner (in a riparian

⁵²⁸ For the home page of the U.S. Army Corps of Engineers, see www.usace.army.mil.

⁵²⁹ For the home page of the U.S. Bureau of Reclamation, see www.usbr.gov.

⁵³⁰ For the home page of the Tennessee Valley Authority, see www.tva.gov.

rights system) or in the user of the water right (in a prior appropriation system). In the eastern states, riparian water law dominates. In western states, the law of prior appropriations is the rule. Many states, however, have adopted some sort of hybrid system that mixes the two concepts.⁵³¹

7.1.7 The Role of Native American Tribes

The right of Native American tribes to govern their members and territory has given rise to a number of water rights disputes under “the reserved rights doctrine.” The first such dispute was addressed in a U.S. Supreme Court decision in 1908, and created the “Winters Doctrine.”⁵³² The case concerned a conflict between Native Americans on a Montana reservation and nearby non-Native American settlers. The decision stands for the principle that although the settlers had established rights under state law, it was the Native Americans who held the enforceable water right with priority of first use (the “Winters Doctrine”). The federal government had ceded these rights to the Native Americans when it created the reservation and acquired lands for settlers outside reservation boundaries. The lands left for the Native Americans included the right to use water for their own purposes. Litigation over Native American water rights continues to this day in many forums.

7.1.8 Administration of Environmental Law

The U.S. Environmental Protection Agency (“EPA”) is the lead entity that regulates water pollution and water quality in the United States. The EPA administers the Clean Water Act of 1972 and its amendments, which regulate the discharges of pollutants into lakes and rivers. Section 402 of the Act establishes a federal permit system for pollution discharges, the National Pollution Discharge Elimination System (“NPDES”), which is required for all discharges from a specific source into navigable waters in the United States. Applicants must comply with federal effluent standards. States are generally free to establish stricter controls of water quality and may, under certain conditions, impose limitations on NPDES permits.

In addition to the EPA, two federal agencies play an important role in the preservation and restoration of fish and wildlife species under the Endangered Species Act (“ESA”). The ESA authorizes the Secretary of the Interior to “list” animal and plant species that are threatened or endangered and to designate critical habitat for those species. Once a species is listed, two provisions of the ESA become particularly important. Section 9 of the Act provides that no person may “take” – meaning to kill, collect, or harm – a species, except as authorized by the statute.⁵³³ In addition, section 7 requires that all federal agencies insure that “any action authorized, funded, or carried out . . . is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species.”⁵³⁴

⁵³¹ DAVID H. GETCHES, *WATER LAW* (West Publishing 3rd ed. 1997) at 7-8 and 190-206.

⁵³² *Winters v. United States*, 207 U.S. 564 (1908).

⁵³³ *Endangered Species Act of 1973*, 16 U.S.C. § 1531-1544, *see* §§ 3(19), 9(1).

⁵³⁴ *Id.* § 7(2).

The U.S. Fish and Wildlife Service (“USFWS”) and the National Oceanic and Atmospheric Fishery Agency (“NOAA”) both implement the ESA, although each governmental entity has different responsibilities. The USFWS has jurisdiction over birds and non-migrating fish. It is part of the U.S. Department of Interior. NOAA has jurisdiction over salmon, steelhead and other anadromous fish that spawn in fresh water but migrate to sea for most or all of their adult lives. NOAA is part of the U.S. Department of Commerce.

7.2 THE LAW OF WATER ALLOCATION IN CANADA

Canada is the second largest nation on earth – only Russia is larger. It is home to 33 million people. Ninety percent of its population lives within 60 miles (100 kilometers) of the border with the United States.⁵³⁵ Approximately one-quarter of the world’s fresh water storage is in Canada – and as much as 40%, if ice storage and water in the Great Lakes, shared with the United States, are taken into account.⁵³⁶ The longest river entirely in Canada is the Mackenzie (1,079 miles/1,737 kilometers), which originates in Great Slave Lake in the Northwest Territories and flows into the Arctic Ocean. The river drains one-sixth of Canada.

7.2.1 Treaties

In Canada, treaties are signed and ratified at the discretion of the Canadian federal government, not Parliament. Because of increasing political pressure by voters, Canada is now evaluating its treaty-making process in order to make it more accountable and transparent.⁵³⁷ The purpose of this change is to increase the role of Parliament in the treaty-making process through the adoption of procedures similar to those used in the United Kingdom and Australia.⁵³⁸

On January 25, 2008, the Canadian Department of Foreign Affairs and International Trade (“DFAIT”) announced a new policy in which the Canadian federal government intends to table all international treaties in the lower house of the Canadian Parliament – the House of Commons – prior to ratification.⁵³⁹ This extra step allows members of Parliament to examine, debate and possibly vote on a treaty. The policy does not remove treaty-making power from, or share

⁵³⁵ Natural Resources Canada, *Significant Canadian Facts*, <http://atlas.nrcan.gc.ca/site/english/learningresources/facts/supergeneral.html>.

⁵³⁶ HARRIET I. RUEGGERBERG & ANDREW R. THOMPSON, *WATER LAW AND POLICY ISSUES IN CANADA* 119 (Westwater Research Centre, University of British Columbia 1984) (“RUEGGERBERG & THOMPSON”).

⁵³⁷ Press Release, Foreign Affairs and International Trade Canada, *Canada Announces Policy to Table International Treaties in House of Commons* (Jan. 25, 2008), <http://news.gc.ca/web/view/en/index.jsp?articleid=374729> (“Press Release, DFAIT”). In that press release, the Honourable Maxime Bernier, Minister of Foreign Affairs, stated:

As of today, all treaties between Canada and other states or entities, and which are considered to be governed by public international law, will be tabled in the House of Commons This reflects our government’s commitment to democracy and accountability. By submitting our international treaties to public scrutiny, we are delivering on our promise for a more open and transparent government.

⁵³⁸ *Id.*

⁵³⁹ *Id.*

treaty-making power within, the Canadian federal government. Nor does the policy *require* ratification by Parliament. Instead, the policy states the government's *intention* to submit international treaties for review by Parliament.⁵⁴⁰ The legal authority to ratify a treaty still remains with the Canadian federal government, which also reserves the right even to bind Canada to treaties prior to tabling them in the House of Commons:

The government will maintain the legal authority to decide whether to ratify the treaty. It will, of course, give consideration to the view of the House in coming to a decision.

Very exceptionally the Government may have to bind Canada to the treaty before the treaty is tabled, informing the House of the treaty at the earliest opportunity.⁵⁴¹

The Treaty Section of the DFAIT will carry out the new policy.⁵⁴² Canada adheres to the Vienna Convention on the Law of Treaties, which is a codification of public international law on the signing and interpretation of treaties.⁵⁴³

7.2.2 The Constitution of Canada

Canada is composed of ten provinces and three northern territories.⁵⁴⁴ The provinces, like the states in the United States, are largely self-governing. The territories, however, are traditionally administered by the central government.⁵⁴⁵ Canada is both an independent sovereign democracy and a federal state, with a constitutional monarchy and a parliamentary system of governance.⁵⁴⁶

Canada's Confederation was created by the *British North America Act, 1867*, subsequently renamed the *Constitution Act, 1867*.⁵⁴⁷ In 1982, Canada's original Constitution was "patriated" –

⁵⁴⁰ Jeff Davis, *New Treaty Review Process Falls Short*, EMBASSY, Jan. 30, 2008, available at http://www.embassymag.ca/html/index.php?display=story&full_path=/2008/january/30/treaty/.

⁵⁴¹ Press Release, DFAIT, *supra* note 537.

⁵⁴² Department of Foreign Affairs and International Trade, CANADA TREATY INFORMATION: CANADA TREATY SECTION, <http://www.accord-treaty.gc.ca/Section.asp?Page=TS>; *External Affairs*, vol 19 (1967) at 369. For more information on Canada's new treaty practice and procedure, see DEPARTMENT OF FOREIGN AFFAIRS AND INTERNATIONAL TRADE, CANADA TREATY INFORMATION: POLICY ON TABELING OF TREATIES IN PARLIAMENT, <http://www.accord-treaty.gc.ca/Tabling.asp>.

⁵⁴³ *Vienna Convention on the Law of Treaties*, art. 2, §1(a), May 23, 1969, 1155 U.N.T.S. 331, available at http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf. See section 4.5.1 at page 132 of this report for more information on the *Vienna Convention*.

⁵⁴⁴ Government of Canada, *Provinces and Territories*, <http://canada.gc.ca/othergov-autregouv/prov-eng.html>.

⁵⁴⁵ EUGENE A. FORSEY, HOW CANADIANS GOVERN THEMSELVES, http://www.parl.gc.ca/information/library/idb/forsey/intro_01-e.asp ("FORSEY").

⁵⁴⁶ *Id.*

⁵⁴⁷ *Id.* *The British North America Act, 1867* and its eleven amendments became the *Constitution Acts, 1867 to 1975*, available at http://www.parl.gc.ca/information/library/idb/forsey/fed_state_08-e.asp.

brought home in the sense that Canada could amend its own Constitution rather than depend on a new Act from the British Parliament. The result was the *Constitution Act, 1982*, which removed the British Parliament's final vestige of power over Canada. The core of this Constitution, however, is still the *Constitution Act, 1867*.

Unlike the U.S. Constitution, which is a single document, the Canadian Constitution is a collection of twenty-five primary documents: fourteen Acts of the British Parliament; seven Acts of the Canadian Parliament; and four British orders-in-council.⁵⁴⁸

Canada's *Constitution Act, 1982* does not directly address water rights and allocation. It does, however, recognize and grant rights to two entities – its provinces and aboriginal peoples – that directly relate to water rights and allocation. First, the *Constitution Act, 1982* grants the provinces great control over their natural resources within their borders. Each province can export within Canada the primary products from its mines, oil wells, gas wells, forests, and electric power plants, so long as price or supply discrimination does not occur.⁵⁴⁹

Second, the *Constitution Act, 1982* contains important provisions regarding aboriginal rights. *The Canadian Charter of Rights and Freedoms* states that it “shall not be construed so as to abrogate or derogate from any aboriginal, treaty or other rights or freedoms that pertain to the aboriginal peoples of Canada,” including the rights and freedoms recognized by both the Royal Proclamation of 1763, as well as land claims agreements that exist today or may be created in the future.⁵⁵⁰

Federal courts have provided little guidance in determining the roles of the federal and provincial governments in water allocation and management.⁵⁵¹ Compared with the United States, there is relatively little water rights litigation on a national level. Although the provinces can sue each other, the Canadian Constitution does not vest exclusive authority in the Supreme Court of Canada to hear these disputes, as the U.S. Constitution does with disputes between two states.

⁵⁴⁸ *Id.* at http://www.parl.gc.ca/information/library/idb/forsey/fed_state_05-e.asp. For more information on the evolution of Canada's Constitution through these twenty-five primary documents, see the Schedule to the *Constitution Act, 1982*, http://laws.justice.gc.ca/en/const/sched_e.html.

⁵⁴⁹ *Id.* at http://www.parl.gc.ca/information/library/idb/forsey/fed_state_19-e.asp. The Federal government (i.e., Parliament), however, may still legislate on such matters. In the case of conflicts of law, the federal law prevails.

⁵⁵⁰ Constitution Act, 1982, § 25, Part II, Canada Act 1982, ch. 11 (U.K.), Schedule B. The *Royal Proclamation of 1763* forms the legal basis for Aboriginal land claims in Canada: “And whereas it is just and reasonable, and essential to our Interest, and the Security of our Colonies, that the several Nations or Tribes of Indians with whom We are connected, and who live under our Protection, should not be molested or disturbed in the Possession of such Parts of Our Dominions and Territories as, not having been ceded or purchased by Us, are reserved to them.” The Royal Proclamation of 1763, Oct. 7, 1763 (Gr. Brit.), available at http://www.solon.org/Constitutions/Canada/English/PreConfederation/rp_1763.html.

⁵⁵¹ Environment Canada, *Final Report of the Inquiry on Federal Water Policy* 37 (1987), http://www.ec.gc.ca/Water/en/info/pubs/fedpol/e_fedpol.pdf. See also Peter Bowal, *Canadian Water: Constitution, Policy, and Trade*, 2006 Mich. St. L. Rev. 1141, 1162 & 1166 (2006) (“Bowal”).

7.2.3 The Role of Parliament

Under the Canadian Constitution, the federal government's exclusive powers over water, as exercised by Parliament, include:

- The authority over public land and property that belong to the federal Crown. This property includes canals, public harbors, lighthouses and piers, river and lake improvements, as well as lands dedicated for general public purposes.⁵⁵²
- The authority to regulate navigation and navigable waters, shipping, and fisheries.
- The residual authority over subjects of a national dimension that fall in the category of the exclusive provincial power of "peace, order, and good government," commonly known as "POGG," and that have not been specifically granted to the provinces.⁵⁵³

There is no central federal law of water allocation and dispute resolution in Canada. There are, however, exceptions to this rule, where Parliament has passed bills that assert federal control over specific areas. *The Dominion Water Power Act, 1985*, for example, administered by the Minister of Indian and Northern Affairs,⁵⁵⁴ regulates hydropower and energy produced on public lands. The *Canada Water Act, 1985* authorizes agreements between provinces for water quality, flood control, and other related problems.⁵⁵⁵

7.2.4 The Role of Common Law

The basic foundation of Canada's water law system, except in Quebec, is the common law passed on to Canada from Great Britain. Riparian rights make up the historic common law of water allocation.⁵⁵⁶ Under the common law, no person can own water outright. Landowners, however, who own the banks of rivers or lakes, or who have water that flows over or percolates through their land, hold special water use rights called riparian rights. These rights include: the right to water access; the right to receive water in its natural state (subject to limited uses by owners upstream); and the right to fish. Riparian owners have standing to sue if these rights are impaired.⁵⁵⁷

⁵⁵² *Constitution Act, 1867*, §§ 91, 92, 108, & Schedule III. See also Margot Hurlbert, *Canada's Water Law* 6-7 (2007), <http://www.ncwc.ca/pdf/waterlaw.pdf> ("Hurlbert"). Section 92(10)(a)-(c) of the *Constitution Act, 1867* also grants federal control. See Bowal, *supra* note 551, at 1167.

⁵⁵³ *Constitution Act, 1867*, 30 & 31 Vict. Ch. 3 (U.K.), as reprinted R.S.C., No. 5 (Appendix 1985), § 91 & Preamble.

⁵⁵⁴ *Dominion Water Power Act*, R.S.C. 1985, c. W-4, § 2.

⁵⁵⁵ *Canada Water Act*, R.S.C. 1985, c. C-11. See also Linda Nowlan, *Customary Water Laws and Practices in Canada* ("Nowlan") at 14, available at <http://www.fao.org/Legal/advserv/FAOIUCNcs/Canada.pdf>.

⁵⁵⁶ Hurlbert, *supra* note 552, at 1. See also RUEGGERBERG & THOMPSON, *supra* note 536, at 4. The laws of Quebec, in contrast, originate from the Napoleonic Code of France, rather than the common law of Great Britain.

⁵⁵⁷ RUEGGERBERG & THOMPSON, *supra* note 536, at 4.

At both the federal and provincial levels of government, statutes are often used to modify, update, or replace the common law. As a federal nation, Canada's Constitution has divided the power to make statutory laws between the federal government (through the Parliament of Canada) and the provincial governments (through the provincial legislatures). Provincial governments typically also have the authority to delegate law-making powers to regional and municipal governments. In addition, Canada's three northern territories have their own legislatures and are delegated certain powers by the federal government, but the Constitution does not grant them the same power as provinces.⁵⁵⁸

Over the years, provincial statutory law has greatly altered water rights that existed under common law, particularly the law of water allocation and ownership.⁵⁵⁹ In most provinces, for example, the beds of water bodies are now vested by statute in the provincial Crown and are no longer owned by riparian landowners. Furthermore, most provincial statutes require riparian landowners to obtain permits or licenses for removing large quantities of water from a watercourse and to tap underground water supplies.⁵⁶⁰ These permits or licenses are typically allocated by the provincial governments in the Canadian West pursuant to statutes based on the doctrine of "prior appropriation" or "prior allocation."⁵⁶¹

7.2.5 The Supreme Court of Canada

The Supreme Court of Canada is the final appeals court; its jurisdiction embraces both the civil law of Quebec and the common law of Canada's other provinces and territories. The Court sits in Ottawa, Ontario. It was originally created by an Act of Parliament in 1875 as a general court of appeal with national jurisdiction.⁵⁶² Its opinions have created some uniformity in common law and statutory interpretation,⁵⁶³ but the Court has not apportioned inter-provincial rivers, as the U.S. Supreme Court has done on interstate rivers within the United States.

⁵⁵⁸ *Id.*

⁵⁵⁹ *Id.* at 5.

⁵⁶⁰ *Id.*

⁵⁶¹ The "first in time, first in right" principle applies to both "prior appropriation" and "prior allocation" doctrines in Canada. But the doctrines differ as to when the right begins. Under the Canadian doctrine of "prior appropriation," a licensee acquires rights to water from the first time the water is put to beneficial use. Under the Canadian doctrine of "prior allocation," a licensee acquires rights to water from the date of the license application. The prior appropriation and prior allocation doctrines are used in the provinces of British Columbia, Alberta, Saskatchewan, and Manitoba. Ontario and Eastern Canada generally rely on the riparian rights doctrine. For additional background information on water allocation in Canada, see Hurlbert, *supra* note 552, at 2, and Nowlan, *supra* note 555, at 13.

⁵⁶² Supreme Court of Canada, *About the Court*, available at <http://www.scc-csc.gc.ca/court-cour/sys/index-eng.asp>.

⁵⁶³ One Canadian Supreme Court case worthy of note involved chlor-alkali plants in Ontario and Saskatchewan, which released mercury into rivers that ended up in Manitoba and forced the closure of commercial fisheries operations there. The Manitoban provincial government took several steps: it paid financial assistance to those affected by the closure, it enacted a law granting Manitobans a right of action to sue the polluting companies in Saskatchewan and Ontario, and it sued the plant operators. The Supreme Court ruled against Manitoba on the grounds that a provincially-created statutory right of action against plants that were properly licensed in Saskatchewan and Ontario was outside of its powers under section 92(13) of the *Constitution Act, 1867*. *Interprovincial Co-Operatives Ltd. v. The Queen*, [1976] 1 S.C.R. 477.

7.2.6 The Role of Provincial Governments

The *Constitution Act, 1867* gives ownership of water to the provinces.⁵⁶⁴ The Act also gives provinces the right to manage and sell water.⁵⁶⁵ As a result, the ten provinces in Canada have jurisdiction to address a broad range of issues relating to rivers and lakes, including water allocation and quality. Provincial legislative powers include the following areas:

- water supply;
- pollution control; and
- hydroelectric power development.⁵⁶⁶

Canada's provinces have the right to sign inter-provincial agreements between themselves to cooperatively manage water resources. These agreements are similar to interstate compacts in the United States.

The Prairie Provinces Water Board (PPWB), for example, was created in 1948 by three provinces – Saskatchewan, Alberta and Manitoba – and the federal government of Canada to recommend the best use of inter-provincial water as well as to allocate water between these provinces.⁵⁶⁷ The authority to enter into the agreement came from the Lieutenant Governors-in-Council of each province and the Governor-in-Council of Canada.⁵⁶⁸

Other inter-provincial water-related agreements include: the Mackenzie River Basin Board (1977) between the federal government of Canada, British Columbia, Alberta, Saskatchewan, the Northwest Territories, and the Yukon.⁵⁶⁹ It is not clear whether the federal government could allocate interprovincial waters if the provinces were unable to reach an agreement.⁵⁷⁰

⁵⁶⁴ *Constitution Act, 1867*, § 109. “Inland waters, such as harbors, bays, estuaries, and other water wholly within provincial boundaries and encompassed by its land mass are subject to provincial jurisdiction.” Bowal, *supra* note 551, at 1162. See also, PETER W. HOGG, *CONSTITUTIONAL LAW OF CANADA* 319 (4th ed. 1997), and *Burrard Power Co. v. R.*, [1911] A.C. 87. 94 (the public lands grant by the Province of British Columbia to the Dominion of Canada also passed the water rights incidental to those lands).

⁵⁶⁵ *Constitution Act, 1867*, § 92(5).

⁵⁶⁶ Environment Canada, *Provincial/Territorial*, http://www.ec.gc.ca/water/en/policy/prov/e_prov.htm (“Environment Canada, *Provincial/Territorial*”).

⁵⁶⁷ Environment Canada, *Prairie Provinces Water Board*, <http://www.mb.ec.gc.ca/water/fa01/index.en.html>. For a discussion of the PPWB's responsibilities in the Saskatchewan-Nelson River Basin, see section 2.7.3 at page 94 of this report.

⁵⁶⁸ Environment Canada, *Master Agreement on Apportionment*, available at <http://www.mb.ec.gc.ca/water/fb01/fb00s05.en.html>.

⁵⁶⁹ Environment Canada, *Mackenzie River Basin Board*, <http://www.mb.ec.gc.ca/water/fa00s02.en.html>.

⁵⁷⁰ See *Inter-provincial Cooperatives, Ltd. v. The Queen*, 1 B.C.R. 477 (1976).

In Canada, governmental powers are delegated by provincial legislatures to municipalities.⁵⁷¹ They have no power independently granted by the Canadian Constitution. As a result, the power of municipalities to manage water cannot exceed the power of the provinces.⁵⁷²

7.2.7 The Role of Territorial Governments

Unlike the provincial governments, which were established by the Canadian Constitution, the territorial governments were created by enactments of the Parliament and are subject to overriding federal legislation.⁵⁷³ As a result, most territorial natural resources fall under the jurisdiction of the Federal government.⁵⁷⁴ All waters in the Yukon, Northwest Territories, and Nunavut are still owned by the federal Crown, subject to unsettled aboriginal land claims.⁵⁷⁵

Indian and Northern Affairs Canada (“INAC”), a federal agency, has the power to allocate water resources in two of the three territories: the Northwest Territories and Nunavut.⁵⁷⁶ INAC’s responsibility for water management originates from the *Department of Indian Affairs and Northern Development Act, 1985*,⁵⁷⁷ which gives it provincial-like power.⁵⁷⁸ There is an exception: responsibility for managing water resources in the Yukon River Basin was transferred in 2003 from the federal government to the territorial Government of Yukon. Although the waters remain vested in the federal Crown, all three territories have established their own water boards to manage and regulate water usage⁵⁷⁹ and issue licenses (permits) to users.

