

# ELR

## NEWS & ANALYSIS

### Equitable and Reasonable Use of Water Within the Euphrates-Tigris River Basin

by Elizabeth Burleson

#### Table of Contents

<b>I. Introduction</b> . . . . .	10041
<b>II. Sovereignty Versus Integrity</b> . . . . .	10042
<i>A. Combining Equitable Utilization and No Significant Harm</i> . . . . .	10043
<i>B. Dispute Resolution</i> . . . . .	10044
<b>III. Article 6 of the Convention on the Law of Non-Navigational Uses of International Watercourses</b> . . . . .	10045
<i>A. Geographic, Hydrological, and Ecological Factors</i> . . . . .	10045
<i>B. Social and Economic Needs</i> . . . . .	10045
<i>C. Population Dependent on the Watercourse in Each State</i> . . . . .	10045
<i>D. Effects of Water Use in One Country on Co-Riparians</i> . . . . .	10046
<i>E. Existing and Potential Uses of the Watercourse</i> . . . . .	10047
<i>F. Conservation, Cost, and Economy of Use</i> . . . . .	10047
<i>G. Availability of Alternatives of Comparable Value</i> . . . . .	10048
<b>IV. From Conflict to Consensus</b> . . . . .	10049
<i>A. Existing Regional Organizations</i> . . . . .	10050
<i>B. U.N. Involvement</i> . . . . .	10050
<i>C. Mesopotamia—The Land Between the Rivers</i> . . . . .	10051
<i>D. Dynamic Response to Water Management</i> . . . . .	10052
<b>V. Conclusion</b> . . . . .	10054

#### I. Introduction

The principle of subsidiarity suggests that issues should be dealt with at the level upon which they can be resolved most effectively. Sharing water resources from international watercourses requires coordination among nations. The greater their interdependence, the more urgent it becomes for countries to cooperate. Within the framework of

the United Nations, subsidiarity requires Parties to try to settle disputes through peaceful means. Will dynamic approaches to sharing water be able to overcome Middle Eastern animosity over the Euphrates and Tigris Rivers? Sustainable watershed management involves understanding a given drainage basin, making informed decisions, and implementing egalitarian agreements between upstream and downstream riparians. Once the “cradle of civilization,” Mesopotamia thrived upon human ingenuity and stewardship of water.<sup>1</sup> Euphrates-Tigris River Basin States can avert conflict over increasing water scarcity by crafting integrated water resources measures based on equitable and sustainable utilization.

While water is one of the most abundant substances on the globe, humans can use less than 0.01% of the water in the world.<sup>2</sup> The United Nations (U.N.) Educational, Scientific, and Cultural Organization (UNESCO) notes that, “[i]n the past hundred years, the world population has tripled while world demand for water has increased sevenfold.”<sup>3</sup> U.N. Secretary-General Kofi Annan points out that,

1. The Sumer and Assyrians of Mesopotamia developed irrigation by channeling the Euphrates and Tigris Rivers. Eyal Benvenisti, *Collective Action in the Utilization of Shared Freshwater: The Challenges of International Water Resources Law*, 90 AM. J. INT’L L. 384, 385 (1996).
2. While water covers 70% of the earth’s surface, polar caps and glaciers account for most of the freshwater in the world. UNITED NATIONS (U.N.) EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION (UNESCO) & U.N./WORLD WATER ASSESSMENT PROGRAM (WWAP), U.N. WORLD WATER DEVELOPMENT REPORT: WATER FOR PEOPLE, WATER FOR LIFE 65-68 (Oxford Univ. Press 2003) [hereinafter WORLD WATER REPORT]. The *World Water Development Report* is the first U.N. systemwide assessment of the world’s water resources. It was compiled by 23 U.N. partners, which together comprise a new U.N. agency, WWAP. Established in 2000, WWAP’s Secretariat is located in the Paris headquarters of UNESCO. After Marrakech, The Hague, and Kyoto, Mexico City will host the next World Water Forum in March 2006. In addition to leading the International Year of Freshwater (2003), UNESCO has established the Institute for Water Education in Delft.
3. UNESCO-IHE INSTITUTE FOR WATER EDUCATION, FROM POTENTIAL CONFLICT TO COOPERATION POTENTIAL: WATER FOR PEACE PREVENTION AND RESOLUTION OF WATER-RELATED CONFLICTS 3 (2003), available at [http://www.unesco.org/water/wwap/pccp/pdf/brochure\\_2.pdf](http://www.unesco.org/water/wwap/pccp/pdf/brochure_2.pdf) (last visited Oct. 19, 2004). See also POPULATION REFERENCE BUREAU, 1997 WORLD POPULATION DATA SHEET (1998), available at <http://www.prb.org/info/97wpds.htm> (last visited Jan. 9, 2004). Water consumption appears to be doubling every 20 years, at over twice the rate of human population growth. As global population increases by approximately 85 million people per year the availability of freshwater per head decreases. MAUDE BARLOW & TONY CLARKE, *BLUE GOLD* 7 (2002).

Elizabeth Burleson is an attorney focusing on international water law and international dispute resolution. She received her LL.M. at the London School of Economics (2004), and her J.D. at the University of Connecticut School of Law (1999). Ms. Burleson is on the Water Committee of the International Bar Association, and she has written environmental reports for the United Nations (U.