⁵⁷¹ *Constitution Act, 1867*, § 92(8). See also Hurlbert, *supra* note 552, at 7-8.

⁵⁷² Hurlbert, *supra* note 552, at 7-8.

⁵⁷³ *Id.*

⁵⁷⁴ *Id.*

⁵⁷⁵ Yukon Act, § 48, R.S.C., ch. Y 2 (1985); Yukon Waters Act, § 3, S.C. 1992, c. 40 (1993); Northwest Territories Waters Act, § 4, S.C. 1992, c. 39 (1993); and Nunavut Waters and Nunavut Surface Rights Tribunal Act, § 8, S.C. 2002, c. 2 (2002). Under the Northwest Territories Waters Act, territorial management is subject to the *Dominion Water Powers Act*. Northwest Territories Waters Act, § 4.

⁵⁷⁶ Environment Canada, *Provincial/Territorial*, *supra* note 566.

⁵⁷⁷ Department of Indian Affairs and Northern Development Act (R.S., 1985, c. I-6), § 5.

⁵⁷⁸ Indian and Northern Affairs Canada, *Water Management in Northwest Territories and Nunavut*, http://www.ainc-inac.gc.ca/ps/nap/wat/watmannwt_e.html. The former name of INAC was the Department of Indian and Northern Affairs. For more information, see the INAC homepage, <http://www.ainc-inac.gc.ca/index-eng.asp>.

⁵⁷⁹ Yukon Waters Act, § 8, Northwest Territories Waters Act, § 10; and Nunavut Waters and Nunavut Surface Rights Tribunal Act, § 14. For more information, see the following home pages: the Yukon Water Board, <http://www.yukonwaterboard.ca/>; the Northwest Territories Water Board, <http://www.nwtwb.com/>; and the Nunavut Water Board, <http://www.nunavutwaterboard.org/>.

7.2.8 First Nations/Aboriginal Peoples

There are approximately 630 First Nations in Canada⁵⁸⁰ with an approximate population of 1.2 million. According to the Assembly of First Nations, a national organization representing First Nations citizens, drinking water quality is a major area of concern.⁵⁸¹ The *Constitution Act 1982* protects aboriginal rights to use natural resources, including water, on lands that the federal government has ceded to them.⁵⁸² Provincial legislation and perhaps the common law may at times conflict with this Constitutional grant of authority, but the scope of provincial power is largely untested in Canadian courts.

Canadian federal and provincial governments have a fiduciary duty to consult with First Nations to ensure that their rights are considered when the government makes resource allocation decisions.⁵⁸³ As part of the effort to resolve First Nation claims, a number of resource management boards have been created, especially in Canada's Territories.⁵⁸⁴

7.2.9 Hydropower in Canada

Canada is the largest exporter of hydropower in the world. The sole beneficiary is the United States.⁵⁸⁵ There is no counterpart in Canada to the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, or the Tennessee Valley Authority ("TVA"), which own a total of 162 dams with the capacity to generate 45,000 MW of power.⁵⁸⁶ In the United States, there are few major interstate rivers where the federal government has *not* built some type of infrastructure. This is not the case in Canada.

In Canada, the construction of large dams is undertaken primarily by a provincial entity or corporation, such as Quebec Hydro or British Columbia Hydro. In addition, Canada has 933

⁵⁸⁰ THE CANADIAN ENCYCLOPEDIA, <http://www.canadianencyclopedia.ca/index.cfm?PgNm=TCE&Params=A1ARTA0000352>.

⁵⁸¹ Assembly of First Nations, *First Nations Water Initiative*, <http://www.afn.ca/article.asp?id=2844>.

⁵⁸² *Constitution Act, 1982*, § 35. For cases interpreting this provision, see *Calder v. A-G, B.C.* [1973], 34 D.L.R. (3d) 145, where the Supreme Court of Canada found that aboriginal title includes the right "to enjoy the fruits of the soil of the forest, and of the rivers and streams within the boundaries of said lands." *Id.* at 170. See also *Delgamuukw v. British Columbia* [1997], 3 S.C.R. 1010 (laws of aboriginal peoples should be taken into account and included in land and water decisions).

⁵⁸³ For recent cases on the subject of consultation, see, e.g., *Taku River Tlingit First Nation v. British Columbia* (Project Assessment Director) [2004] 3 S.C.R. 550, 2004 SCC 74 (holding that consultation was sufficient for a mine) and *Haida Nation v. British Columbia* (Minister of Forests) [2004] 3 S.C.R. 511, 2004 SCC 73 (holding that consultation was insufficient for the transfer of timber interests).

⁵⁸⁴ The territorial and First Nation water boards can be found at the following websites: <http://www.nunavutwaterboard.org>, and <http://www.yukonwaterboard.ca/>, <http://www.nwtwb.com/>, and <http://www.glwb.com/>, <http://www.mvlwb.com/html/introduction.htm>, and <http://www.slwb.com/>.

⁵⁸⁵ See the U.S. Energy Information Administration, *Country Analysis Brief on Canada*, <http://www.eia.doe.gov/emeu/cabs/Canada/Background.html>.

⁵⁸⁶ See Table 39 at page 91 of this report showing the federal agencies that own major dams in the United States.

“large dams” that are used for hydroelectric power generation, irrigation and flood control.⁵⁸⁷ New hydropower projects undergo a lengthy regulatory process, which includes both a comprehensive environmental assessment and public consultations.⁵⁸⁸

7.2.10 Administration of Environmental Laws

Environment Canada is the lead federal agency for environmental issues. It is the Canadian counterpart to the U.S. Environmental Protection Agency (“EPA”). Environment Canada’s mandate is to:

- Preserve and enhance the quality of the natural environment;
- Conserve Canada’s renewable resources;
- Conserve and protect Canada’s water resources;
- Forecast weather and environmental change;
- Enforce rules relating to boundary waters; and
- Coordinate environmental policies and programs for the federal government.⁵⁸⁹

The agency also implements the *Canada Water Act, 1985*, which calls for joint consultation between federal and provincial governments on matters relating to water resources.⁵⁹⁰

As part of its responsibilities, Environment Canada also serves as a source of information on:

- Water management, such as bulk water removal and the export, treatment, remediation, and conservation of water;
- Water quality and the safety of drinking water; and
- How Canadians use water.⁵⁹¹

7.3 BORDER WATER LAW BETWEEN THE UNITED STATES AND CANADA

The U.S.-Canadian boundary extends 5,334 miles (8,890 kilometers), including Alaska, and crosses numerous rivers and lakes.⁵⁹²

⁵⁸⁷ The definition of “large dams” as adopted by the Canadian Dam Association, consistent with international practice as defined by the International Commission on Large Dams (“ICOLD”).

⁵⁸⁸ International Water Power and Dam Construction, *Country Profiles: Canada*, <http://www.waterpowermagazine.com/story.asp?sectionCode=165&storyCode=2019652>.

⁵⁸⁹ Environment Canada, *About Us*, <http://www.ec.gc.ca/default.asp?lang=En&n=ECBC00D9-1>.

⁵⁹⁰ Environment Canada, *Water Policy and Regulation: Federal-provincial agreements*, http://www.ec.gc.ca/water/en/policy/coop/e_agree.htm.

⁵⁹¹ See generally Environment Canada, *Water*, <http://www.ec.gc.ca/default.asp?lang=En&n=76D556B9-1> (“Environment Canada, *Water*”).

⁵⁹² Natural Resources Canada, *Significant Canadian Facts*, <http://atlas.nrcan.gc.ca/site/english/learningresources/facts/supergeneral.html>.

7.3.1 International Treaties and Agreements

In the last 100 years, the United States and Canada have signed a number of treaties that address their shared rivers and lakes. The International Waters Treaty, also known as the Boundary Waters Treaty of 1909, is the most important of these agreements.⁵⁹³

The Boundary Waters Treaty

The Boundary Waters Treaty of 1909 sought to resolve a number of water disputes between the two countries, but more importantly, it created a permanent framework for resolving future water issues along the entire U.S.-Canada border on *any* subject, including air and water pollution.

The preamble to the Treaty states simply that the two countries – referred to as “High Contracting Parties” – are:

[E]qually desirous to prevent disputes regarding the use of boundary waters and to settle all questions which are now pending between the United States and the Dominion of Canada involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along their common frontier, and to make provision for the adjustment and settlement of all such questions as may hereafter arise, have resolved to conclude a treaty in furtherance of these ends⁵⁹⁴

The name “Boundary Waters Treaty” is therefore something of a misnomer because the Treaty covers a range of topics, and the institution it created, the International Joint Commission (“IJC”), is empowered to investigate a variety of boundary issues.

The term “boundary waters” is defined narrowly: it refers to lakes, rivers, and connecting waterways along the U.S.-Canada border, including bays, arms and inlets, but *not* tributary waters that flow into those waterways, and *not* waters of rivers flowing across the boundary.⁵⁹⁵

The definition of “boundary waters” includes four of the five Great Lakes through which the international border passes. It is not clear, however, whether Lake Michigan, which is located entirely within the United States, is a boundary water (covered by the Treaty because it is a connecting waterway) or a tributary (excluded from certain provisions of the Treaty). The

⁵⁹³ *Boundary Waters Treaty of 1909*, U.S.-Can, Jan. 11, 1909, 36 Stat. 2448 (“*Boundary Waters Treaty*”), available at <http://www.ijc.org/rel/agree/water.html#text>. The Treaty was signed by the U.S. Secretary of State and the British ambassador to the United States on behalf of “His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India.” At the time, Canada was a dominion of Great Britain, not an independent nation. *Id.* preamble.

⁵⁹⁴ *Boundary Waters Treaty* preamble.

⁵⁹⁵ *Id.* The preliminary article states: “For the purpose of this treaty boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary.”

Treaty does not apply to groundwater. Other provisions in the Treaty apply to transboundary rivers, such as the Columbia River in the Pacific Northwest, which flows across the border, but which are not boundary waters.

Article I requires both nations to keep navigable boundary waters forever “free and open for the purposes of commerce.”⁵⁹⁶

Article II preserves the “exclusive jurisdiction and control” of both nations of “all waters on its own side of the line” that flow across the boundary or into boundary waters. The provision applies to waters that cross the border, but *not* to boundary waters themselves.⁵⁹⁷ At first glance, this provision would seem to reflect the “Harmon Doctrine,” enunciated by the U.S. Attorney General in 1895. Harmon asserted that a nation’s control over a river within its borders was absolute under international law.

But the remaining text in Article II shows that the Harmon Doctrine is not alive and well in the Treaty. The article states:

[B]ut it is agreed that any interference with or diversion from their natural channel of such waters on either side of the boundary, resulting in any injury on the other side of the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the country where such diversion or interference occurs⁵⁹⁸

Professor Bourne, a Canadian water law scholar, captures the essence of this limitation:

This article recognized the unfettered right of the parties to divert waters flowing across the boundary or into boundary waters, although it . . . [gave] a measure of protection to private interests that may be thereby injured in the other country.⁵⁹⁹

The treaty imposed additional obligations on both countries. Article III, for instance, stated that neither country may permit uses, obstructions and diversions, whether temporary or permanent, affecting “the natural level or flow of boundary waters” on the other side of the border, except by mutual consent or with IJC approval.⁶⁰⁰ Thus, diversions and other works that do not materially affect levels of flows of boundary waters in the other nation do not need IJC approval. Conversely, if either the United States or Canada attempted to construct a dam or diversion that

⁵⁹⁶ *Id.* art. I.

⁵⁹⁷ *Id.* art. II.

⁵⁹⁸ *Id.* art. II. This provision – authorizing injured parties in the United States or Canada to pursue litigation in the other country for violations of the Treaty – has apparently never been used.

⁵⁹⁹ Charles B. Bourne, *Canada and the Law of International Drainage Basins*, in *INTERNATIONAL WATER LAW: SELECTED WRITINGS OF PROFESSOR CHARLES B. BOURNE* (Patricia Wouters, ed., Kluwer International 1997) at 294-295.

⁶⁰⁰ *Boundary Waters Treaty* art. III.

changed the natural level or flow of a boundary waterway, then the IJC has jurisdiction over the proposal.⁶⁰¹

Both countries also agreed in Article IV that they would not permit the construction or maintenance of dams or other infrastructure on their side of the border that raised the natural level of either boundary waters or transboundary waters. Simply put, a downstream country, whether the United States or Canada, could not flood the territory of the upstream nation by building a reservoir that crossed the border – except by mutual consent or with IJC approval.⁶⁰²

To guide the IJC in reviewing applications for the new uses of boundary waters, the Treaty created an “order of precedence:” first for domestic and sanitary purposes; second, for navigation; and third for power and irrigation.⁶⁰³ These priorities, spelled out in Article VIII, do not apply or disturb existing uses (as of 1909) on either side of the border.

In two places, the Treaty addressed the specific apportionment of individual rivers:

- Article V limits the diversion of waters from the Niagara River so that the level of Lake Erie was “not appreciably affected.”⁶⁰⁴ This language was amended in 1950 when the United States and Canada agreed to the Niagara River Water Diversion Treaty.
- Article VI apportions the St. Mary and Milk Rivers, which begin in the United States (Montana) and flow into Canada (Alberta and Saskatchewan). Both nations agreed to treat the rivers as if they were “one stream for the purposes of irrigation and power.”⁶⁰⁵ The Treaty mandated that the rivers be apportioned equally. But either country could withdraw more than half the water from one river and less than half from the other river “so as to afford a more beneficial use to each [country].”⁶⁰⁶

Finally, the two nations agreed in Article IV that boundary waters *and* waters which flow across the boundary “shall not be polluted on either side to the injury of health or property on the other.”⁶⁰⁷

This language is one of the first attempts in any treaty to address cross-border pollution. Professor Bourne describes this provision as something of an afterthought because it was

⁶⁰¹ *Id.* Article III also provides that the United States and Canada may approve the uses, obstructions or diversions by “special agreement” without IJC involvement.

⁶⁰² *Id.* art. IV. This article, too, allows the United States and Canada to approve these activities by “special agreement” between themselves (i.e., by mutual consent) without IJC involvement.

⁶⁰³ *Id.* art. VIII.

⁶⁰⁴ *Id.* art. V. The *Niagara River Treaty of 1950* amended this language.

⁶⁰⁵ *Id.* art. VI.

⁶⁰⁶ *Boundary Waters Treaty* art. VI. The IJC issued a subsequent order on the river, clarifying the Treaty article and addressing measurement and apportionment details.

⁶⁰⁷ *Id.* art. IV.

“inserted at the end of Article IV which deals with a matter entirely unrelated to pollution, namely raising the level of waters across the boundary by dams or obstructions.”⁶⁰⁸ Nonetheless, it has turned out to be one of the most significant provisions – a solitary sentence with enormous significance to both countries.

To implement the Treaty, the parties established the six-member International Joint Commission, the first entity among major nations with authority over an entire border.⁶⁰⁹ Under Article IX, the IJC has authority to investigate “any other questions or matters of difference arising between them involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along the common frontier”⁶¹⁰

The Treaty remains by its term in force for only five years, starting from its ratification (which occurred in 1910). By its terms, the treaty remains in force “thereafter until terminated by twelve months’ written notice” by either party.⁶¹¹ Thus, the most important boundary agreement between both countries could be voided by either country for no stated reason and with only a year notice.

Other treaties soon followed the signing of the 1909 Boundary Waters Treaty:

- The Lake of the Woods Treaty (1925) was signed nine years after the Boundary Waters Treaty and is the first agreement between the United States and Canada that addresses a specific waterway. Lake of the Woods is 90-miles (145 kilometers) long. It occupies part of Ontario and Manitoba in Canada and a small part of Minnesota. The lake includes 65,000 miles (105,000 kilometers) of shoreline and 14,552 islands.

In 1919, the Canadian government and the province of Ontario formed a Board of Control to regulate lake levels, but its duties were limited. After a five-year study, the IJC recommended specific flows and levels for the lake. The Lake of the Woods Treaty adopted the IJC recommendations and set specific levels for the lake (e.g., whenever it rose above 1,061 feet./1,708 kilometers or fell below 1,056 feet./1,700 kilometers). So long as the lake levels remained within those limits, no IJC action was necessary. If the level of the lake exceeded or fell below those levels, an international board, under the auspices of the IJC, would control the level of water.⁶¹²

- The Rainy Lake Convention (1938) gave the IJC the power to determine when emergency conditions, such as high or low water, existed in the Rainy Lake watershed. The IJC was empowered to adopt measures to control the flow of the lake, which was

⁶⁰⁸ BOURNE, *supra* note 599, at 311.

⁶⁰⁹ The IJC has no independent enforcement powers (i.e., it cannot fine the countries or seek an injunction in the courts, etc.). Rather, its duties are investigative and consensual. It reports on matters and serves as a forum for the resolution of issues.

⁶¹⁰ *Boundary Waters Treaty* art. IX.

⁶¹¹ *Id.* art. XIV.

⁶¹² *Lake of the Woods Treaty*, U.S.-Can., Feb. 24, 1925, 44 Stat. 2108.

controlled in part by dams at Kettle Falls, Minnesota and at International Falls (U.S.)-Fort Frances (Canada). Three years later, in 1941, the IJC created the Rainy Lake Board of Control to address these issues and adopt regulations.⁶¹³

- The Niagara River Water Diversion Treaty (1950) amended the Boundary Waters Treaty of 1909 to allow for diversions for hydropower projects. The treaty called for the United States and Canada to cooperate in building dams and other infrastructure at or near Niagara Falls, New York. At the same time, the treaty preserved the aesthetics of Niagara Falls by requiring releases of water at certain times of the day and year (the tourist season). All water, not reserved for scenic purposes, could be diverted for power generation. Both countries agreed to divide equally the power produced by the dams.⁶¹⁴
- The Great Lakes Fishery Convention (1955) created an international commission to coordinate fisheries research, control the invasive sea lamprey and facilitate cooperative fishery management among state, provincial, tribal and federal management agencies in the United States and Canada. Four members from each country serve on the commission.⁶¹⁵
- The Columbia River Treaty (1961), ratified in 1964, provided for the construction of four dams for hydropower, storage, and flood control.⁶¹⁶ The IJC helped develop the treaty principles, but the agreement itself was negotiated primarily by the province of British Columbia, the Canadian federal government and the U.S. government. The effect of the treaty was to double the amount of reservoir storage on the Columbia River.⁶¹⁷
- The Great Lakes Water Quality Agreement (1972) sought to reduce the level of phosphorous, particularly in Lake Erie.⁶¹⁸ The agreement called for joint research on cross-border environmental problems, and established a system of surveillance to identify problems and measure progress. Three subsequent agreements addressed water quality and air quality:

⁶¹³ *Rainy Lake Convention*, U.S.-Can., Sept. 15, 1938, 54 Stat. 1800.

⁶¹⁴ *Niagara River Water Diversion Treaty*, U.S.-Can., Feb. 27, 1950, 1 U.S.T. 695.

⁶¹⁵ *Convention on Great Lakes Fisheries*, U.S.-Can., Sept. 10, 1954, 6 U.S.T. 2836. For the Commission's home page, see www.gllfc.org.

⁶¹⁶ *Treaty relating to the Cooperative Development of the Water Resources of the Columbia River Basin*, U.S.-Can., Jan. 17, 1961, 542 U.N.T.S. 244. The treaty is also found at 15 U.S.T. 1555. The four dams are: 1) Mica, 2) Hugh Keenleyside (now Arrow), and 3) Duncan, all in the Province of British Columbia, and 4) Libby Dam on the Kootenai River in the state of Montana. The reservoir behind Libby Dam floods 42 miles of Canadian territory.

⁶¹⁷ See discussion at section 9.3.2 at page 209 for additional details on the history of Columbia River Treaty.

⁶¹⁸ *Great Lakes Water Quality Agreement*, U.S.-Can., Apr. 15, 1972, 837 U.N.T.S. 213. The agreement is also found at 23 U.S.T. 301.

1. The Second Great Lakes Water Quality Agreement (1978), which replaced the 1972 agreement;⁶¹⁹
 2. A Protocol amending the Second Great Lakes Water Quality Agreement (1987)(which is still in force, as amended, to this day);⁶²⁰ and
 3. The Great Lakes Air Quality Agreement (1992).⁶²¹
- The Canada-U.S. Skagit River Agreement (1984) concluded a decades-long dispute between the U.S. and Canada over the proposed construction of High Ross Dam in Washington State, which would have flooded parts of the province of British Columbia.⁶²² The Skagit River begins in British Columbia and then flows south across the border, then west into Puget Sound. The City of Seattle (Seattle City Light) had built three dams on the river in the Cascade Mountains: Gorge, Diablo, and Ross Dams. In 1970, Seattle applied to the Federal Energy Regulatory Commission (“FERC”), the successor to the Federal Power Commission, for a construction license to build High Ross Dam at the site of the existing structure. Environmental groups and U.S. Native American tribes petitioned FERC. Litigation in U.S. federal courts eventually led to a decision that upheld FERC’s decision to issue a construction license for High Ross Dam.⁶²³ But Seattle eventually abandoned its plans to build the dam. The Skagit River Agreement concluded the dispute when British Columbia agreed to supply Seattle with an amount of power equivalent to what Seattle would have obtained from High Ross Dam. Seattle, in turn, paid British Columbia for the power at rates based on what it would have cost Seattle to build High Ross Dam.
 - The Canada-U.S Agreement on the Souris River (1989) called for Canada to build two flood control dams (Rafferty and Alameda) on the Souris River, which flows from Canada into the United States and back again into Canada. The agreement provides that the United States pay Canada for flood control storage from the dams.⁶²⁴

7.3.2 The International Joint Commission

Most international river and lake commissions have limited missions: they are created to resolve disputes over individual waterways. In contrast, the International Joint Commission (“IJC”) created by the Boundary Waters Treaty of 1909 has a unique role. The IJC has broad authority

⁶¹⁹ *Second Great Lakes Water Quality Agreement*, U.S.-Can., Nov. 22, 1978, 1153 U.N.T.S. 187. The agreement is also found at 30 U.S.T. 1383.

⁶²⁰ *Third Great Lakes Water Quality Agreement*, U.S.-Can., Nov. 18, 1987, T.I.A.S. No. 1151.

⁶²¹ *Great Lakes Air Quality Agreement*, U.S.-Can., Mar. 13, 1991, 1852 U.N.T.S. 79, available at http://untreaty.un.org/unts/60001_120000/30/4/00058181.pdf.

⁶²² *Treaty Between the United States of America and Canada Relating to the Skagit River and Ross Lake, and the Seven Mile Reservoir on the Pend d'Oreille River*, U.S.-Can., Apr. 2, 1984, T.I.A.S. 11088.

⁶²³ *Swinomish Tribal Community v. FERC*, 627 F.2d 409 (D.C. Cir. 1980).

⁶²⁴ *Agreement Between the Government of the United States of America and the Government of Canada for Water Supply and Flood Control in the Souris River Basin*, U.S.-Can., Oct. 26, 1989, T.I.A.S. 11731.

to prevent and resolve disputes over *all* bodies of water that form the boundary or that cross the boundary and connecting waterways between the United States and Canada.⁶²⁵

The IJC's authority therefore includes the Great Lakes and the St. Lawrence River, as well as portions of the rivers that cross or that form the international boundary, including:

- The Columbia River, which flows from the Canadian province of British Columbia into Washington State;
- The Red River of the North, which flows from North Dakota and Minnesota into the province of Manitoba; and
- The St. John and St. Croix rivers, which drain parts of Maine and the province of New Brunswick on the eastern seaboard.

Under the Boundary Waters Treaty, the IJC exercises its responsibilities in two ways. First, it acts as a quasi-judicial body to consider applications for approval to build and operate dams and other works on boundary water and transboundary waters. Second, at the request of either nation, it examines and provides non-binding recommendations on a broad variety of transboundary issues. These duties are referred to as the “reference” function because the matter is referred to the IJC by either the United States or Canada under Article IX of the Treaty.⁶²⁶ The Commission and its staff discharge this responsibility through “joint fact-finding.”

The majority of the IJC's activities are consensual, supported by its United States and Canadian members, who are appointed by their respective governments. The six-member IJC refers to itself as a “binational,” as opposed to a “bilateral” entity. This distinction is important: there is parity between the two countries – they have an equal number of votes on the Commission, though as a matter of practice, the commissioners attempt to seek consensus and operate as a single body “seeking solutions to common problems in the common interest.”⁶²⁷ The IJC also has the authority to engage in binding arbitration; however, this provision requires the prior approval of both the U.S. and Canadian governments and has to-date never been invoked.⁶²⁸

Three members from the United States and three members from Canada serve on the IJC. The U.S. members are nominated by the President and confirmed by the U.S. Senate. The Canadian members are appointed by the Governor-in-Council of Canada, on the advice of the Prime Minister. The IJC has section offices in Washington, D.C., and Ottawa, Ontario, and a regional Great Lakes office in Windsor, Ontario.

⁶²⁵ For the home page of the International Joint Commission, see www.ijc.org. For a definition of boundary waters, see the Preliminary Article of the 1909 *Boundary Waters Treaty*, *supra* note 595.

⁶²⁶ In the history of the IJC, there has never been a “unilateral” reference from either Canada or the United States. Both countries ask the IJC to pursue an issue or problem.

⁶²⁷ For an overview of the IJC's role in boundary issues, see its publication, “The IJC and the 21st Century,” at www.ijc.org/php/publications/html/21ste.htm.

⁶²⁸ *Boundary Waters Treaty* art. X. The U.S. Senate and Canadian Governor-in-Council must give their respective “advice and consent,” prior to this referral. *Id.* A majority of the IJC “shall have the power to render a decision.” *Id.* art VIII.

The IJC typically creates Boards with experts from government agencies in both countries to monitor and implement its orders and ensure compliance with its directives. Over the years, the IJC has established Boards to address problems ranging from fluctuating lake levels and operational constraints of dams to complex matters of international pollution control. The “Boards of Control” oversee the operation of IJC-approved dams to ensure compliance with IJC orders. Other Boards monitor water quality and pollution reduction activities. In chronological order, the Boards of the IJC are:

- The International Lake Superior Board of Control (1914) monitors and implements an IJC order granting permission for increased hydropower development of the St. Mary’s River that links Lake Superior and Lake Huron.⁶²⁹
- The International St. Croix River Watershed Board (1915) initially had the duty to monitor water flow and power generation on the St. Croix River, which runs 115 miles (185 kilometers) along the border between the state of Maine and the province of New Brunswick. In 1962, the IJC established an international advisory board on pollution control for the river and merged its duties in 2000 with the original board to become the “St. Croix River Board.” The Board monitors compliance with water quality, pollution control and fishery restoration efforts.
- The International Lake of the Woods Control Board (1925) was created to address water levels in Lake of the Woods if they fell below or exceeded certain amounts specified in the 1925 Lake of the Woods Convention and Protocol. If levels of the lake do not fall below the levels specified in the Treaty, management of the Lake is left solely to a Canadian Board, also called the Lake of the Woods Control Board (“LWCB”), which is composed of the Canadian federal government, Ontario and Manitoba.⁶³⁰
- The International Kootenay Lake Board of Control (1938) monitors the operation of Corra Linn Dam in British Columbia, Canada, which stores water on Kootenay Lake. Although the Kootenay River begins in the Rocky Mountains in Canada, it crosses the border into the United States in northwestern Montana before turning north, where it flows through Idaho and then back into British Columbia. The lake is approximately 62 miles long (100 kilometers).
- The International Columbia River Board of Control (1941) implements an IJC order granting approval for the U.S. Bureau of Reclamation to build and operate Grand Coulee Dam and reservoir in Washington State. The reservoir reaches to the international border.
- The International Rainy Lake Board of Control (1941) monitors and directs the regulation (water levels and outflows) of Rainy Lake and Namakan Lakes. The

⁶²⁹ The “St. Mary’s River” discussed here is different from the “St. Mary River” that begins in Montana and flows into Alberta.

⁶³⁰ For the home page of the Lake of the Woods Control Board, see <http://www.lwcb.ca>. The web site contains a history of the Canadian Board, which also has authority over another lake, Lac Seul.

regulations are implemented by two companies, Boise Cascade in the United States and Abitibi-Consolidated in Canada.

- The International Osoyoos Lake Board of Control (1946) implements the IJC Order on the operation of Zosel Dam, built on the Okanogan River⁶³¹ below Osoyoos Lake in British Columbia. The Lake straddles the international boundary with Washington and is important to agricultural interests in both countries. The original Zosel Dam was replaced by a new dam in 1987 at a different location, this time in the United States. The dam is operated by the Oroville and Tonasket Irrigation District under contract with the project owner, the Washington Department of Ecology.
- The International Red River Board (1948), originally established as the International Souris-Red Rivers Engineering Board in 1948, reported on the use and apportionment of waters in the Souris, Red, Popular and Big Muddy river basins. The Red River (known as the Red River of the North in the United States) flows north from its headwaters in Minnesota and forms the border between that state and North Dakota before crossing the U.S.-Canada border into Canada. Its outlet is Lake Winnipeg, Manitoba. The basin consists of a substantial portion of North Dakota and northwestern Minnesota and a significant portion of Manitoba.

In 1964, the IJC established the Red River Pollution Board to investigate the extent and causes of pollution and recommend remedial measures.

Then, in 2001, the IJC established a new entity, the International Red River Board, to ensure a broader ecosystem approach to water quantity and water quality problems. The new Board combined the activities in the Red River Basin previously undertaken by the International Souris-Red Rivers Engineering Board and the Red River Pollution Board.

The International Red River Board also has responsibility for analyzing several diversion projects in the United States that have a potential cross-border impact. Among these is the Devils Lake Project, which moves water from a 125,000 acre (51,000 hectare) lake in North Dakota into the Sheyenne River, a tributary to the Red River. Devils Lake has no natural outlet and has flooded homes and businesses in a wet year. To reduce flooding, the state of North Dakota built an outlet. The Canadian province of Manitoba and others attempted to block the diversion in state courts, alleging that the project could introduce invasive species and fish parasites into the Sheyenne River and ultimately into the Red River and Lake Winnipeg, home to one of the most productive freshwater fisheries in central Canada. The court rejected Manitoba's challenge.⁶³²

Manitoba has also expressed concern about two other diversion projects, one under construction, the other proposed. The Northwest Area Water Supply Project ("NAWS"), now being built in the United States, will bring drinking water to the town of Minot, North Dakota, and surrounding communities hit hard by drought. The

⁶³¹ The river is spelled "Okanagan" in Canada.

⁶³² *People to Save the Sheyenne River v. Department of Health*, 697 N.W.2d 319 (N.D. 2005).

diversion moves water from Lake Sakakawea behind Garrison Dam in the Missouri River Basin to the Souris River Basin. (The Souris River only joins the Red River in Canada but the International Red River Board, not the International Souris River Board, has assumed the responsibility for monitoring the diversion.) The International Red River Board also monitors the proposed Red River Valley Water Supply Project, which would move water from Lake Sakakawea into the Red River Basin.

- The International St. Lawrence River Board of Control (1952) monitors outflows from Lake Ontario into the St. Lawrence River. The St. Lawrence River, which drains the lakes, begins on the eastern shores of Lake Ontario and forms the boundary line between New York and Quebec. The river then continues its journey entirely in Canada and empties into the Gulf of St. Lawrence.
- The International Niagara Board of Control (1953) provides advice on matters relating to the flows in the Niagara River and for the operation of dams at Niagara Falls.
- The International Souris River Board (1959) had an initial task of monitoring an IJC order in 1941 that allocated waters in the Souris River basin between North Dakota and Saskatchewan. The Souris River (435-miles/700 kilometers long) is part of the Saskatchewan-Nelson River System. The river begins in the province of Saskatchewan in Canada, crosses the border into North Dakota in the United States, and then returns to the province of Manitoba in Canada, where it flows into the Assiniboine River, which in turn flows into the Red River, a tributary of Lake Winnipeg.

The Souris River is one of three cross-border waterways where the IJC has apportioned water. The other two are the St. Mary-Milk River System and Niagara River. The 1909 Boundary Waters Treaty and subsequent agreements between the two nations specifically addressed water apportionment issues in those river basins.

The Souris River, on the other hand, occupies a unique position in IJC history: it is the only river that the IJC has apportioned at the request of both United States and Canada without express statutory directions. Instead, the IJC relied on its broad powers to investigate and recommend solutions under Article IX of the Boundary Waters Treaty. With concurrence from both governments, the IJC in 1941 and 1958 allocated 50% of the river flow at the Saskatchewan Border to North Dakota, and required North Dakota to leave 14,480 AF (20 cfs) in the river from June to October when it flows into Manitoba.

The International Souris River Board is now also responsible for investigating and recommending remedial measures for reducing water pollution. To ensure a broader ecosystem approach to water quantity and water quality problems, the Board assumed the activities in the Souris River Basin previously undertaken by the International Souris-Red Rivers Engineering Board and the Souris River Board.

- The International Rainy River Water Pollution Board (1965) monitors and supervises pollution reduction inspections on the Rainy River, which flows from Rainy Lake to International Falls, Minnesota, and Ft. Frances, Ontario, and then enters into the southern end of Lake of the Woods.

In addition to those Boards, the IJC also participates in a number of activities with entities on both sides of the border. These efforts include the Great Lakes Water Quality Board, which helps assess the progress in both countries under the U.S.-Canada Water Quality Agreements. The IJC has also established a number of advisory and research boards on the Great Lakes, including the Great Lakes Science Advisory Board, the International Air Quality Advisory Board and the Council of Great Lakes Research Managers. Unlike the Boards of Control, which have specific regulatory authority, the advisory and research boards provide assistance and offer recommendations.

7.3.3 The International Role of the U.S. EPA

The U.S. Environmental Protection Agency (“EPA”) implements a number of water and air quality agreements affecting the Great Lakes and has assumed significant international responsibilities. The EPA is also the lead entity in establishing a Binational Toxics Strategy to increase data collection, identify cost-effective solutions, and take steps toward eliminating toxic discharges into the Great Lakes. These cross-border efforts include the implementation of several water quality agreements and one air quality agreement.⁶³³

7.3.4 The Governors of the Great Lakes States

The governors of the eight U.S. states in the Great Lakes Basin have an unusual and influential role on environmental matters and on proposed water diversions out of the Great Lakes Basin.⁶³⁴

Under the 1986 Water Resources Development Act, no new diversions of water to markets outside of the Great Lakes Basin are allowed unless all of the governors of the eight states

⁶³³ A detailed analysis of EPA activities in the Great Lakes Basin is beyond the scope of this report. For a summary of current EPA activities, see the home page of the U.S. Environmental Protection Agency, Great Lakes Program, <http://epa.gov/greatlakes/index.html>. See *supra* notes 618-621, for legal citations for the Great Lakes Water Quality Agreement (1972), the Second Great Lakes Water Quality Agreement (1978), a Protocol to the Second Great Lakes Water Quality Agreement (1987) and the Great Lakes Air Quality Agreement (1992).

⁶³⁴ The issue of diversions – into and out of the Great Lakes Basin – has a long and contentious history dating back to the 1800s. The largest out-of-basin diversion, which exists to this day, began in 1848 when the path of the Chicago River in Illinois was reversed. State officials diverted the river, which in its natural course would have emptied into Lake Michigan, and routed it into the man-made Chicago Sanitary and Ship Canal, which flowed south into the Des Plaines River, which eventually empties into the Illinois River and then into the Mississippi River. As part of this change, the city also diverted water from Lake Michigan into the canal. The purpose of the diversion was to reverse the flow of untreated sewage in the Chicago River that could otherwise have passed near the city’s water intakes. The diversion led to several U.S. Supreme Court opinions: *Missouri v. Illinois*, 200 U.S. 496 (1906), and *Sanitary District of Chicago v. United States*, 266 U.S. 405 (1925), and *Wisconsin v. Illinois*, 388 U.S. 426 (1967), as modified in *Wisconsin v. Illinois*, 449 U.S. 48 (1980), which limited these diversions to 3,200 cfs. Other large diversions in the basin include sending water from Long Lac and the Ogoki watersheds in Ontario, Canada, into Lake Superior. Those diversions began during World War II to increase hydropower generation for armaments manufacturing. The two diversions (the Chicago outflows and the Ontario inflows) are roughly the same quantity.

approve. An amendment in 2000 strengthened this provision to include “exports” of water and to prohibit a federal agency from studying diversions.⁶³⁵ The Act, as amended, in effect gives a single governor veto power over proposed out-of-basin diversions and exports.⁶³⁶

The governors also played a role in drafting the Great Lakes Charter, signed in 1985 and amended in 2001, which seeks to foster regional cooperation between the eight U.S. states and two Canadian provinces in the basin.⁶³⁷ The Charter is a voluntary, non-binding accord created in part to limit diversions of water outside of the basin and also to address cross-border environmental problems, including industrial pollution and invasive species. The Charter created the Council of Great Lakes Governors to implement its provisions.⁶³⁸ Although the Council of Great Lakes Governors has no authority to mandate changes in river or lake operations, or to compel environmental clean-up efforts, it remains an influential body for fostering international cooperation in the Great Lakes Basin.

In December 2005, the Council of Great Lakes Governors proposed two agreements to create a new governance structure for the basin. The first is a proposed Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement between the eight U.S. states and two Canadian provinces. The second is the Great Lakes-St. Lawrence River Water Resources Compact, an interstate compact. All eight states approved the latter agreement, and Congress consented to it in 2008.⁶³⁹

⁶³⁵ 42 U.S.C. § 1962d-20(d). The amended Act states: “No water shall be diverted or exported from any portion of the Great Lakes within the United States, or from any tributary within the United States of any of the Great Lakes, for use outside the Great Lakes Basin unless such diversion or export is approved by the Governor of each of the Great Lakes States.” The initial language was adopted in 1986 in response to two “grand proposals” to move Great Lakes Basin water elsewhere in the United States. One proposal, unveiled in 1981, called for the Power River Coal Co. to build a water pipeline from the Great Lakes Basin to Wyoming and a coal slurry pipeline from Wyoming to the Great Lakes area. The proposal was subsequently abandoned. A second proposal, unveiled in 1982, would have used Great Lakes water to recharge the Ogallala Aquifer, which stretches from Wyoming to Texas. The U.S. Army Corps of Engineers, which studied the idea, did not pursue it. The “export” language, added as an amendment in 2000, was intended to clarify the scope of the Act in response to a 1998 proposal by a Canadian company, the Nova Group, to ship Great Lakes water in tankers. Nova subsequently withdrew its proposal because of public objections. Although the amended language would not have prohibited the Nova proposal (which needed Canadian, not U.S. approval), the provision was intended to deter new proposals of the same scale in the United States.

⁶³⁶ The Canadian Parliament also restricted Great Lakes diversions. In 2002, Parliament amended the *Boundary Waters Treaty Act of 1909* by prohibiting most diversions and the bulk removal of boundary waters without a license from the Ministry of Foreign Affairs. See *International Boundary Waters Treaty Act*, R.S.C. 1985, c.1-17 as amended by *An Act to amend the International Boundary Waters Treaty Act*, S.C. 2001, c. 40 (Royal Assent 18 December 2001; in force 9 December 2002).

⁶³⁷ The states represented are (in alphabetical order): Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New York and Wisconsin. Ontario and Quebec are the two Canadian provinces with representatives.

⁶³⁸ For the home page of the Council of Great Lakes Governors, see <http://www.cglg.org>.

⁶³⁹ See www.cglg.org/projects/water/CompactImplementation.asp.

7.3.5 The Role of NAFTA

The North American Free Trade Agreement (“NAFTA”) was signed by the United States, Canada and Mexico in 1992. The primary purpose of NAFTA is to create a trading bloc in North America and to eliminate the majority of tariffs on products created by the three nations. Although NAFTA does not apply to water resources, several of its “side agreements” have an affect on border law and water quality. For a discussion of NAFTA, *see* section 7.5.4 at page 192.

7.4 THE LAW OF WATER ALLOCATION IN MEXICO

Mexico occupies approximately 760,000 square miles (2 million square kilometers), an area almost three times the size of Texas. Its population is 109 million and has quadrupled since 1950. The greatest population and economic growth has taken place in areas with less water. About three-quarters of Mexico’s population lives in the northern and central part of the country, a region which has only 31% of the nation’s water supply.

7.4.1 Treaties

In the Mexican legal system, the President and the Foreign Minister negotiate treaties but it is the upper house of the Mexican Parliament, the Senate, which has the power to approve treaties.⁶⁴⁰

7.4.2 The Constitution of Mexico

Mexico is a federation with 31 states and one federal district (comparable to Washington, D.C.).⁶⁴¹ Mexico City is the federal capital – the greater area has a population of about 19.2 million, making it the largest metropolitan area in the Americas and one of the largest in the world.

Mexico established its first constitution in 1836 after the Mexican Revolution which resulted in its independence from Spain. The modern Mexican Constitution – formally known as the Political Constitution of the United Mexican States – was adopted in 1917. The Constitution establishes a federal democratic republic composed of states. All the states have their own constitution. But states in Mexico, unlike in the United States, may not make alliances or sign agreements with other states.⁶⁴²

The Constitution establishes three branches of government (the executive, legislative and judicial branches). The executive branch is organized around an elected President, who serves a single, six-year term. The Congressional powers are enumerated in the Constitution.⁶⁴³ The legislative

⁶⁴⁰ MEXICO CONST. art 76(I). Treaties, along with the Constitution and the laws enacted by Congress, are part of the supreme law of the land. *Id.* art. 133.

⁶⁴¹ *Id.* art. 43.

⁶⁴² *Id.* art 117 (I).

⁶⁴³ *Id.* arts. 71-72.

branch consists of two houses of Congress: the 500-member Federal Chamber of Deputies and the 128-member Senate.

7.4.3 The Role of Civil Law

Mexico is a civil law country: its legal traditions reflect Spanish and European influence, as opposed to the common law influence of England, which is embedded in the American legal system. Mexico's legal system therefore consists primarily of statutes enacted by the federal and state legislatures.⁶⁴⁴ There is little or no "common law" where court opinions (e.g., case law) create precedents for deciding the rights and duties of citizens. In civil law countries, like Mexico, the government publishes laws and other legal matters in official diaries ("*diarios*").

7.4.4 The Supreme Court of Mexico

Mexico's Supreme Court has 11 members (also called "ministers"), appointed by the President for single 15-year terms and approved by the Senate.⁶⁴⁵ Under the Constitution, the Supreme Court can hear disputes between Mexico's 31 states. The Court is the final appellate body over all federal and state courts. The subject matter jurisdiction of federal courts in Mexico includes cases involving conflicts between the federal and state governments, cases involving the enforcement and application of federal laws, cases involving treaties, and cases in which the federal government is a party.⁶⁴⁶ The Supreme Court, however, has not considered a water allocation issue between states on interstate rivers, as has the U.S. Supreme Court.

7.4.5 An Overview of Mexican Water Law

The main body of Mexican water law is composed primarily of Article 27 of the Constitution⁶⁴⁷ and the 1992 National Water Law⁶⁴⁸ (and related regulations).

⁶⁴⁴ The civil codes, or *codigo*, are listed at the web site of the Chamber of Deputies. www.disputados.gob.mx/Leves/Biblio. The civil codes consist of more than 3,000 individual articles organized into books, titles, chapters, articles and sections.

⁶⁴⁵ Mexico's federal judiciary is governed by articles 94 through 107 of the Constitution and the Organic Law of the Federal Judiciary.

⁶⁴⁶ MEXICO CONST. art. 104.

⁶⁴⁷ *Id.* art. 27.

⁶⁴⁸ National Water Law art. 1 ("*Ley Aguas Nacionales*"). *Diario Oficial de la Federacion* (D.O.) Dec. 1, 1992. The law is complemented by an implementing regulation, the Regulation Under the National Waters Law (*Reglamento de la Ley de Aguas Nacionales*) and by Official Mexican Standards (*Normas Oficiales Mexicanas*). For background information, see the Commission for Environmental Protection ("*CEC*")'s analysis of the protection and management of water resources in Mexico, www.cec.org/pubs_info/resources/law_treat_agree/summary_enviro_law/publication/mxdoc.cfm?v.

Article 27 nationalizes all water in Mexico.⁶⁴⁹ It states that all land and water are vested originally in the Nation, “which has had, and has, the right to transmit title thereof to private persons.” The “Nation” therefore owns all waters. “In the Nation is likewise vested the ownership of the waters of the territorial seas . . . inland marine waters . . . those of natural inland lakes . . . those of rivers”⁶⁵⁰ All exploitation or appropriation of water may be undertaken only through “concessions granted by the Federal Executive, in accordance with rules and conditions established by law.”⁶⁵¹

Because water resources in Mexico are entirely federal, only federal agencies have the jurisdiction to make water allocations. In 1989, the National Water Commission (*Comisión Nacional del Agua*) (“CONAGUA”) was created to improve the management of water and facilitate the privatization of certain functions.⁶⁵² The Commission is the lead federal agency over water issues. The Commission is headed by a Director General appointed by the President. The Commission is part of the Ministry of Environment and Natural Resources but enjoys substantial autonomy. The Commission employs 17,000 workers and has 13 regional offices.

The National Water Commission grants water for two types of “concessions”⁶⁵³ – called assignments or licenses – to a variety of water users throughout the country. Both uses involve a right to “exploit, use or appropriate” water.⁶⁵⁴

Assignments are granted for municipalities, states, and the Federal District (Mexico City) where water is “destined for public urban or domestic water services.”⁶⁵⁵ An assignment is non-transferable.

Licenses, on the other hand, are granted to “individuals or public or private entities” that are not in the business of supplying public urban or domestic needs. Licenses therefore include water for irrigation and industrial activity. A license can be transferred to another person or entity. The grant of an assignment or license does not necessarily guarantee that water is available all the time. In droughts, for example, water use can be reduced.

⁶⁴⁹ MEXICO CONST. art. 27, § 1. For a summary of Mexican water law and institutions, see “Mexico’s Domestic Framework for Transboundary Water Management,” Chapter 1 in COMMISSION FOR ENVIRONMENTAL COOPERATION, NORTH AMERICAN ENVIRONMENTAL LAW AND POLICY (Editions Yvon Blais, 2001) at 27-36. See also Jose Ramon Cossio Diaz, *Constitutional Framework for Water Regulation in Mexico*, 35 Nat. Resources J. 489 (1995).

⁶⁵⁰ MEXICO CONST. art. 27 § 5.

⁶⁵¹ *Id.* art. 27.

⁶⁵² The Commission’s role is described in the section 9 of the National Water Law.

⁶⁵³ National Water Law art. 20-29.

⁶⁵⁴ The phrase “exploit, use or appropriate” is different from the term “appropriation,” as used in the United States. Under the National Water Law in Mexico, “exploitation” refers to the use of water for extracting chemicals or elements, and which is returned to its source without significant consumption. National Water Law art. 3 (XXVII). “Use” refers to partial or full consumption (e.g., municipal supplies). Art. 3 (LII). “Appropriation” means the use of water for activities that are non-consumptive (i.e., power plants). Art 3 (VII).

⁶⁵⁵ National Water Law art. 3 (VIII).

Some rights to use water for irrigation predate the 1992 National Water Law. Irrigation districts, such as the Irrigation District for the Colorado River,⁶⁵⁶ continue to irrigate lands on the basis of their historical rights that pre-date the National Water Law. The National Water Commission has reaffirmed some of those rights through concessions. Many irrigation districts in Mexico have transferred assets to users for maintenance and operation.

The process of issuing water assignments and licenses is somewhat decentralized. The Commission consults with 13 River Basin Agencies, each with authority over a specific watershed, prior to issuing the assignment or license. The granting of both assignments and licenses take into account the availability of water.⁶⁵⁷ The River Basin Agencies report directly to the National Water Commission, and their functions are established by the National Water Act and its regulations. River Basin Agencies also engage in water planning and infrastructure development within a watershed. Public participation in this process occurs through advisory River Basin Councils.

The National Water Commission also maintains the National Register of Water Rights. The Register contains essential information about the legal rights of users. Registration of a water license is proof of title and a condition precedent to transfer.

The National Water Law, as amended in 2004, authorizes the Commission to establish Mexico's national water policy. The current policy consists of 22 fundamental principles.⁶⁵⁸ In addition, the National Water Law reaffirms that water is an asset in the federal public domain.⁶⁵⁹ The National Water Law also states that a river basin (along with its aquifers) is the basic regional unit for managing water resources.⁶⁶⁰ To implement the policies, the National Water Commission publishes a National Water Plan.⁶⁶¹

7.4.6 Hydropower in Mexico

Three rivers play an important role in the U.S.-Mexico relationship and in cross-border water allocation and management: The Rio Grande, the Colorado River and the Tijuana River.

⁶⁵⁶ The Colorado River district was organized under an Agreement on the Control and Organization of the Irrigation District for the Colorado River, December 5, 1938, and the regulations of that irrigation district, published in the Mexico Federal Register, July 24, 1964.

⁶⁵⁷ *Id.* arts. 81.

⁶⁵⁸ The 22 principles include declarations that water is an asset in the federal public domain (Principle 1), that water management should promote water reuse (Principle 12) and that individuals or legal entities that contaminate water resources are responsible for restoring water quality (Principle 17).

⁶⁵⁹ *Id.* art. 3.

⁶⁶⁰ *Id.* art. 7.

⁶⁶¹ The National Water Plan is published in English. See www.conagua.gob.mx/CONAGUA07/Contenido/Documentos/PNH_Ingles.pdf.

The Rio Grande has two dams spanning the international border: Amistad and Falcon. The Western Area Power Administration, a U.S. federal power marketing agency that sells and delivers electricity from dams in the western United States (excluding the Pacific Northwest), also has responsibility to sell power from Amistad and Falcon.⁶⁶² Power is shared with Mexico. Western delivers the U.S. share to electric utilities in the United States.

The Colorado River, the dominant waterway in the American Southwest, begins on the western slopes of the Rocky Mountains and flows into Mexico near Yuma, Arizona.⁶⁶³ With the exception of Morales Diversion Dam in Mexico, the major infrastructure on the Colorado River is all located upstream in the United States. Mexico currently diverts its entire apportionment of Colorado River water at Morales Dam for agricultural and municipal purposes.

The Tijuana River begins in Mexico and flows north across the border to an area south of San Diego, California, then flows into the Pacific Ocean.

A single entity, the state-owned Federal Electricity Commission (“Comision Federal de Electricidad” or “CFE”), generates about two-thirds of Mexico’s electricity. It holds a monopoly on transmission and distribution outside of Mexico City and some other municipalities. CFE produces about 40% of its electricity by burning oil and natural gas, and 14% from dams.⁶⁶⁴

TABLE 48. The Largest Hydroelectric Projects in Mexico Owned by CFE.

Name:	Capacity: (MW)	State:
Manuel Torres	2,400	Chiapas
Malpaso	1,080	Chiapas
Infiernillo	1,000	Guerrero
Aguamilpa Solidaridad	960	Nayarit
Belisario Dominguez	900	Chiapas

MW = megawatts (million watts) of generating capacity.

Source: CFE web site,

<http://www.cfe.gob.mx/en/LaEmpresa/generacionelectricidad/lisctralesgeneradoras>.

7.4.7 Administration of Environmental Laws

Mexico has a comprehensive set of environmental statutes. The most important of those statutes is the General Law for Ecological Equilibrium and Environmental Protection (*Ley General del*

⁶⁶² The Amistad and Falcon dams have the capacity to produce 196 MW. The U.S. share is 98 MW.

⁶⁶³ See section 2.7.1 at page 183 of this report for more information about the Colorado River.

⁶⁶⁴ For the home page of the Comision Federal de Electricidad, see <http://www.cfe.gob.mx/en/LaEmpresa/queescfe>.

Equilibrio Ecologico y la Proteccion al Ambiente, or “Ecology and Environmental Protection Law”), enacted in 1988.⁶⁶⁵

The Ecology and Environmental Protection Law contains a chapter pertaining to the “rational use of water and aquatic ecosystems,”⁶⁶⁶ which includes among its criteria the maintenance of basic flows of water.⁶⁶⁷ In addition, law states that “the preservation and sustainable use of water, as well as of aquatic ecosystems is the liability of their users, as well as anyone carrying out works or activities that affect those resources.”⁶⁶⁸ The law establishes criteria that must be considered in making water resource decisions, including the “grant of concessions,” as well as “suspensions or revocations of permits, authorizations, concessions or allotments.”⁶⁶⁹

The federal Secretary of Environment and Natural Resources administers the Ecology and Environmental Protection Law.⁶⁷⁰ The law requires entities to obtain permission from the Secretary prior to engaging in certain activities, such as building water infrastructure projects.⁶⁷¹ The Secretary notifies project proponents of his determination if a project is subject to the environmental impact evaluation procedure. If so, he invites proponents to submit reports, expert opinions, and other documents upon which the Secretary can determine whether an environmental impact statement is required, and if so the timing for its submission.⁶⁷²

Despite broad terms of the Ecology and Environmental Protection Law, concerns about uneven enforcement remain. In the 1990s, these concerns prompted environmental groups and others in the United States to seek “side agreements” to the North American Free Trade Agreement (“NAFTA”).

The authors of a comprehensive text on Mexican law described the situation:

The adoption of LGEEPA [the Ecology and Environmental Protection Law] in 1988 marked Mexico’s first real attempt to regulate environmental quality. Mexico had adopted environmental laws prior to that date, but in a country with immense problems of economic development and under-development, the regulation of polluting industries took a back seat to economic expansion. Even with the adoption of LGEEPA, Mexico was slow to enforce its environmental laws with rigour. However, the negotiation of NAFTA in the early 1990s served to focus attention on Mexico’s law of environmental

⁶⁶⁵ Ecology and Environmental Protection Law (“LGEEPA”). *D.O.* May 30, 2000. The law and regulations are available in Spanish at www.semarnat.gob.mx. The law became effective March 1, 1988.

⁶⁶⁶ *Id.* Title III, Chapt. 1, art. 88-97.

⁶⁶⁷ *Id.* art. 88.

⁶⁶⁸ *Id.*

⁶⁶⁹ *Id.* art. 89, subparts II and V.

⁶⁷⁰ *Id.* art. 36.

⁶⁷¹ *Id.* art. 28, I, III, IX, X.

⁶⁷² *Id.* art. 28.

protection, and the supplemental North American Agreement on Environmental Cooperation, which became part of the NAFTA 'package,' lent international emphasis to effective regulation in this area.⁶⁷³

The next section examines the U.S.-Mexican border law, including NAFTA, in more detail.

7.5 BORDER WATER LAW BETWEEN THE UNITED STATES AND MEXICO

The border between Mexico and the United States is 1,969 miles (3,170 kilometers).⁶⁷⁴ The largest portion of this border is the Rio Grande, which flows 1,254 miles (2019 kilometers) east from El Paso, Texas and Ciudad Juárez, Chihuahua, to its mouth at the Gulf of Mexico.

West from El Paso and Ciudad Juárez, the U.S.-Mexico border separates the states of New Mexico, Arizona and California in the United States from the Mexican states of Chihuahua, Sonora, and Baja California Norte. At the western end of the international boundary lies San Diego, California, on the north, and the city of Tijuana, Mexico, on the south.

7.5.1 International Treaties and Agreements

The Treaty of Guadalupe Hidalgo is the main agreement that established the current international boundary between the United States and Mexico.⁶⁷⁵ Other important agreements are summarized below:

- The Convention of 1889 created the “International Boundary Commission” to resolve boundary disputes between the two nations. “All differences or questions that may arise on that portion of the frontier between the United States of America and the United States of Mexico . . . shall be submitted for examination and decision to an International Boundary Commission, which shall have exclusive jurisdiction in the case of said differences or questions.”⁶⁷⁶
- The 1906 Rio Grande Treaty was the first water allocation treaty on the Rio Grande signed by the United States and Mexico.⁶⁷⁷ Under the treaty, the United States was

⁶⁷³ STEPHEN ZAMORA, JOSE RAMON COSSIO, LEONEL PEREZNIETO, JOSE ROLDAN-XOPA AND DAVID LOPEZ, *MEXICAN LAW* (Oxford University Press 2004) at 399.

⁶⁷⁴ According to the International Water and Boundary Commission, the U.S.-Mexico border is the most frequently-crossed border in the world, with 250 million crossings every year.

⁶⁷⁵ *Treaty of Guadalupe Hidalgo*, U.S.-Mex., Feb. 2, 1848, 9 Stat. 922, available at www.yale.edu/lawweb/avalon/diplomacy/mexico/guadhida.htm. A number of subsequent agreements adjusted specific sections of the U.S.-Mexico border. See *infra* note 682.

⁶⁷⁶ *Convention Between the United States of America and the United States of Mexico to Facilitate the Carrying Out of the Principles Contained in the Treaty of November 12, 1884*, U.S.-Mex., March 1, 1889, 26 Stat. 1512.

⁶⁷⁷ *Equitable Distribution of the Waters of the Rio Grande*, U.S.-Mex., May 21, 1906, 34 Stat. 2953 (“*Rio Grande Treaty*”).

obligated to deliver 60,000 AF to Mexico after completion of Elephant Butte Dam and the distribution system (i.e., canals) in New Mexico. The treaty obligated the United States to deliver the water to Mexico at the border at no cost to Mexico.⁶⁷⁸ In return, Mexico waived its rights to water in the Rio Grande between El Paso and Fort Quitman, Texas (80 miles downstream).⁶⁷⁹ The United States and Mexico agreed to prorate shortages in case of “extraordinary drought or serious accident” to the irrigation system in the United States.⁶⁸⁰

- The U.S.-Mexico Water Treaty of 1944 addressed the allocation of water and management issues on three rivers: the Rio Grande, the Colorado, and the Tijuana.⁶⁸¹ The treaty also resolved some boundary issues.⁶⁸²

On the Rio Grande, the 1944 treaty allocated waters downstream of Fort Quitman Texas.⁶⁸³ The treaty did not address water allocation issues above Fort Quitman, which were (and are to this day) covered by the 1906 Rio Grande Treaty.

To the United States, the treaty allocated 58% of the Rio Grande’s average annual flow, including:

- one-half of the flows in the main channel of the Rio Grande downstream of Fort Quitman;
- all of the flow into the Rio Grande from the Pecos River in Texas and other named rivers in the United States; and
- one-third of the flow from the Rio Conchas and five other tributaries in Mexico that flow into the Rio Grande, provided that this flow shall not be less than 300,000 AF as an average annual amount over five years.

To Mexico, the treaty allocated 42% of the river’s annual flow, including:

- one-half of the flow in the main channel of the Rio Grande downstream from Fort Quitman;
- all of the flows reaching the Rio Grande from the San Juan and Alamo Rivers in Mexico; and

⁶⁷⁸ *Rio Grande Treaty* art. II and III.

⁶⁷⁹ *Id.* art. IV.

⁶⁸⁰ *Id.* art. II.

⁶⁸¹ *Treaty Relating to the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande*, Feb. 3, 1944, U.S.-Mex., 3 U.N.T.S. 313 (“*Mexico Water Treaty*”). The treaty is codified at 59 Stat. 1219.

⁶⁸² Other boundary disputes were settled in later agreements. *See, e.g.*, the *Convention for the Solution of the Problem of the Chamizal*, U.S.-Mex., Aug. 29, 1963, 505 U.N.T.S. 185. The treaty is also found at 15 U.S.T. 21.

⁶⁸³ *Id.* art. 4.

- two-thirds of the flow from the Rio Conchas and five other tributaries in Mexico that flow into the Rio Grande.

The 1944 treaty also contained a provision authorizing the two countries to build and operate dams on the lower Rio Grande – provisions that ultimately led to the construction of the Amistad and Falcon Dams.⁶⁸⁴

On the Colorado River, the treaty guaranteed to Mexico the annual quantity of 1.5 MAF of water.⁶⁸⁵ Mexico's share could go up in years when the United States determined there was sufficient surplus water to deliver but it would not exceed 1.7 MAF.⁶⁸⁶ But the treaty said Mexico "shall acquire no right beyond that provided by this subparagraph [Article 10(b)]" for any purpose in excess of 1.5 MAF annually.⁶⁸⁷

The treaty foreclosed the assertion of Mexican claims for greater water quantities. "Mexico shall acquire no right beyond that provided by this subparagraph by the use of the waters of the Colorado River system, for any purpose whatsoever, in excess of 1,500,000 acre feet."⁶⁸⁸ Furthermore, if an extraordinary drought or serious accident made it "difficult" for the United States to meet the guaranteed 1.5 MAF, then the water allocated to Mexico "will be reduced in the same proportion as consumptive uses in the United States are reduced."⁶⁸⁹

The treaty authorized Mexico to build a dam at the border (Morelos Diversion Dam) to divert the major part of its allocated waters to irrigate farm land in the Mexicali Valley. The treaty did not address water quality, which became an issue in the 1960s and 1970s as the salinity of water deliveries to Mexico increased significantly. On the Tijuana River, the treaty only called for the two governments to study equitable distribution of waters and plans for storage and flood control.⁶⁹⁰

⁶⁸⁴ *Id.* art. 5. See also *Agreement Relating to the Construction of Amistad Dam on the Rio Grande*, U.S.-Mex., Oct. 24, 1960, 401 U.N.T.S., 137. The treaty is also found at 11 U.S.T. 2396.

⁶⁸⁵ *Mexico Water Treaty* art. 10 and 15. The deliveries of water from the United States to Mexico are mandatory. For background information on the treaty, see NORRIS HUNDLEY, JR., *DIVIDING THE WATERS, A CENTURY OF CONTROVERSY BETWEEN THE UNITED STATES AND MEXICO* (University of California Press 1966) at 41-136.

⁶⁸⁶ *Mexico Water Treaty* art 10(a).

⁶⁸⁷ *Id.* art. 10(b).

⁶⁸⁸ *Id.* art. 10(b).

⁶⁸⁹ *Id.* art. 10(b).

⁶⁹⁰ *Id.* art. 16.

7.5.2 The International Boundary and Water Commission

The International Boundary and Water Commission (“IBWC”) has a broad mandate to address and resolve water allocation, water quality, sanitation and flood control issues and problems between the United States and Mexico.⁶⁹¹

The IBWC administers the 1944 Water Treaty and ensures compliance with its terms.⁶⁹² The treaty authorized the IBWC to conduct investigations⁶⁹³ and to facilitate the settlement of “differences” between the two countries.⁶⁹⁴ The IBWC is an “international body,”⁶⁹⁵ and not an agency of either the United States or Mexico. It is comprised of two factions, one a component of the U.S. Department of State, the other a component of the Ministry of Foreign Relations of Mexico.⁶⁹⁶ The IBWC is both an engineering and a diplomatic agency.⁶⁹⁷ The Secretary of State and the Minister of Foreign Affairs each appoint the head of their respective sections. The U.S. section is located in El Paso, Texas. The Mexican section is based across the border in Ciudad Juarez. The heads of the two sections are called “commissioners.” They typically meet or talk privately.

IBWC decisions are recorded as “minutes” or “actas.”⁶⁹⁸ These minutes are not treaties or treaty amendments – they are decisions made pursuant to existing treaty obligations.⁶⁹⁹ Some minutes address sanitation problems along the border.⁷⁰⁰ Other minutes address infrastructure.⁷⁰¹

⁶⁹¹ For the home page of the International Boundary and Water Commission, see www.ibwc.state.gov.

⁶⁹² *Mexico Water Treaty* art. 2. A predecessor organization known as the International Boundary Commission was created by treaty in 1899. The Mexico Water Treaty changed the name of the commission to the International Boundary and Water Commission, and expanded its duties.

⁶⁹³ *Id.* art. 24(a).

⁶⁹⁴ *Id.* art. 24(d).

⁶⁹⁵ *Id.* art. 2.

⁶⁹⁶ The Mexican section of the IBWC is the Comisión Internacional de Límites y Aguas (“CILA”).

⁶⁹⁷ *Mexico Water Treaty* art. 2.

⁶⁹⁸ *Id.* art. 25. Minutes may be adopted by formal recognition or by acquiescence.

⁶⁹⁹ For a list of IBWC minutes, see www.ibwc.state.gov/Treaties_Minutes/minutes.html.

⁷⁰⁰ See, e.g., *Recommendations for the Solution to the Border Sanitation Problems*, Minute No. 261, U.S.-Mex., Sept. 24, 1979, available at http://www.ibwc.state.gov/Treaties_Minutes/Minutes.html. See also *Agreement Between the United States of America and Mexico Relating to the New River (Rio Nuevo) Border Sanitation Problem*, Minute No. 264, U.S.-Mex., Aug. 26, 1980, available at http://www.ibwc.state.gov/Treaties_Minutes/Minutes.html.

⁷⁰¹ See, e.g., *Replacement of the International Cordova-Bridge of the Americas Over the Rio Grande at El Paso at El Paso, Texas-Ciudad Juárez Chihuahua*, Minute No. 290, U.S.-Mex., Sept. 21, 1993, available at <http://www.ibwc.state.gov/Files/Minutes/Min290.pdf>.

Still other minutes address water quality.⁷⁰² Since the 1960s, the salinity of water to Mexico had increased significantly for two reasons. First, the Wellton-Mohawk Irrigation and Drainage District in Arizona began pumping saline waters into the Gila River, a tributary of the Colorado River, in order to lower ground-water underlying farm land. But the saline water raised the level of salt in the downstream Colorado River when it was subsequently delivered to Mexico at the international border. Second, excess Colorado River flows, which Mexico had received prior to 1961, decreased because of low runoff in the Upper Colorado River Basin, leaving less water in the river that would dilute the saline discharges.

Two IBWC Minutes addressed this problem. Minute 241 provided that 118,000 AF per year in Wellton-Mohawk saline drainage water would not be credited (counted) in U.S. deliveries to Mexico, thus allowing Mexico to replace that water with better quality supplies from above Imperial Dam in California (27 miles/43 kilometers upstream) and from wells in the area of Yuma, Arizona.⁷⁰³

Minute 242 required the United States to adopt measures by 1974 to assure that 1.36 MAF delivered at Morelos Diversion Dam would have an annual average salinity not to exceed 115 ppm (+/- 30 ppm) found at Imperial Dam. In the absence of this standard, irrigation water returning to the river below Imperial Dam at the international border would have exceeded that amount.⁷⁰⁴

Congress subsequently enacted the Colorado River Salinity Control Act, which authorized the U.S. Bureau of Reclamation to implement the Minute.⁷⁰⁵ The IBWC monitors ongoing compliance.

Although the 1944 treaty allocated the flow of the river for use in either the United States or Mexico, the treaty also anticipated that the IBWC might be called upon to provide for “joint use of international waters.” With respect to those waters, the treaty created a list of priorities as a

⁷⁰² See, e.g., *Joint Project for Improvement of the Quality of Waters of the New River at Calexico, California-Mexicali, Baja California*, Minute No. 274, April 15, 1987, available at <http://www.ibwc.state.gov/Files/Minutes/Min274.pdf>. See also *Joint Measures to Improve the Quality of the Waters of the Rio Grande at Laredo, Texas/Nuevo Laredo, Tamaulipas*, Minute No. 279, U.S.-Mex., Aug. 28, 1989, available at <http://www.ibwc.state.gov/Files/Minutes/Min279.pdf>.

⁷⁰³ *Recommendations to Improve Immediately the Quality of the Colorado River Waters Going to Mexico*, Minute No. 241, U.S.-Mex., July 14, 1972, available at <http://www.ibwc.state.gov/Files/Minutes/Min241.pdf>.

⁷⁰⁴ *Permanent and definitive solution to the international problem of the salinity of the Colorado River*, Minute No. 242, U.S.-Mex., Aug. 30, 1973, available at <http://www.ibwc.state.gov/Files/Minutes/Min242.pdf>. The Minute established a salinity standard at Morelos Dam in Mexico at no more than 115 ppm greater than at Imperial Dam, upstream in the United States. The Minute also called for the construction of the Wellton-Mohawk Bypass Drain and limited groundwater pumping within five miles of the international boundary to 160,000 AF per year.

⁷⁰⁵ *Colorado River Salinity Control Act*, 43 U.S.C. §§ 1571-1599. The Act authorized the Bureau of Reclamation to build the Yuma Desalting Complex in Arizona and other projects to improve water quality. The Desalting Complex reduces the salinity of irrigation drainage water that is pumped from a shallow aquifer beneath the farmlands of the Wellton-Mohawk Project prior to re-injecting the water into the Colorado River. The Desalting Complex has the capacity to treat about 97,000 AF per year.

“guide” for the IBWC when it makes decisions regarding competing uses.⁷⁰⁶ In order of priority, those uses are:

- Domestic and municipal uses;
- Agriculture and stockraising;
- Electric power;
- Other industrial uses;
- Navigation;
- Fishing and hunting; and
- Any other beneficial uses which may be determined by the Commission.

The above uses are “subject to any sanitary measures or works which may be mutually agreed upon by the two Governments, which hereby agree to give preferential attention to the solution of all border sanitation problems.”⁷⁰⁷

The treaty priorities do not affect domestic use in the United States or Mexico. Both countries are free to establish their own priorities as they wish. The priorities listed above direct the IBWC when it makes decisions – a grant of authority that is limited as a practical matter to the part of the Rio Grande that forms the border between the two countries and where the IBWC owns infrastructure (two dams), as well as a small portion of the Colorado River and Tijuana River that flow across the border.

Current activities include efforts to restore the Colorado River Delta. Minute 306, adopted by the IBWC in 2000, called for both nations to create a “conceptual framework” for recommendations to increase flows in the delta.⁷⁰⁸ The Minute recognized that “each country has laws and regulations concerning the preservation of riparian and estuarine system habitat that are executed by authorities,” and that “collaboration is growing between those authorities, as well as between scientific, academic and non-governmental organizations in the two countries which have an interest in preserving the Colorado River delta ecology.”⁷⁰⁹

7.5.3 The International Role of the U.S. EPA

In addition to the IBWC’s activities, the United States and Mexico have signed a number of agreements addressing environmental and water quality issues in the “border area.”⁷¹⁰ The U.S. Environmental Protection Agency (“EPA”) assumes the responsibility for administering these accords.

⁷⁰⁶ *Id.* art. 3.

⁷⁰⁷ *Id.* art. 3.

⁷⁰⁸ *Conceptual framework for United States-Mexico studies for future recommendations concerning the riparian and estuarine ecology of the limitrophe section of the Colorado River and its associated delta*, Minute No. 306, U.S.-Mex., Dec. 12, 2000, available at <http://www.ibwc.state.gov/Files/Minutes/Min306.pdf>.

⁷⁰⁹ *Id.* at 1.

⁷¹⁰ The border area is defined as 62 miles (100 kilometers) on either side of the international boundary.

In 1983, for example, the lead environmental agencies in the United States and Mexico signed the La Paz Agreement,⁷¹¹ which established the U.S. EPA as the national coordinator of environmental prevention and cleanup efforts,⁷¹² but left the authority of the IBWC intact.⁷¹³ The U.S. and Mexico agreed to: 1) cooperate in the field of environmental protection in the border area;⁷¹⁴ 2) adopt the appropriate measures to prevent, reduce, and eliminate sources of pollution;⁷¹⁵ 3) cooperate in the solution of the environmental problems of mutual concern;⁷¹⁶ and 4) coordinate their efforts, in conformity with their own national legislation and existing bilateral agreements, to address problems of air, land, and water pollution in the border area.⁷¹⁷

Under the La Paz Agreement, “parties may conclude specific arrangements for solution of common problems in border area.”⁷¹⁸ There are five annexes to the La Paz Agreement.⁷¹⁹ The Agreement has also spawned several administrative programs.⁷²⁰

The United States and Mexico have created a joint environmental program called “Border 2012” to identify pollution problems and fund infrastructure improvements. The goal is to protect the health of 12 million people who live along the border. The program focuses on clean air, safe drinking water, emergency preparedness, and reducing the risk of exposure to hazardous waste.

7.5.4 Agencies Created by NAFTA

The North American Free Trade Agreement (“NAFTA”) of 1992 and its supplemental agreements (sometimes called “side” agreements) created a number of cross-border institutions that address environmental issues. These agreements do not allocate water. NAFTA is a trilateral agreement: the United States, Canada, and Mexico all signed the accord, which came into force on January 1, 1994.⁷²¹

⁷¹¹ *The Agreement Between the United States of America and the United Mexican States on Cooperation for the Protection and Improvement of the Environment in the Border Area*, U.S.-Mexico, Aug. 14, 1983, 22 I.L.M. 1025 (1983) (“*La Paz Agreement*”).

⁷¹² *Id.* art. 8.

⁷¹³ *Id.* art. 12.

⁷¹⁴ *Id.* art. 1.

⁷¹⁵ *Id.* art. 2.

⁷¹⁶ *Id.* art. 2.

⁷¹⁷ *Id.* art. 5.

⁷¹⁸ *Id.* art. 3.

⁷¹⁹ *Id.* See also Annex I: San Diego-Tijuana Border Sanitation Problem (1985); Annex II: Discharge of Hazardous Substances (1985); Annex III: Transboundary Shipments of Hazardous Wastes and Substances (1986); Annex IV: Transboundary Pollution from Copper Smelters (1987); and Annex V: International Transport of Urban Air Pollution (1989).

⁷²⁰ See U.S. Environmental Protection Agency, *U.S.-Mexico Border 2012 Program*, www.epa.gov/usmexicoborder/.

⁷²¹ *North American Free Trade Agreement*, U.S.-Can.-Mex., Dec. 17, 1992, 32 I.L.M. 289 (1993).

The most important side agreement to NAFTA is the North American Agreement on Environmental Cooperation (“NAAEC”), which established several new institutions to address environmental concerns, in particular cross-border environmental problems. The NAAEC does not create new standards for environmental regulation.⁷²²

Instead, the NAAEC is intended to establish a level playing field between Canada, Mexico and the United States and to avoid trade distortions caused by lack of environmental enforcement. The NAAEC’s objectives are to promote sustainable development, encourage pollution prevention policies and practices, and enhance compliance with environmental laws and regulations. It recognizes the right of each party to establish its own levels of domestic environmental protection and environmental development policies and priorities.⁷²³ Each party promises to “effectively enforce” its environmental laws.⁷²⁴ The NAAEC creates a Commission for Environmental Cooperation (“CEC”) and “reaffirms” the responsibility of states to ensure that activities within their jurisdictions do not cause damage to the environment of neighbor states (essentially adopting the transboundary no-harm rule).⁷²⁵ Citizens may file requests for the

NAFTA and the supplemental trade agreements are implemented in the United States by the North American Free Trade Implementation Act, Pub. L. No. 103-182, 102 Stat. 2057 (1993). The primary purpose of NAFTA is to create a trading bloc in North America and to eliminate the majority of tariffs on products created between the three nations. All three governments issued a statement in 1993 making clear that NAFTA expressly excluded water (except for bottled water). The statement read:

The governments of Canada, the United States and Mexico, in order to correct false interpretations, have agreed to state the following jointly and publicly as Parties to the North American Free Trade Agreement (NAFTA):

The NAFTA creates no rights to the natural water resources of any Party to the Agreement.

Unless water, in any form, has entered into commerce and become a good or product, it is not covered by the provisions of any trade agreement, including NAFTA Water in its natural state in lakes, rivers, reservoirs, aquifers, water basins and the like is not a good or product, is not traded, and therefore is not and has never has been subject to the terms of any trade agreement.

International rights and obligations respecting water in its natural state are contained in separate treaties and agreements negotiated for that purpose. Examples are the United States-Canada Boundary Waters Treaty of 1909 and the 1944 Boundary Waters Treaty between Mexico and the United States.

News Release, Canadian Council of Ministers of the Environment, *1993 Statement by the Governments of Canada, Mexico and the United States*, available at www.scics.gc.ca/cinfo99/83067000_e.html.

⁷²² The North American Agreement on Environmental Cooperation, U.S.-Can.-Mex., Sept. 13, 1993, 32 I.L.M. 1480 (1993), available at www.cec.org/pubs_info_resources/law_treat_agree/naaec/index.cfm?varlan=english

⁷²³ *Id.* art. 3.

⁷²⁴ *Id.* art. 5.

⁷²⁵ For the home page of the Commission for Environmental Cooperation, see www.cec.org.

CEC to investigate the enforcement of environmental laws under article 14 of the NAAEC.⁷²⁶ The CEC has no regulatory power that preempts agencies in the United States, Canada, or Mexico, but it can publish a report with its findings.

The side agreements to NAFTA also created the North American Development Bank (“NADB”) to loan money for sewers, roads, port facilities, and other infrastructure projects. In addition, a “sister” institution – the Border Environmental Cooperation Commission (“BECC”) – provides benefits to Mexico by funding projects in the water sector.⁷²⁷

⁷²⁶ To trigger a CEC review, the citizen submissions must assert that the United States, Mexico, or Canada is failing to enforce its environmental laws. This mechanism is described as creating a “whistle-blower” role for individuals, environmental groups, and others. For an index of complaints and CEC actions, *see* www.cec.org/citizen/index.cfm?varlan=english.

⁷²⁷ For the home page of the North American Development Bank, *see* www.nadb.org. The Bank and the BECC have a joint charter.

CHAPTER 8

INTERNATIONAL LAW RELEVANT TO THE RIVERS OF EUROPE

In this chapter:

- 8.1 The Law of Water Allocation in Europe
- 8.2 The EU's Water Framework Directive

8.0 INTERNATIONAL LAW RELEVANT TO THE RIVERS OF EUROPE

8.1 THE LAW OF WATER ALLOCATION IN EUROPE

Europe is home to the only regional water treaty that establishes principles of allocating and managing cross-border rivers and lakes.

In 1992, the member countries of the United Nations Economic Commission for Europe (“ECE”) approved a Convention on the Protection and Use of Transboundary Watercourses and International Lakes (commonly the “Helsinki Water Convention”).⁷²⁸

The Helsinki Water Convention has now been signed by 36 nations and the European Community.⁷²⁹ It entered into force in 1996, in contrast to the U.N. Convention on the Law of Non-navigational Uses of International Watercourses, which is still not in force because a sufficient number of countries have not ratified the agreement.

The scope of the Helsinki Water Convention is broader than any other regional treaty on transboundary waters. The Helsinki Convention, for example, defines “transboundary waters” to mean “any surface or ground waters which mark, cross or are located on boundaries between two or more States.”⁷³⁰ The Convention therefore applies to transboundary rivers, lakes and aquifers. Equally broad is the definition of “transboundary impact,” which means “any significant adverse effect on the environment resulting from a change in the conditions of transboundary waters caused by human activity.”⁷³¹

The Helsinki Water Convention obligates the signatories to:⁷³²

- Prevent, control, and reduce pollution;
- Ensure that transboundary waters are used with the aim of ecologically sound and rational water management;
- Ensure that transboundary waters are used in a “reasonable and equitable way,” taking into particular account their transboundary character; and
- Ensure conservation and, where necessary, restoration of ecosystems.

⁷²⁸ *The Convention on the Protection and Use of Transboundary Watercourses and International Lakes*, March 17, 1992, 31 I.L.M. 1312 (1992) (“*The Helsinki Water Convention*”).

⁷²⁹ The *Helsinki Water Convention* came into force 26 years after the International Law Association adopted the “Helsinki Rules.” The signatory nations are (in alphabetical order): Albania, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Kazakhstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldova, the Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Ukraine, Uzbekistan and the European Community. For additional information, see www.unece.org/env/water.

⁷³⁰ *Helsinki Water Convention* art. 1(1).

⁷³¹ *Id.* art. 1(2).

⁷³² *Id.* art. 2(2).

In taking these measures, the parties shall be “guided by.”⁷³³

- The “precautionary principle,” which means that actions to avoid the impact of release of hazardous substances shall not be postponed because scientific research has not fully proven a causal link between the substances and their potential impact;
- The “polluter pays principle,” which means the costs of pollution prevention, control, and reduction shall be borne by the polluter; and
- Water resources shall be managed so that the needs of the present generation are met without compromising the ability of future generations to meet their own needs.⁷³⁴

The Helsinki Water Convention calls on parties to use the best available technology to remedy problems. Other provisions call for bilateral and multilateral cooperation among riparian nations.⁷³⁵ Its provisions address the exchange of information,⁷³⁶ consultation⁷³⁷ and joint monitoring and assessment.⁷³⁸

Several recent bilateral and multi-lateral agreements between European nations are based on the principles of the Helsinki Water Convention. These agreements include the 1994 Danube River Protection Convention and the 1996 Rhine River Convention, as well as separate conventions on smaller watercourses, such as the Meuse River,⁷³⁹ the Scheldt River⁷⁴⁰ and Lake Peipsi.⁷⁴¹ In 2003, the Helsinki Water Convention was amended to allow for countries outside the ECE area to sign the agreement and abide by its legal framework.

8.2 THE EU’S WATER FRAMEWORK DIRECTIVE

In 2000, the European Union (“EU”) approved the first region-wide framework for cooperation in water policy and river management. The EU Water Framework Directive seeks to establish a “good status” (non-polluted status) for all major waters in Europe by 2015.⁷⁴²

⁷³³ *Id.* art. 2(5).

⁷³⁴ This notion is often referred to as the “principle of sustainability,” though the *Helsinki Water Convention* does not use those words.

⁷³⁵ *Helsinki Water Convention* art. 9.

⁷³⁶ *Id.* art. 6.

⁷³⁷ *Id.* art. 10.

⁷³⁸ *Id.* art. 11.

⁷³⁹ The Meuse River flows through parts of France, Belgium and The Netherlands.

⁷⁴⁰ The Scheldt River flows through parts of France, Belgium and The Netherlands.

⁷⁴¹ The Lake Peipsi Basin drains part of Russia and Estonia.

⁷⁴² See EU Water Framework Directive – integrated river basin management for Europe 2000/60/EC, 2000, O.J.(L 327) 1-72 (EC) (“EU Water Framework Directive”), available at http://ec.europa.eu/environment/water/water-framework/index_en.html.

The purpose of the Water Framework Directive is to:

- Prevent further deterioration of rivers and lakes, and protect and enhance their ecosystems;
- Promote sustainable water uses;
- Reduce pollution; and
- Mitigate or prevent floods.⁷⁴³

The Water Framework Directive imposes legal obligations on member States and creates a funding mechanism to implement the Helsinki Water Convention's provisions on pollution control. According to the EU, about 20% of all surface water in Europe is "seriously threatened with pollution, and 60% of European cities over-exploit their groundwater resources."⁷⁴⁴ To address these problems, the Water Framework Directive establishes standards and programs for pollution reduction, drinking water safety, river management, water prices, and other subjects.

In 2003, the EU approved the creation of River Basin Districts ("RBDs") in its member States. Some districts lie entirely within a country's borders (i.e., the Adour Garonne River in France) while others are transboundary (i.e., the Rhine and Danube Rivers).

In 2006, the EU established monitoring networks to assess the water quality of rivers and lakes in Europe. Member States must complete draft river basin management plans by 2008 and finalize them in 2009. In 2010, the EU plans to introduce pricing policies to encourage more efficient use of water. In 2012, the EU plans to put river basin operational measures into effect.

⁷⁴³ EU *Water Framework Directive* art. 1.

⁷⁴⁴ *The Water Framework Directive: Tap into it!* pamphlet at 2, available at http://ec.europa.eu/environment/water/water-framework/pdf/tapintoit_en.pdf. For other materials available on the EU web site, see <http://ec.europa.eu>.

CHAPTER 9

INNOVATIVE RIVER MANAGEMENT AGREEMENTS

In this chapter:

- 9.1 Water Banking on the Lower Colorado River
- 9.2 Water Trading in Australia
- 9.3 Acquiring Downstream Benefits
 - 9.3.1 The Rhine River
 - 9.3.2 The Columbia River

9.0 INNOVATIVE RIVER MANAGEMENT AGREEMENTS

In this chapter, we examine several innovative river management arrangements: 1) water banking on the lower Colorado River in the United States; 2) water trading in Australia; and 3) mechanisms to share the benefits of pollution control infrastructure on the Rhine River and power generation on the Columbia River. In describing these agreements, we do not suggest they are models to be emulated by other nations – we are not endorsing their application elsewhere. Rather, we propose to describe these agreements in more detail below as a way of encouraging river managers to think about them and to determine what, if anything, these arrangements might offer for their river basins.

There are many other examples of imaginative and interesting arrangements – the way in which Austria, Germany, and Switzerland cooperatively manage Lake Constance in the Rhine River Basin, for example, or the workings of the Prairie Provinces Water Board in Canada, which allocates water in rivers flowing east from the Rocky Mountains.

We opted to analyze certain rivers over others because they illustrate the ingenuity of regional mechanisms. Although some of the agreements are domestic in nature (i.e., water banking on the lower Colorado River and water trading in Australia), they nonetheless have international relevance. There is a long tradition in international law of incorporating domestic legal doctrines. The principle of the “equitable and reasonable use” of international rivers, for example, has its origins in U.S. Supreme Court opinions from the early 1900s and in important judicial opinions from Switzerland and Germany. What began as obscure domestic case law in all three countries is now a widely accepted international doctrine, cited by courts and commentators around the world.

9.1 Water Banking on the Lower Colorado River

The Lower Colorado River is home to one of the more innovative interstate water sharing agreements in the United States known as “water banking.” Three states – Arizona, California, and Nevada – participate in this activity.

The need for imagination and innovation on the Lower Basin of the Colorado River is best illustrated by the table below, which tells a story of demographics and rapid population increases in three of the area’s largest cities: Las Vegas, Nevada; Phoenix, Arizona; and Los Angeles, California.

TABLE 49. Population Changes in the Largest Cities in the Lower Colorado River Basin.

Date:	Las Vegas:	Phoenix:	Los Angeles:
1920	2,300	29,000	576,700
1960	64,400	439,000	2,479,000
Current	1,913,000	1,552,000	3,695,000

Source: U.S. Census

The legal foundation for the water banking agreements is the U.S. Secretary of the Interior's authority to contract for the storage and delivery of water in the Lower Colorado River Basin. This authority is based on the U.S. Supreme Court opinion of 1963 and its decree issued the following year.⁷⁴⁵ The Court in those decisions held that Congress had intended to apportion the Lower Basin in 1928 when it authorized the U.S. Bureau of Reclamation to sign long-term contracts with Arizona, California, and Nevada. The three states therefore had the following rights to water from the Colorado River, listed in the table immediately below.⁷⁴⁶

TABLE 50. Lower Basin Allocations Per U.S. Supreme Court Opinion.

State:	Annual Allocation:
California	4.4 MAF (and 50% of the surplus)
Arizona	2.8 MAF (and 46% of the surplus)
Nevada	.3 MAF (and 4% of the surplus)
TOTAL	7.5 MAF

Source: *Arizona v. California*, 376 U.S. 340, 342 (1964) (Decree).

The 1964 Decree further clarified the Secretary of the Interior's role in apportioning unused water from the river. The Decree stated:

If, in any one year, water apportioned for consumptive use in a State will not be consumed in that State [for any reason] . . . nothing in this decree shall be construed as prohibiting the Secretary of the Interior from releasing such apportioned but unused water during such year for consumptive use in the other States. No rights to the recurrent use of such water shall accrue by reason of the use thereof.⁷⁴⁷

Three decades later, this language would become hugely important for the three Lower Basin states. Even in the mid-1990s, Arizona did not use its full allocation of water from the Colorado River each year in average or better water conditions. Unlike Nevada and California, it had surplus water in average years. Arizona could therefore contemplate storing a portion of its unused water allocation for later use, thereby foregoing future water allocations, which it could transfer to Nevada or California to meet their needs. This basic idea was at the heart of the “water banking” scheme.

⁷⁴⁵ *Arizona v. California*, 373 U.S. 546 (1963), and section II (B) (6) of the decree in *Arizona v. California*, 376 U.S. 340 (1964) (“the Supreme Court Decree”).

⁷⁴⁶ The 7.5 MAF total for the Lower Basin was the number that the seven basin states had agreed to in 1922, when they signed the Colorado River Compact in 1922. The compact did not allocate water between the states.

⁷⁴⁷ Section II(B)(6) of the Supreme Court Decree, *supra* note 745.

Arizona established its water bank – the Arizona Water Banking Authority (“AWBA”) – in 1996.⁷⁴⁸ Arizona estimated it would not have to use its full apportionment until 2030, despite population growth and increased demands for water for irrigated agriculture. During that interim period, the accumulated amount of water left in the river would amount to approximately 14 MAF, which California would have otherwise diverted for its own use.⁷⁴⁹ Thus, Arizona had an interest in storing its share of Colorado River water by way of “banking” it for later years. But a state water banking authority by itself, without supportive federal regulations, was not sufficient to engage in the type of *interstate* transactions that supporters envisioned.

In 1999, the Secretary of the Interior adopted regulations to allow for interstate water banking in the Lower Basin.⁷⁵⁰ The first major interstate water banking contracts were signed two years later. In July 2001, the Southern Nevada Water Authority (“SNWA”), the Colorado River Commission of Nevada (“CRC”), and the AWBA signed an agreement to bank 1.2 MAF of surplus water from the Colorado River. The SNWA agreed to pay \$300 million over the life of the agreement (\$240 per AF) for Arizona to store the water. The Agreement was later amended to provide for an increase in the amount of water banked to 1.25 MAF and a total payment by SNWA of \$330 million. The water banking transaction consists of four separate steps:

1. Nevada requests that Arizona place a specific quantity of water, not to exceed 100,000 AF per year, in an aquifer in Arizona for storage.
2. At a later date, when Nevada needs the water, it directs that Arizona retrieve the water and use it for Arizona’s own use.
3. Arizona then forebears (relinquishes) an identical amount of water from its unused apportionment from the Colorado River, creating an “intentionally created unused apportionment” or “ICUA.” Arizona then directs the Secretary of the Interior to deliver this water to Nevada from Lake Mead (the reservoir behind Hoover Dam).
4. The Secretary of the Interior delivers Arizona’s unused apportionment to Nevada.

As part of the amended agreement, SNWA would be entitled to recover 20,000 AF per year (“AFY”) in 2007 and 2008 (although it has not elected to do so), and 30,000 AFY in 2009 and 2010. For 2011 and beyond, the parties agreed to a maximum recovery rate of 40,000 AFY until the banked reserves have been fully exhausted.

In October 2004, the Colorado River Commission of Nevada and the SNWA entered into similar agreements with the Metropolitan Water District (“MWD”) of Southern California, in which the Metropolitan Water District agreed to store a portion of Nevada’s unused Colorado River water in southern California until it was needed. Under the agreements, Nevada may recover up to

⁷⁴⁸ For the statute creating the Arizona Water Banking Authority, *see* Arizona Revised Statutes, A.R.S. § 45-2423.

⁷⁴⁹ For information on the Arizona Water Banking Authority, *see* www.awba.state.az.us/backgrnd/exec_sum.html.

⁷⁵⁰ *Off Stream Storage of Colorado River Water; and Development of and Release of Intentionally Created Unused Apportionment in the Lower Division States*, 43 C.F.R. 414. For background information, *see* 64 Fed. Reg. 59006 (Nov. 1, 1999). The regulations were based on the Secretary of the Interior’s authority under the Boulder Canyon Project Act of 1928 and the U.S. Supreme Court’s 1964 Decree.

30,000 AFY from the storage account, with six months notice provided to MWD. As of 2007, SNWA has banked 20,000 AF in the California Water Bank.

9.2 WATER TRADING IN AUSTRALIA

The physical characteristics and management problems of the Colorado River are strikingly similar to those found in the Murray-Darling River Basin in Australia.

Both rivers are relatively small in volume but drain parts of a large, primarily arid basin. Both rivers are vital to an entire region in the country – in the case of the Colorado, the entire desert southwest; in the case of the Murray-Darling, the entire southeast portion of Australia. There are large dams and significant irrigation infrastructure in both basins – Hoover and Glen Canyon Dams, for example, on the Colorado River; Hume and Dartmouth Dams, along with numerous weirs, on the Murray-Darling Rivers. Both rivers are used heavily for agriculture. The Colorado River irrigates four million acres (1.6 million hectares) in the United States and 500,000 acres (200,000 hectares) in Mexico. The Murray-Darling Rivers irrigates 3.6 million acres (almost 1.5 million hectares). Both rivers are essentially over-allocated (or would be over-allocated in the absence of legal constraints and regulations). Both rivers have serious salinity problems in certain stretches. And both rivers are now in a prolonged drought. Climate change scientists caution that these extended dry periods may become more common in the future and the supplies of water may become even more stressed.

To address these cumulative problems, Australia has developed a system of water trading, among the most sophisticated anywhere in the world. The three major basin states (New South Wales, Victoria, and South Australia), in cooperation with the Murray-Darling River Basin Commission,⁷⁵¹ have created a mechanism that allows individual farmers and landowners to buy and sell both their entitlements and their allocations through an open market and at market prices. (The entitlements are permanent rights; the allocations are annual amounts, based on available water.)

The resulting trades (purchases and sales) have helped the region address water shortages. Water goes to where it is valued the most, allowing farmers to sell water that would otherwise be used for annual crops, such as rice, and “move” the water to land-owners with trees, vineyards, and other crops that take years to grow.

To date, water trading in Australia has not involved derivatives because farmers and other water users have been primarily interested in obtaining water, not a financial product. However, as the water market becomes mature, water derivatives may become more prevalent as users look for new, innovative ways of managing their businesses.

The current trading system evolved over the years, as the following chronology illustrates:

⁷⁵¹ The Murray-Darling Basin Commission is a cooperative venture between the Commonwealth (federal) government and states in the river basin. The Commission is discussed in more detail in section 2.5.1 at page 66 of this report.

- 1983: Three states (New South Wales, Victoria, and South Australia) adopt a policy of allowing property owners to transfer water rights (allocations) on a temporary basis for no more than a year.
- 1989: The Murray-Darling Basin Commission adopts a policy, later implemented by the three states, to allow for the sale of water on a permanent basis.
- 1994: The Council of Australian Governments (“COAG”)⁷⁵² approves a Water Reform Agenda, which includes a proposal for states to allow water trading arrangements across borders. The COAG proposal represents a significant change away from the long-standing practice of state governments to administer water allocations. In its place, COAG supports a market-based strategy that relies on defined property rights and the freedom to buy/sell water as a commodity, separate from the rest of the property.
- 1995: The Murray-Darling Basin Commission adopts a “Cap” on diversions in the river basin to control potential overuse and reduce the effects of salinity downstream. The cap is based on volumes of water used in irrigation in 1993-94, and represents the Commission’s most direct action to-date to acknowledge that irrigation can no longer expand unabated.
- 1997: The Murray-Darling Basin Commission adopts interstate water trading rules,⁷⁵³ which go into effect on January 1, 1998. Farmers – the ones who hold the water licenses (water rights) – have permission to trade water. The governments regulate the transactions but they do not trade themselves.
- 1998: The Murray-Darling Basin Commission begins an interstate pilot project allowing water users to buy and sell water across state boundaries. Under the pilot program, farmers can trade “high security water allocations” in limited areas.⁷⁵⁴ Prices are set by the market, not by government.
- 2004: COAG proposes a National Water Initiative that includes the expansion of permanent interstate water trading.
- 2006: The Murray-Darling Basin Commission ends its 8-year long interstate pilot water trading program. In total, about 25,800 AF (31,865 ML) were traded in that period.⁷⁵⁵ In its place, the Commission expands the available water for both interstate entitlement and trading allocation.⁷⁵⁶ The Commission establishes a system of permanent water trading

⁷⁵² COAG consists of the states and Commonwealth governments in Australia. It can make recommendations and adopt policies for the entire country.

⁷⁵³ Trading rules are contained in Schedule E to the Murray-Darling Basin Agreement.

⁷⁵⁴ The areas were the Mallee Region of New South Wales and Victoria and the Murray Basin in South Australia.

⁷⁵⁵ See *An Evaluation of the Interstate Water Trade Pilot Project*, Final Report submitted by Tim Cummins & Associates on September 20, 2007, to the Murray-Darling Basin Commission.

⁷⁵⁶ To implement the expanded trading program, the Murray-Darling Basin Commission revised Schedule

to give irrigators and other water users the flexibility to alter the scale of their operations. An irrigator can now buy water to expand activities. Alternatively, an irrigator who may wish to sell water that is not needed or retire land from irrigation can sell all, or part of, his or her water entitlement and gain a financial return from the sale of that asset.

During the 2006-2008 drought, many water users relied on allocation trading to obtain water for their permanent crops (i.e., fruit trees). They purchased water from users who did not plant annual crops but who sold their water for profit (instead of the crops). There is a limit, however, to the amount of permanent trades that can occur in certain irrigation districts. Under a program called the National Water Initiative, the states have agreed to impose a 4% limit on the amount of water that leaves irrigation areas permanently.⁷⁵⁷ The purpose of this limit is to slow the rate of social change in areas traditionally dependent on irrigated agriculture.

Temporary trading, however, does not have those constraints. How much water can be traded in any given year depends on the actions of both the Murray-Darling Basin Commission and the states. The Commission takes a basin-wide view and announces each year how much water is available for use by the states. In a period of severe drought (as is the case now), the Commission may actually set the amount of forecast usage at zero at the beginning of the rainy season (winter) and then adjust the potential allocations upward as the rains come. In 2006, for example, the Commission proposed a zero allocation (meaning, literally, that unless it rained, farmers would receive no water at all) and then increased the allocations as the season progressed. Thus, a farmer wanting to sell water for year had to wait until it rained in order to execute a transaction for the following summer. The process of deciding how much water is available is a cooperative task: the Commission provides advice to the state on the Murray River reservoirs under its authority and the states then make the formal allocations of water to their users.

The mechanism for farmers (individuals or corporations) to trade water consists of seven steps:

1. The water user (seller) seeks a potential buyer through personal contacts or through a broker.
2. The seller files an application with the state licensing authority showing the amount of water to be traded (sold) and for what duration.
3. The state licensing authority verifies that the seller has a valid entitlement and, if the sale is permanent, that it will not exceed the 4% limit imposed by the Murray-Darling Basin Commission. If the application meets these standards, the state licensing authority notifies the Commission of a pending transfer.
4. The state licensing authority advises the *buyer* of any restrictions on usage (i.e., salinity control) that accompany the transfer.

E to the Murray-Darling Basin Agreement.

⁷⁵⁷ The National Water Initiative is a program developed by the Council of Australian Governments ("COAG"). For the home page of COAG, see www.coag.gov.au. For the home page of the National Water Initiative, see www.nwc.gov.au/www/html/117-national-water-initiative.asp?intSiteID=1

5. The state licensing authority then cancels or reduces the license of the seller to match with the amount of water that is sold.
6. The state licensing authority of the buyer advises the Commission once the transfer has taken place.
7. The Commission records the transfer in its Trade Register.

There is no uniform system of forms or applications in the basin. Each state has its own format. A farmer in Victoria, for example, must follow the procedures outlined by the state agency there, the Department of Sustainability and Environment. A farmer in New South Wales must do the same with his licensing agency.

In 2007, Parliament passed a new *Water Act*, which, among other things, created a new basin-wide entity, the Murray-Darling Basin Authority, to prepare a basin-wide plan and to propose new ways of trading water. The trend in Australia is for water to become more fungible and for owners of water licenses to have more freedom to buy and sell these rights as they wish.

9.3 ACQUIRING DOWNSTREAM BENEFITS

The Rhine River and Columbia River are seemingly as different from each other as possible. The Columbia River is remote and flows through few cities of any size. The Rhine is part of an urban, industrialized corridor.

Yet these rivers have something in common. They both adopted mechanisms that allow a downstream State to share in the benefits of infrastructure built upstream in another State. One State builds, the other State enjoys. How are these costs allocated?

We examine two examples below. The first of these agreements is from the 1990s in the Rhine Basin. The second is from the Columbia River in the 1960s. Both agreements illustrate how nations can – and have – developed pragmatic cross-border solutions to problems.

9.3.1 The Rhine River

The Rhine River begins in Switzerland and flows through France and Germany before it reaches the Netherlands, where it empties into the North Sea. Industry and cities line its path. Effluent dumped created a serious salinity problem – not from irrigated agriculture, but from other sources, such as mines that produce potash for fertilizer.

The largest potash mine along the route of the river was located in Alsace, France, in an area that had been part of Germany prior to the end of World War I. “Germany has a world monopoly on potash,” a German publication from 1918, prior to armistice, noted proudly. “As it is out of the question that Alsace would be separated from Germany, all dreams of breaking the German potash monopoly are vain It is hardly exaggerating to say that the potash mines of Germany will be able to supply the whole world for 500 years and more. The potash fields are practically inexhaustible.”⁷⁵⁸

⁷⁵⁸ THE JOURNAL OF INDUSTRIAL AND ENGINEERING CHEMISTRY, August 1918, at 655. The armistice ending World War I was signed November 11, 1918.

But Germany did surrender Alsace, and the potash mines became part of France.⁷⁵⁹ By 1970, effluent from the mines and from other human sources had increased the salinity level of the Rhine River downstream. Millions of tons of salts flowed each year into the Netherlands, the farthest downstream country. The Netherlands is particularly vulnerable from salt intrusion in two directions: from the North Sea, which it borders; and from the Rhine River. Three-quarters of the Netherlands are located below sea level and thus goes to considerable expense to prevent salt-water intrusion of drinking water.

Before 1900, the salt content of the Rhine River did not exceed 10-12 milligrams per liter (“mg/l”)(10-12 parts per million/ppm). That figure rose steadily in the 1930s and 1940s. By 1976, the problem was serious enough that five basin States signed a convention to restrict the amount of chloride in the Rhine River measured at the border between Germany into the Netherlands.⁷⁶⁰ At the time, the levels of chlorides sometimes reached 360 mg/l, equivalent to 30 times natural levels.

The 1976 convention established a compromise level: 200 mg/l at the German-Dutch border. France agreed it would not exceed that amount and would temporarily store the salts underground until natural flows in the river diluted the concentrations. Once the level of salts was sufficiently diluted, France could discharge chlorides once again up to the 200 mg/l limit. The agreement therefore anticipated cycles of storage and release of salts, depending on the amount of water in the river.

Although France signed the convention, it did not ratify it because of economic concerns about its impact on the potash industry as well as potential contamination to its own groundwater if it stored salts underground in limestone formations (as proposed). In response to France’s delay in ratifying the convention, several businesses in the Netherlands then sued France in Dutch courts.

France eventually ratified the convention in 1985. But problems persisted. Lake IJssel, one of the Netherlands’ main sources of drinking water, is linked to the Rhine River. When the Rhine River, with a higher chloride concentration, mixes with the lake and its brackish (high salinity) water, the levels of salts exceed drinking water standards. The Netherlands pushed for more stringent controls.

It was only in 1991, that the five States signed a Chlorides Protocol addressing specific cleanup measures and the allocation of pollution control costs among the basin nations.⁷⁶¹ Even then there were delays. The Chlorides Protocol came into force in November 1, 1994. Under the Chlorides Protocol, France agreed to build a chloride removal system and to pump recovered salts into an underground limestone formation. The four nations – France, the Netherlands,

⁷⁵⁹ The Alsace reverted back to Germany between 1933-1945. After the end of World War II, the area became part of France again.

⁷⁶⁰ *Convention for the Protection of the Rhine Against Pollution by Chlorides*, Dec. 3, 1976, 1404 U.N.T.S. 91. The five signatory States were: France, Germany, Luxembourg, the Netherlands and Switzerland.

⁷⁶¹ *Additional Protocol to the Convention on the Protection of the Rhine Against Pollution by Chlorides*, Sept. 25, 1991, 1840 U.N.T.S. 372 (“*Chlorides Protocol*”), available at http://untreaty.un.org/unts/60001_120000/29/39/00057935.pdf (“*Chlorides Protocol*”). The five signatory States were: France, Germany, Luxembourg, the Netherlands and Switzerland.

Luxembourg and Switzerland – agreed to share in the cost of pollution prevention. The Netherlands agreed to pay the largest share (by percent). It agreed to help pay for certain measures within its own borders *and* for upstream chloride prevention measures.⁷⁶² The Netherlands would pay France to help cleanup the river. The Chlorides Protocol therefore did not neatly adopt the “polluter pays” principle. It was a more flexible accord based in part on the economic assessment by the Netherlands government that “it was considered cheaper to invest in pollution abatement in France than in water purification in the Netherlands.”⁷⁶³

Under the terms of the Chlorides Protocol, the Netherlands’ total investment was capped at 32.37 million guilders (equivalent to approximately \$17 million in 1991) and the French investment was capped at 400 million francs (\$70 million in 1991). The agreement set a 1998 deadline for France to complete its investment.

TABLE 51. Sharing the Cost of Chloride Prevention Measures in the Rhine River.

State:	Percentage of Total:
The Netherlands	34%
Germany	30%
France	30%
Switzerland	6%
TOTAL	100%

Source: *Chlorides Protocol* art. 4.

France ultimately invested in the effluent-reduction infrastructure but then found itself in a dispute with the Netherlands over the implementation of the Chlorides Protocol’s cost allocation formula. The dispute was eventually referred to the Permanent Court of Arbitration (“PCA”), which entered an arbitral award in 2004 finding that France owed 120 million francs (approximately 20 million euros) in refunds to the Netherlands.⁷⁶⁴ Meanwhile, the French government began taking steps in the early 2000s to close the mines that were the source of the problem.⁷⁶⁵

⁷⁶² *Id.* art. 3. The protocol required the Netherlands to “take measures in Netherlands territory to limit chloride concentrations in the waters of the IJsselmeer [Lake IJssel] used to supply drinking water” by discharging briny water that entered the lake and discharge it elsewhere.

⁷⁶³ *Transboundary Water Management as an International Public Good*, a report prepared for the Ministry of Foreign Affairs of Sweden (2001) at 28, and available at www.odi.org.uk/wpp/resources/project-reports/01-transboundary-water-management.pdf.

⁷⁶⁴ PERMANENT COURT OF ARBITRATION, THE RHINE CHLORIDES ARBITRATION CONCERNING THE AUDITING OF ACCOUNTS (NETHERLANDS-FRANCE), AWARD OF 2004, (Asser Press 2008) (“*Chlorides Arbitral Award*”). Summaries of the tribunal’s award are also found at 15 Y.B. Int’l Env’tl. L. 258 (2006). The PCA, founded in 1899 in The Hague, Netherlands, provides a range of dispute resolution mechanisms, including arbitration. The PCA is not a court in the normal sense of the word but rather a forum where parties (States, corporations, and individuals) seek to resolve disputes. The PCA maintains a roster of arbitration experts.

⁷⁶⁵ France initially planned to close the mines in 2003-2004 but a fire in 2002 forced it to close the mines permanently at that time. The mines were owned by Mines Domaniales de Potasse d’Alsace (“MDPA”).

The legacy of the Chlorides Protocol is not the legal dispute on costs but the fact that four countries – including the State with the most to lose if the chloride problem was not solved – agreed to share costs and help pay for the cleanup. This spirit of cooperation was not lost on the PCA arbitration panel. It noted that when States bordering an international waterway decide to create a joint regime for the use of its waters, they are implicitly acknowledging a shared “community of interest” – a term first used in the 1929 case by the Permanent Court of International Justice involving the Oder River, and invoked subsequently by many international law commentators.⁷⁶⁶

9.3.2 The Columbia River

The Columbia River is home to a network of hydroelectric dams that produces more power than any other river in North America. The dams are located in both the United States and Canada and are coordinated and managed cooperatively, as if they were owned by a single utility. But this situation was not always the case, and the negotiations between the two countries in the 1950s and early 1960s are an interesting chapter in the history of international water allocation.

The basic problem facing the United States was this: only 15% of the Columbia River Basin lies in Canada, yet Canada supplies about 38% of the average annual flows in Washington State and Oregon and supplies a more impressive 50% of the peak flood water flows.⁷⁶⁷ It was impossible for the United States to increase the efficiency of hydroelectric operations in its own borders, or to protect itself from floods (as it sought to do in the 1950s) without Canadian cooperation.

At the time, consumers and industrial users in the United States and Canada demanded more and more power. Electricity consumption increased significantly each year. Would Canada build dams on the Columbia River only for its own uses? Or could both nations more effectively manage the hydropower potential of the Columbia River if they coordinated dam construction and operation?

The idea of a coordinated Columbia River scheme involving the United States and Canada was not new. In 1944, the International Joint Commission (“IJC”) undertook an investigation at the behest of both countries to examine the feasibility and advantages of a cooperatively-managed river.⁷⁶⁸ The Commission’s report took 15 years to complete and was finished only in 1959.⁷⁶⁹

⁷⁶⁶ *Chlorides Arbitral Award*, *supra* note 764, at 57 (para. 97).

⁷⁶⁷ See U.S. Army Corps of Engineers & the Bonneville Power Administration, *Columbia River Treaty: History and 2014/2024 Review (2008)*, available at www.bpa.gov/Corporate/pubs/Columbia_River_Treaty_Review_-_April_2008.pdf. The downstream volumes are measured at The Dalles, Oregon (east of Portland, Oregon).

⁷⁶⁸ The IJC was established under the Boundary Waters Treaty of 1909. Its duties are discussed in section 7.3.2 of this report at page 173.

⁷⁶⁹ See the IJC publication, *The IJC and the 21st Century* at 157, available at www.ijc.org/php/publications/html/21ste.htm.

Meanwhile, the two countries offered competing proposals of what to build and where. The issue turned into a genuine dispute over a U.S. proposal on a key tributary of the Columbia, the Kootenay River (spelled “Kootenai” in the United States). The Kootenay River begins in Canada, flows into the United States, and then turns north again and re-enters Canada, where it finally empties into the Columbia River near Castlegar, British Columbia, 20 miles (32 kilometers) from the international border.

In the early 1950s, the United States proposed building Libby Dam on the Kootenay River in Montana. The dam would create a reservoir that flooded 42 miles of valley land in Canada. The United States acknowledged it had to compensate Canada for the lands inundated by the reservoir, but it refused to compensate the Canadians for the benefits (power) that the United States would reap by using Canadian territory for the reservoir.

In 1954, the United States changed its position and offered to pay more money to Canada, but it still refused to share power from the dam. The amount of money was still considered so small that General Andrew McNaughton, chairman of the IJC section for Canada, was reported to have said: “They want us to give them a gold watch for the price of a bit of tinsel.”⁷⁷⁰

General McNaughton then initiated a study to examine whether Canada could divert the Kootenay River for its own use, never mind the United States. Although it did not use these terms, Canada invoked the much-maligned Harmon Doctrine for its own purposes.⁷⁷¹

Canada said it wanted to examine diverting the Kootenay River *before* it flowed into the United States.⁷⁷² The reservoir behind a dam at the headwaters of the Kootenay River in Canada would back up waters – perhaps as much as 3.5 MAF per year – into Canal Flats, the headwaters of the Columbia River. Canada would then build another dam downstream on the Columbia River to capture the flows of the river, embellished by the additions of the Kootenay River. Below this dam, Canada proposed to build a huge tunnel to carry 15 MAF of water each year – about two-thirds of the entire flow of the Columbia River at that location – and to divert it into the Fraser River, which empties into the Straits of Georgia at Vancouver, British Columbia. This all-Canada diversion would also allow for increased power generation on the Fraser River.

Not a drop of diverted water would cross the U.S. border. The proposal would move enough water from the Kootenay River that it would discourage, if not prohibit, the United States from building Libby Dam on the Kootenay River in Montana. Furthermore, power generation on the Columbia River downstream in the United States would be severely limited, too.⁷⁷³

⁷⁷⁰ Charles B. Bourne, *The Columbia River Controversy*, 37 *Can. B. Rev.* 444-472 (1959), reproduced in *INTERNATIONAL WATER LAW: SELECTED WRITINGS OF PROFESSOR CHARLES B. BOURNE* (Patricia Wouters, ed., Kluwer International 1997) at 324.

⁷⁷¹ See section 3.1 at page 106 this report for a summary of the 1895 Harmon Doctrine, in which the United States took the position that in the absence of a treaty, it owed no legal obligations under international law to leave water in the Rio Grande for use by Mexico.

⁷⁷² The Kootenay River flows less than a mile from the southern end of Columbia Lake, the headwaters of the Columbia River. From there, the two rivers diverge: the Kootenay River flows south and the Columbia River flows north before it makes an arc and heads in the direction of the U.S.-Canadian border.

⁷⁷³ Professor Bourne contended that Canada could have undertaken this scheme consistently with the *Boundary Waters Treaty of 1909*. BOURNE, *supra* note 770, at 322-352. Under article II of the *Boundary Waters*

If the intent of this proposal was to grab the attention of U.S. officials, it succeeded. The United States and Canada came to the negotiating table and eventually agreed on the terms of the Columbia River Treaty.⁷⁷⁴ Under the Treaty, the U.S. was allowed to build Libby Dam, as planned, on the Kootenay River.⁷⁷⁵ The Canadians agreed to build three dams of their own: Mica, Arrow (later renamed Hugh Keenleyside), and Duncan, but they agreed not to divert the Columbia River into the Fraser River, as General McNaughton had threatened. In effect, the two nations decided in the end to cooperate on a common scheme that would benefit both countries.

Under the proposed treaty, the United States received two tangible benefits: flood control and power, though it only paid for flood control upfront (\$64.4 million). The United States ratified the Columbia River Treaty almost immediately, but it was roundly criticized in some circles in the Canadian province of British Columbia because it did not compensate Canada for assuming the financial risk of building the three dams that would primarily benefit the United States. At the time, British Columbia had embarked on several dams of its own on the Peace River, and it complained that it did not need the power from the three proposed treaty dams nor did it have money to build them.

To solve this problem, the Canadian government (under a change in political leadership when the Liberal Party assumed control of Parliament) requested an upfront payment from the United States to build the dams in Canada. The United States eventually agreed to this provision, and its terms were spelled out in a protocol to the 1961 Treaty.⁷⁷⁶

At stake in this transaction was *not* power that Canada would generate when the three dams were finished. That energy remained in Canadian ownership – it was Canada's to use domestically or sell as it pleased. But Canada said it was entitled to receive half of the “downstream benefits” (the power) *generated in the United States*. Canada argued the proposed dams in its territory would allow utilities in the United States to produce significantly more power. The dams in Canada would serve as reservoirs to benefit American utilities, releasing water when they needed

Treaty, both the United States and Canada retained jurisdiction over rivers in their territory. They needed approval from the International Joint Commission only if they diverted water from a “boundary water” (i.e., such as Lake Superior, one of the Great Lakes that straddles the border) or if they raised or lowered the level of a river or lake at the border to flood the other nation. But the Canadian diversion proposal for the Kootenay-Columbia did not fall into either category. Professor Bourne acknowledged that article II seemed “to embody what is known as the Harmon doctrine, a doctrine propounded by Attorney General Harmon of the United States in 1895 and formerly used by the United States government in disputes with the Mexican and Canadian governments. The essence of the doctrine is that a state may do as it pleases with the waters in its territories over which it has sovereignty without regard to downstream interests; there is no ‘liability or obligation’ of any sort to them.” *Id.* at 326. Bourne noted that at the time of the adoption of the 1909 treaty, the Canadian government insisted on mitigating the potential impacts of the Harmon doctrine by allowing either the United States or Canada to pursue claims against each other for damage caused by diversions. But Bourne argued that this language had no practical effect on Canada because there was no legal mechanism in 1909 that allowed United States to seek compensation for damages in Canadian courts. As a result, the United States had no way to recover damages caused by the Canadian proposal for the Kootenay-Columbia Rivers. *Id.* at 328-330.

⁷⁷⁴ *Treaty relating to the Cooperative Development of the Water Resources of the Columbia River Basin*, U.S.-Can., Jan. 17, 1961, 542 U.N.T.S. 244 (“*Columbia River Treaty*”). The treaty is also found at 15 U.S.T. 1555.

⁷⁷⁵ *Id.* art. XII (Kootenai River Development). The Libby Dam was completed in 1973.

⁷⁷⁶ *Columbia River Treaty*, *supra* note 774.

it. Because Canada did not need more power at the time, it wanted the United States to buy Canada's share of the downstream benefits (the "Canadian Entitlement") for 30 years.⁷⁷⁷

Eventually, the United States agreed. Under the terms of the protocol, the U.S. utilities that wanted more power from the Columbia River formed an entity to sell revenue bonds to raise money. They, not the Canadians, assumed the financial risk of going into debt. The utilities then agreed to pay a lump sum of \$264.4 million upfront to Canada for this "pre-sale" of power. With these additional agreements in place, Canada ratified the Columbia River Treaty in 1964.

Professor McCaffrey describes the significance of the treaty:

The concept of sharing downstream power benefits is an extremely important one, since it frees upstream and downstream states from the zero-sum game that would otherwise result from the construction of significant works in an upper riparian country. The 1961 Columbia River Treaty demonstrates that projects upstream and downstream can work synergistically to produce greater benefits for both states than either could gain by acting alone – a true positive-sum game.⁷⁷⁸

The Columbia River Treaty lasts in perpetuity, though either nation may give a minimum of 10 years' notice to terminate the accord starting on September 16, 2014, the 60th year anniversary of its ratification. Both sides are evaluating the agreement now. It is not clear what changes, if any, they want to make to the treaty, which, among other things, doubled the amount of reservoir storage on the river.⁷⁷⁹ This increased storage reduces peak flows (and therefore prevents or reduces flooding in the United States) and allows both countries to generate more electricity.⁷⁸⁰

The treaty also had three major impacts in the United States: 1) it led the U.S. Bureau of Reclamation in the 1960s to build a third powerhouse at Grand Coulee Dam in Washington State, increasing power production there; 2) it led the Bonneville Power Administration ("BPA"), a federal agency, to finance and build long-distance transmission lines (known as "the intertie") between the Pacific Northwest and California, where extra power was sold; and 3) it assumed the coordinated operations of dams in the United States and led to the adoption of the Pacific Northwest Coordination Agreement ("PNCA") in 1964, which allowed the federal agencies and local utilities to manage river operations as if the dams were owned by a single entity.⁷⁸¹

⁷⁷⁷ In the 1990s, Canada gave the United States notice, pursuant to the Treaty, that it wanted the Canadian Entitlement back for its own use at the end of the 30-year period. The U.S. utilities began returning the power in phases in 1998 at the U.S.-Canadian border. For additional information on the negotiation of the Treaty, see www.nwcouncil.org/history/ColumbiaRiverTreaty.asp.

⁷⁷⁸ McCaffrey, *supra* note 141, at 353.

⁷⁷⁹ Article II of the Columbia River Treaty required Canada to provide 15.5 MAF (19.12 cubic kilometers) of usable reservoir storage.

⁷⁸⁰ The Columbia River Treaty did not address flows for fish and wildlife.

⁷⁸¹ The original 1964 PNCA expired in 2003. It was revised in 1997 and now expires in 2024.

When the treaty was signed, Congress had yet to pass the Endangered Species Act (“ESA”).⁷⁸² As a result of the ESA, the regulatory regime of the river in the United States is now markedly different. The key federal agencies involved in river management – the Army Corps, the Bureau of Reclamation, and BPA – run the river differently than they did 40 years ago. Flows for maintaining salmon habitat and preserving fish runs are common. As a result, treaty re-negotiations, if initiated by the United States, Canada, or both, will most certainly involve an ecological dimension.⁷⁸³ At which point in time the two countries, with a long history of cooperation, will have to address once again: How can we make the best use of the formidable supply of water in the Columbia River while attempting to balance environmental concerns? What are our obligations to each other? How do we most effectively share the resources of the river?

⁷⁸² *Endangered Species Act of 1973*, 16 U.S.C. § 1531-1544.

⁷⁸³ In the years since Canada ratified the Columbia River Treaty, the British Columbia government has established the Columbia Basin Trust, a crown corporation, to allocate funds for the benefit of approximately 2,300 residents whose homes and farms were flooded when the dams were built and to support programs that address environmental, social and economic development in the affected area. The trust was endowed with \$295 million and has invested in local power projects and business loans. See www.cbt.org.

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APPENDICES

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APPENDIX A: SUMMARY CHART (part 1)

	The Danube	The Rhine	The Jordan	The Tigris-Euphrates	The Nile	The Ganges	The Indus
Location	Europe	Europe	The Middle East	The Middle East	Africa	Asia	Asia
Source	The Black Forest in western Germany	The Alps in Switzerland	The slopes of Mt. Hermon in Israel, Lebanon and Syria	Turkey	Various lakes and rivers in Ethiopia, Sudan, Rwanda and Tanzania	India	Tibet
Mouth	Black Sea	North Sea	Dead Sea	Persian Gulf	Mediterranean Sea	Bay of Bengal	Arabian Sea
Length: Miles (km)	1,770 miles (2,850 km)	865 miles (1,392 km)	223 miles (360 km)	Tigris: 1,180 miles (1,900 km) Euphrates: 1,740 miles (2,800 km) Shatt al-Arab (combined Tigris and Euphrates): 125 miles (200km)	4,132 miles (6,650 km)	Brahmaputra: 1,800 miles (2,900 km) Ganges: 1,560 miles (2,510 km)	1,800 miles (2,900 km)
Major Tributaries	The Drava The Tisza	The Aare The Mosel The Mainz	The Yarmouk The Jabbok	The Khabur and Balikh in Turkey (Euphrates) and The Karun in Iran, which flows into the Shatt al-Arab	The Blue Nile The White Nile The Atbara	The Brahmaputra The Meghna The Yamuna	The Indus The Jhelum The Chenab The Sutlej The Beas The Ravi
Annual Flows (MAF)	158 MAF at the Black Sea	56 MAF into the North Sea	Small amounts into the Dead Sea	37 MAF at the Persian Gulf	72 MAF into the Mediterranean Sea	985 MAF at the Bay of Bengal	142 MAF
Cities	Vienna, Austria; Bratislava, Slovakia; Budapest, Hungary; Belgrade, Serbia	Basel, Switzerland; Strasbourg, France; Bonn, Germany; Cologne, Germany; Duisberg, Germany; Rotterdam, the Netherlands	No major cities adjacent to the river; Amman, Jordan is in the basin	Mosul, Basra and Baghdad, Iraq	Khartoum, Sudan; Cairo, Egypt	Delhi, India Dacca, Bangladesh and many other cities	Karachi, Pakistan Hyderabad, Pakistan and many other cities
Basin Size (sq. miles/sq. km)	307,000 sq. miles (796,000 sq. km)	77,000 sq. miles (199,000 sq. km)	7,100 sq. miles (18,400 sq. km)	296,000 sq. miles (766,000 sq. km)	1.3 million sq. miles (3.3 million sq. km)	644,000 sq. miles (1.7 million sq. km)	418,000 sq. miles (1.1 million sq. km)
Basin Population	81 million	50 million	17 million	44 million	160 million	407 million	178 million

APPENDIX A: SUMMARY CHART (part 2)

	The Mekong	The Murray-Darling	The Amazon	The LaPlata	The Colorado	The Columbia	The Nelson-Saskatchewan
Location	Southeast Asia	Australia	South America	South America	North America	North America	North America
Source	Himalayan Mountains in Tibet	Snowy Mountains in southeast Australia	The Andes Mountains In Peru	Brazil	Western slopes of the Rocky Mountains in the United States	Western slopes of the Rocky Mountains in Canada	Eastern slopes of the Rocky Mountains in Canada
Mouth	Mekong Delta	Southern Ocean	Atlantic Ocean	Atlantic Ocean	Gulf of California	Pacific Ocean	Hudson Bay
Length: Miles (km)	2,700 miles (4,350 km)	Murray: 1,609 miles (2,589 km) Darling: 1,702 miles (2,739 km)	4,000 miles (6,400 km)	Parana: 3,032 miles (4,880 km) Paraguay: 1,584 miles (2,550 km) Uruguay: 990 miles (1,593 km) La Plata: 180 miles (290 km)	1,450 miles (2,333 kilometers)	1,243 miles (2,000 kilometers)	Saskatchewan: 1,202 miles (1,949 km) The Nelson: 400 miles (644 km)
Major Tributaries	Mun River (Thailand) Nam Theun (Laos) and the Tonle Sap River in Cambodia	The Murray The Darling The Murrumbidgee	The Rio Negro The Madeira The Yapura The Purus and many others	The Paraguay The Parana The Uruguay	The Green, Gunnison, San Juan and other rivers	The Snake, Willamette, Clearwater and other rivers	The Saskatchewan The Winnipeg The Red River of the North
Annual Flows (MAF)	282 MAF	290,000 AF into the Southern Ocean	5,430 MAF	480 MAF into the Atlantic Ocean	13-15 MAF at Lee Ferry, Arizona (the dividing line between the Upper and Lower Basins)	192 MAF into The Pacific Ocean	60 MAF into Hudson Bay
Cities	Vientiane, Laos Phnom Penh, Cambodia	Canberra, ACT	Manaus and Belem, Brazil	Buenos Aires, Argentina Brasilia, Brazil Asuncion, Paraguay Montevideo, Uruguay	No major cities	Trail, British Columbia Wenatchee, Washington Tri-Cities, Washington Vancouver, Washington	Calgary, Alberta Edmonton, Alberta Saskatoon, Sask. Winnipeg, Manitoba Fargo, North Dakota Grand Forks, North Dakota
Basin Size (sq. miles/sq. km)	310,000 sq. miles (806,000 sq. km)	425,000 sq. miles (1.1 million sq. km)	2.4 million sq. miles (6.1 million sq. km)	1.1 million sq. miles (2.9 million sq. km)	271,000 sq. miles (703,000 sq. km) of which 98.4% is in the United States, and 1.6% in Mexico	258,000 sq. miles (668,000 sq km) of which 85% is in the United States, and 15% in Canada)	707,000 sq. miles (1.8 million sq. km)
Basin Population	60 million	2 million	25 million	72 million	6.3 million	6 million	5 million

APPENDIX A: SUMMARY CHART (part 3)

The Mississippi	
Location	North America
Source	Lake Itasca in Minnesota
Mouth	Gulf of Mexico
Length: Miles (km)	3,710 miles (5,971 kilometers)
Major Tributaries	The Missouri, Ohio, Illinois and others
Annual Flows (MAF)	442 MAF at the Gulf of Mexico
Cities	Minneapolis-St. Paul, Minnesota; St. Louis, Missouri; Memphis, Tennessee; New Orleans, Louisiana
Basin Size (sq. miles/sq. km)	1.2 million sq. miles (3.2 million sq. km)
Basin Population	84 million

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APPENDIX B: INTERNATIONAL TRIBUNALS PRIOR TO 1946

The Food and Agricultural Organization (“FAO”) of the United Nations estimates that over the years – from the ancient empires of the Middle East to the present – nations have signed more than 2,000 treaties that address some aspect of river and lake governance: boundaries, navigation, irrigation, power generation, fishing, water quality and water allocation.⁷⁸⁴

But how have States resolved disputes? It is, after all, one thing to have a written document that two countries consider binding, but another matter to seek review by a neutral third-party who is empowered to arbitrate and decide a dispute.

B.1 The Jay Treaty Tribunal (1794)

The modern history of international arbitration starts with the Treaty of Amity, Commerce and Navigation – also known as the Jay Treaty or the Treaty of London – signed in 1794 between the United States and Great Britain.⁷⁸⁵ John Jay negotiated the Treaty while serving as the Chief Justice of the U.S. Supreme Court.

The Jay Treaty attempted to resolve issues left over from the American Revolution. Among the areas of contention were the British presence in the Northwest Territory of the United States, which Britain had promised to abandon, as well as war-time debts and the U.S.-Canadian boundary.⁷⁸⁶

The Jay Treaty called for the creation of two claims commissions, composed of U.S. and British citizens. The mandate of these two commissions was to reach an agreement concerning:⁷⁸⁷

- The amounts of unrecovered debts from British merchants, unresolved since the Revolutionary War ended in 1783; and
- The losses sustained by American merchants to reimburse them for the confiscation of 350 ships between the years 1793 and 1794.

B.2 The Alabama Claims Arbitration (1872)

⁷⁸⁴ FOOD AND AGRICULTURE ORGANIZATION, SYSTEMATIC INDEX OF INTERNATIONAL WATER RESOURCES TREATIES, DECLARATIONS, ACTS AND CASES BY BASINS (FAO: 1978 and 1984). The FAO compiled treaties starting in 805, when Emperor Charlemagne granted rights of navigation to a monastery on the Rhine River. *Id.* at 1.

⁷⁸⁵ *Treaty of Amity, Commerce and Navigation*, U.S.-Gr. Brit., Nov. 19, 1794, 8 Stat. 116, T.S. No. 105 (“*Jay Treaty*”), available at <http://www.yale.edu/lawweb/avalon/diplomacy/britain/jay.htm>.

⁷⁸⁶ The *Jay Treaty* was controversial at the time: both Thomas Jefferson and James Madison opposed it because they believed it undermined America’s relationship with France. In their view, Great Britain continued to be the main threat to American independence and values. Opponents organized public protests with the rallying cry: “Damn John Jay! Damn everyone that won’t damn John Jay! Damn every one that won’t put lights in his window and sit up all night damning John Jay!”

⁷⁸⁷ *Jay Treaty* arts. 6 & 7.

Under the Treaty of Washington of 1871, the United States and Great Britain agreed to submit U.S. claims for alleged breaches of neutrality during the American Civil War to a tribunal.⁷⁸⁸

Although Great Britain was nominally neutral during the Civil War (1861-1865), British ports were used to outfit ships in the Confederate States Navy. The most feared of these vessels was the CSS *Alabama*, a sloop of war that sunk 62 merchant marine ships and Union Navy vessels before it was destroyed in 1864 by a Union ship off the coast of France.⁷⁸⁹ After the Union won the war, the U.S. government attempted to hold Great Britain accountable and demanded compensation. Some Americans suggested that Britain should offer Canada to the United States in compensation, though those proposals were apparently not taken seriously.⁷⁹⁰

The treaty created a five-person “Tribunal of Arbitration.” Both the United States and Great Britain named arbitrators to the panel, along with the King of Italy, the President of Switzerland, and the Emperor of Brazil.⁷⁹¹ The tribunal ultimately awarded the United States a sum of \$15.5 million in gold as indemnity.⁷⁹²

B.3 The Permanent Court of Arbitration (1889)

The Convention for the Pacific Settlement of International Disputes, signed at The Hague, Netherlands, in 1889 and revised in 1907, created the Permanent Court of Arbitration (“PCA”).⁷⁹³ Despite its name, the PCA is neither permanent nor a court of justice. It does not have a permanent bench of judges. Instead, it consists of a roster of potential arbitrators who form *ad hoc* panels to resolve issues voluntarily submitted to them. The PCA – unlike the Permanent Court of International Justice (“PCIJ”) and its successor, the International Court of Justice – is open not just to states but to corporations and individuals.⁷⁹⁴ The PCA is the only forum discussed in this chapter that is still in existence.

⁷⁸⁸ *Treaty of Washington*, U.S.-Gr. Brit., May 8, 1871, TS 133, 17 Stat. 863.

⁷⁸⁹ The *Alabama* was built in 1862 at Birkenhead, England, and served as a “commerce raider” for two years during which the ship never laid anchor in a Southern port. Other British-built ships in the Confederate Navy included the *Florida*, *Georgia*, *Rappahannock* and *Shenandoah*. The destruction of the *Alabama* is captured in a painting by Edouard Manet, entitled “The Battle of the Kearsage and the Alabama.”

⁷⁹⁰ See the U.S. Secretary of State web site on the Alabama Claims (1862-1872), www.state.gov/r/pa/ho/time/cw/17610.htm.

⁷⁹¹ See Article 1 of the Alabama Claims Arbitration.

⁷⁹² See *supra* note 790.

⁷⁹³ For the home page of the Permanent Court of Arbitration, see www.pca-cpa.org.

⁷⁹⁴ For a list of all the cases decided by the PCA, see www.pca-cpa.org/showpage.asp?pag_id=1029.

B.4 The Central American Court of Justice (1908-1918)

The Central American Court of Justice was created by Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua.⁷⁹⁵ It was the first regional court of compulsory jurisdiction, where states and individuals could bring proceedings. But the court existed for only a decade and heard only ten cases. Nonetheless, in the opinion of professors Buergethal and Murphy, the court “holds a special place in the history of international courts, not only because it was the first [court of compulsory jurisdiction], but also because under its charter individuals had standing to institute proceedings against governments.”⁷⁹⁶ In 1962, the charter of the Organization of American States created a new court. Its mission is to promote peace in the region and unity among its member States and it has the jurisdiction to hear only a limited number of disputes.⁷⁹⁷

B.5 Special Tribunals and Arbitrations (1872-1925)

Over the years, a number of special tribunals have been created by treaty to resolve boundary and water disputes. A complete survey of those tribunals is beyond the scope of this study, but a few examples are worth summarizing directly below.

The Helmand River Delta Cases (1872 and 1905)

The Helmand River begins in Afghanistan and flows for 700 miles (1,127 kilometers) in that country before crossing the border into Iran (called Persia at the time). The two countries could not agree on the boundary of the river and the uses of the waterway. At the time, Afghanistan was under British control.

In 1872, the two countries submitted the dispute to a British commissioner, Major General Sir Frederick Goldsmid. He issued his award in Tehran, Persia, and concluded that: 1) Persia should not possess land on the right bank of the Helmand River above a certain point (Kohak Band); and 2) the river would form the boundary between both nations below that point, where both Afghanistan and Persia would agree not to build works that interfered with the supply of water for irrigation.⁷⁹⁸

Subsequent flooding caused the Helmand River to move and change its route. Both Afghanistan and Persia then built irrigation canals to divert water for their own use. In 1902, conflicts over use in the Helmand River were submitted to a second British commissioner, Colonel Sir Henry MacMahon, who attempted to define what amount of water constituted a fair supply for irrigating lands in Persia. In 1905, MacMahon concluded that both Persia and Afghanistan had

⁷⁹⁵ The Court was also known as the “Court of Cartago.” For a list of decisions issued by the Court between 1908 and 1918, see <http://www.worldcourts.com/cacj/eng/decisions.htm>.

⁷⁹⁶ THOMAS BUERGENTHAL & SEAN MURPHY, PUBLIC INTERNATIONAL LAW (West Publishing 4th ed. 1990) at 77.

⁷⁹⁷ For the home page of the *Corte Centroamericana de Justicia* (“CCJ”), see <http://www.ccej.org.ni>.

⁷⁹⁸ *Helmand River Delta Case – Arbitral Awards of 19 August 1872 and 10 April 1905*, 1974 Y.B. Int’l L. Comm’n., vol. 2, pt.2, at 189. For a summary of the award, see section 4.2.1 at <http://www.fao.org/DOCREP/005/W9549E/w9549e07.htm>. The web site contains a summary of leading arbitral awards compiled by the U.N. Food and Agriculture Organization (“FAO”).

the right within their territories to maintain canals and make new ones for irrigation, provided that the supply of water on both sides was not diminished. MacMahon concluded that Persia had “no right to alienate” (use) water rights in the Upper Helmand Basin (Afghanistan) other than those in the original 1872 award.⁷⁹⁹

The San Juan River Case (1888)

The San Juan River is an outlet of Lake Nicaragua, the largest lake in Central America. The river forms the border between Nicaragua and Costa Rica and flows eastward, emptying into the Caribbean Sea.

In 1858, the two nations signed the Canas-Jerez Treaty (also known as the Treaty of Limits), which placed the river within the boundaries of Nicaragua but gave Costa Rica the right to use the river for navigation.⁸⁰⁰

Only eight years later, in 1886, the two countries found themselves at an impasse over the extent of Costa Rica’s rights of navigation. President Grover Cleveland served as the arbitrator and reaffirmed the provisions of the 1858 Treaty. President Cleveland concluded that Costa Rica had a right to use the San Juan River for commercial (not military) traffic and that Costa Rica could not prevent Nicaragua from improving the river at its own expense (so long as the improvements did not harm Costa Rica).⁸⁰¹

Subsequent disputes led to litigation before the Central American Court of Justice (described briefly above) and to litigation now before the International Court of Justice.⁸⁰² In its petition to the Court, Costa Rica alleged that Nicaragua created checkpoints (obstacles to travel) and improperly imposed charges on Costa Rican ships.

The Kushk River Case (1893)

The Kushk River forms the boundary between Afghanistan and Turkmen (then under control of Russia). In 1885 and 1887, Great Britain signed a protocol delimiting the boundary between Turkmen and Afghanistan (under its control). Turkmen objected to the amount of Afghani diversions. A joint Anglo-Russian Commission resolved the issue by drafting a new protocol that spelled out precisely how much water Afghanistan could withdraw, and from where; the protocol limited diversions in certain places.⁸⁰³

⁷⁹⁹ *The Helmand River Delta Case*, 13 Aitchison 34-35, 209.

⁸⁰⁰ *Treaty of Limits*, Nicar.-Costa Rica, April 15, 1858, 48 BFSP 1049.

⁸⁰¹ *The San Juan River case (Costa Rica v. Nicaragua)*, award of March 22, 1888, 2 More Int. Arbitration 1964, summarized in 1974 Y.B. Int’l Comm’n., vol. 2, pt.2, at 190. For a summary of the award, see section 4.2.2 at <http://www.fao.org/DOCREP/005/W9549E/w9549e07.htm>.

⁸⁰² See *Dispute Regarding Navigational and Related Rights (Costa Rica v. Nicaragua)*. The case, filed in 2005, is still pending at the ICJ. See www.icj-cij.org/docket.

⁸⁰³ *The Kushk River Award of September 3, 1893*, see Martens N.R.G. 566. For a summary of the award, see section 4.2.3 at <http://www.fao.org/DOCREP/005/W9549E/w9549e07.htm>.

The Faber Case (1903)

The Zulia River begins in Colombia and then flows into Venezuela. The claimant, Faber, was a German subject, who lived in Colombia, and used the Zulia in Venezuela for commerce. Venezuela, however, suspended navigation on the Zulia River, harming Faber and other German merchants who relied on the river as a way of moving goods. A protocol between Venezuela and Germany created a Mixed Claims Commission to resolve the issue and, if appropriate, award damages.⁸⁰⁴ The Commission decided in Venezuela's favor and concluded that the Zulia River, while navigable to small boats, was so shallow that Venezuela could demand that cargo be offloaded at a port in Venezuela and shipped again through its territory by other means.⁸⁰⁵

The Tacna-Arica Case (1925)

Chile and Peru both claimed the Tacna and Arica Rivers as their own. The controversy was a legacy of the War of the Pacific (1879-1883), a confrontation between Chile, Peru and Bolivia. The defeated Peruvian government signed the 1881 Treaty of Ancon. Future disputes over the river lead to more friction between Chile and Peru. Unable to agree, the two countries submitted the dispute to President Calvin Coolidge, who appointed General John J. Pershing as the first arbitrator.⁸⁰⁶ A treaty concluded in 1929 – with assistance from President Hoover – gave the Tacna River to Peru and the Arica River to Chile.⁸⁰⁷

B.6 The Permanent Court of International Justice (1922-1946)

The League of Nations Treaty in 1920 at the end of World War I created the Permanent Court of International Justice (“PCIJ”) in The Hague, Netherlands.⁸⁰⁸ The Court was the first permanent international tribunal with general jurisdiction among signatory nations. During its tenure, the Court dealt with 29 contentious cases between States and delivered 27 advisory opinions.⁸⁰⁹

Among the opinions issued by the PCIJ were two significant water law cases. Each one is important for different reasons: the *Oder River* case because the PCIJ concluded that an international river was a “community of interest” and the riparian nations therefore shared a common legal right; and the *Meuse River* case because of a concurring opinion by a single judge,

⁸⁰⁴ *The German-Venezuelan Mixed Claims Commission* that decided the *Faber* case was created Feb. 13, 1903. *Mixed Claims Commission (Germany-Venezuela)*, 10 UNRIAA 357 at 466.

⁸⁰⁵ For a summary of the award, see section 4.2.4 at <http://www.fao.org/DOCREP/005/W9549E/w9549e07.htm>. A complete set of documents is available at http://untreaty.un.org/cod/riaa/cases/vol_X/357-476.pdf.

⁸⁰⁶ For a summary of the *Tacna-Arica* award, see section 4.2.5 at <http://www.fao.org/DOCREP/005/W9549E/w9549e07.htm>.

⁸⁰⁷ *Treaty for the Settlement of the Dispute Regarding the Tacnia and Arica*, Chile-Peru, June 3, 1929, 94 U.N.T.S. 401.

⁸⁰⁸ *The Covenant of the League of the Nations*, June 28, 1919, 2 Bevans 48.

⁸⁰⁹ For a history of the PCIJ and a complete list of its opinions, see <http://www.icj-cij.org/pcij/index.php?p1=9>.

who argued persuasively for an expansive view of the principle of equity in deciding the dispute, a notion still cited with approval today.

Navigation on the Oder River (1929)

This case concerned the rights of navigation on two tributaries of the Oder River. The Oder begins in the Czech Republic (formerly Czechoslovakia), flows through Poland, then serves as the border between Poland and Germany, and finally flows entirely in German territory until it empties into the Baltic Sea.

The Treaty of Versailles, signed in 1919 to mark the end of World War I, named certain rivers that were “international” and open to navigation.⁸¹⁰ The Oder River was one such waterway. To enforce this provision, the treaty placed the Oder River under the administration of an international commission composed of representatives from seven states: Czechoslovakia, Denmark, France, Prussia (Germany), Great Britain, Poland, and Sweden.⁸¹¹

Several years later, a dispute arose over the Oder River Commission’s decision to include two tributaries of the Oder River (the Netze and Warthe in Poland) within its authority and to order that the tributaries were open to international navigation. Poland opposed this decision: it argued that the Commission’s authority ended at the Germany-Polish border and that the Commission had no legal authority over tributaries entirely within its territory.

The PCIJ found in the Commission’s favor and held that the rivers were open to international navigation.⁸¹² But the PCIJ found that the terms of the Treaty of Versailles were written too ambiguously to resolve the issue by examining the treaty language in isolation. Instead, the PCIJ relied in part on general principles of “international fluvial law” at the time the treaty was adopted.⁸¹³

The PCIJ noted that more than 100 years before the Treaty of Versailles was signed, the Final Act of the Congress of Vienna (1815) had adopted the principle that “free navigation” applied “throughout the whole course of the rivers . . . from the point where they respectively become navigable to their mouths”⁸¹⁴

The PCIJ concluded that the Treaty of Versailles was based on those concepts, and it therefore interpreted the ambiguous article treaty terms in light of what it said were established legal principles of international river law:

[W]hen a single waterway traverses or separates the territory of more than one State . . . it is at once seen that a solution of the problem is sought not in the idea

⁸¹⁰ *Treaty of Versailles* art. 331.

⁸¹¹ *Id.* art. 334.

⁸¹² *Territorial Jurisdiction of the International Commission of the River Oder*, Judgment No. 16, 1929 P.C.I.J. (Ser. A) No. 23 (Sept. 10).

⁸¹³ *Id.* at 26.

⁸¹⁴ *Id.* at 27 (citing Article 109 of the *Final Act of the Congress of Vienna*).

of a right of passage in favour of upstream states, but in that of a *community of interest* of riparian states. This community of interest in a navigable river becomes the basis of a *common legal right*, the essential features of which are the perfect equality of all riparian States in the use of the whole course of the river and the exclusion of any preferential privilege of any one riparian state in relation to the others.

It is on this conception that international river law . . . is undoubtedly based.

If the common legal right is based on the existence of a navigable waterway separating or traversing several States, it is evident that this common right extends to the whole navigable course of the river and does not stop short at the last frontier⁸¹⁵

Five decades later, the International Court of Justice cited the *River Oder* decision for support when it resolved the dispute over the *Gabcikovo-Nagymaros Project* on the Danube River.⁸¹⁶

Diversion of Water from the Meuse River (1937)

The Meuse River begins in France and crosses into Belgium. From there, it forms the boundary between Belgium and the Netherlands, prior to flowing into the Rhine River Delta.

The 1863 Treaty between Belgium and the Netherlands attempted to “settle permanently and indefinitely” the regime concerning diversions from the river.⁸¹⁷ But in 1936, the Netherlands filed a petition with the PCIJ, alleging that Belgium had built or planned to build canals that would withdraw water that should have remained in the river for use by the Netherlands. Belgium filed a counterclaim alleging that the Netherlands had violated the treaty by building diversion canals along the shared border.

Although the majority of the PCIJ relied on the 1863 treaty in resolving the dispute by denying the claims of both nations, it is the concurring opinion of Judge Manley Hudson that is cited today. The PCIJ, like the contemporary International Court of Justice, received its authority from a “Statute,” which, among other things, identified the sources of law that the judges could use in resolving disputes. The Statute of the PCIJ included, as does the current Statute for the International Court of Justice, the words “general principles of law recognized by civilized nations.”⁸¹⁸

The question that Judge Hudson addressed was whether those general principles of law empowered the PCIJ to resolve the dispute based in part on equity. He concluded the answer was “yes,” and he explained:

⁸¹⁵ *Id.* at 27-28 (emphasis added).

⁸¹⁶ *See* section 5 of the main report.

⁸¹⁷ *Treaty Between Belgium and the Netherlands*, Belg.-Neth, May 12, 1863, 1 Martens N.R.G., Ser. II, 117, available at <http://www.yale.edu/lawweb/avalon/diplomacy/belgium/bel005.htm>.

⁸¹⁸ Statute of the P.C.I.J. art 38.

What are widely known as principles of equity have long been considered to constitute a part of international law, and . . . they have often been applied by international tribunals A sharp division between law and equity, such as prevails in the administration of justice in some States, should find no place in international jurisprudence⁸¹⁹

Judge Hudson acknowledged that the Court had not been expressly authorized by its Statute to apply equity as distinguished from law. But he concluded:

Article 38 of the Statute expressly directs the application of ‘general principles of law recognized by civilized nations’ It must be concluded, therefore, that under Article 38 of the Statute, if not independently of that Article, *the Court has some freedom to consider principles of equity as part of the international law which it must apply.*⁸²⁰

In this instance, the relevant principle of equity was found in the maxim, “He who seeks equity must do equity.”⁸²¹ Thus, a court of equity properly refuses relief to a plaintiff whose conduct has been improper.⁸²² In Judge Hudson’s view, the Netherlands, which brought the case against Belgium, was “engaged in taking precisely similar action, similar in fact and in law” as Belgium.⁸²³ “This seems to call for an application of the principle of equity stated above.”⁸²⁴ Judge Hudson therefore concluded that the Netherlands ought not to obtain relief.

The *Meuse* decision was the last water allocation and management case decided by the PCIJ, which ceased to exist after World War II. To take its place, the United Nations Charter established the International Court of Justice.

⁸¹⁹ *Diversion of Water from the Meuse (Neth. v. Belg.)*, 1937 P.C.I.J. (ser. A/B) No. 70 at 76 (June 28).

⁸²⁰ *Id.* at 76-77.

⁸²¹ *Id.* at 77.

⁸²² The doctrine is similar to the “clean hands doctrine,” in which a court will not grant equitable relief to a party who seeks to use judicial machinery as a remedy if the party itself has failed in prior conduct to abide by the agreement in question or has violated a principle of equity and fair-dealing.

⁸²³ *River Meuse* opinion at 77.

⁸²⁴ *Id.*

APPENDIX C: SOURCES AND CITATIONS

In preparing this study, we consulted general information about the origins and practice of international law and the interpretation of treaties. We also analyzed specific treaties, conventions, protocols and other agreements that address water allocation, water quality and dispute resolution issues.

For copies of the actual treaties, we relied on five sources available on the Internet:

1. Oregon State University's Transboundary Freshwater Dispute data base. <http://www.transboundarywaters.orst.edu/database/interfreshtreatdata.html>.
2. The United Nations Treaty data base. <http://untreaty.un.org>.
3. The WaterLex" data base of treaties compiled by the U.N.'s Food and Agriculture Organization. <http://faolex.fao.org/waterlex>.
4. The Avalon Project at the Yale Law School <http://www.yale.edu/lawweb/avalon/treaty.htm>.
5. The web site of the International Water Law Project. <http://internationalwaterlaw.org>.

As part of our research efforts, we also analyzed opinions from the International Court of Justice and its predecessor, the Permanent Court of International Justice. The opinions are available at <http://www.icj-cij.org> and <http://www.icj-cij.org/pcij>.

We also reviewed arbitral awards that arose out of activities by nations or private parties on international lakes and rivers. In addition, we examined, legal analyses and commentary from institutes, including the American Law Institute's Restatement of Foreign Relations Law of the United States (Third) (1987) ("Restatement Third") and the International Law Association's Helsinki and Berlin Rules. We also relied on publications from the United Nations and its organs, including UNESCO, the U.N. Economic Commission for Europe, and the International Law Commission. The text contains citations to those sources.

Other helpful sources include:

- The Atlas of International Freshwater Agreements, published in 2002 by the U.N. Environment Programme, available at Oregon State University's web site, <http://www.transboundarywaters.orst.edu/publications/atlas>;
- The web sites of the U.S. Secretary of State, the Environmental Protection Agency ("EPA") and other agencies within the United States that address cross-border water quantity and water quality issues;
- The reports and orders from the International Joint Commission ("IJC"), <http://www.ijc.org>, and the reports and minutes of the International Boundary and Water Commission ("IBWC"), available at <http://www.ibwc.state.gov>;
- Reports from river commissions with jurisdiction over lakes and river basins around the world. The web sites are noted in the text.

For historical background and analysis, we read law review articles on international water allocation and dispute resolution issues and we consulted reference and history books, including STEPHEN MCCAFFREY, *THE LAW OF INTERNATIONAL WATERCOURSES* (2nd edition)(Oxford University Press 2007), and LUDWIK A. TECLAFF, *WATER LAW IN HISTORICAL PERSPECTIVE* (William Hein Company 1985).

For data on rivers we consulted three major sources:

- VAN DER LEEDEN, TROISE AND TODD, *THE WATER ENCYCLOPEDIA* (Lewis Publishers 2nd ed. 1990)
- *The Water Resources e-Atlas, available at http://multimedia.wri.org/watersheds_2003/index.html*
- ARTHUR C. BENKE AND COLBERT E. CUSHING, *RIVERS OF NORTH AMERICA* (Elsevier Press 2005).

Finally, we reviewed the web sites of environmental groups and non-government organizations that monitor water quality and the state of the world's river systems.

The authors have attempted to provide thorough citations for the interested reader so he/she can find reference materials, legal documents and web sites for additional information.

In some instances, we have varied from strict "Blue Book" citations that are used by lawyers in the United States. To facilitate and encourage additional research into the rivers, for example, we have listed a more complete citation for books by adding the name of the publishing house, a detail that is typically not needed for a proper legal citation. We have also attempted to list, when available, the volume of the United Nations Treaty Series ("U.N.T.S.") or the League of Nations Treaty Series ("L.N.T.S."), which are accessible on line and at law libraries around the world. When the treaty is an agreement to which the United States is a signatory, we have followed the U.N.T.S. citation with a reference to the U.S. Treaty citation ("U.S.T.") or a statute.

APPENDIX D: CONVERSION TABLE

The conversion table below allows a reader to convert units of measure commonly used in the United States with metric units (and vice versa).

Quantity:	To Convert From:	To Metric:	Multiply By:	To Convert From Metric, Multiply By:
LENGTH	Feet (ft)	Meters (m)	.3048	3.281
	Miles	Kilometers (km)	1.609	.6214
AREA	Acres	Hectares (ha)	.4047	2.471
	Square miles (sq. m)	Square km (sq. km)	2.590	.3861
VOLUME	Gallons	Liters (L)	3.785	.2642
	Thousand acre-feet (AF)	Million cubic meters (MCM)	1.234	.8107
	Million acre-feet (MAF)	Billion cubic meters (BCM)	1.234	.8107
FLOW	Cubic ft. per second	Cubic meters per second (c3m)	.0283	35.315

OTHER CONVERSION FACTORS:

1 acre foot = 325,851 gallons.

An acre foot is the amount of water needed to cover an acre with one foot of water.

1 cubic foot per second = 724 acre feet (AF) per year.

Example: A river has a flow of 100 cfs. Over the year, it will have an annual flow of 72,400 AF.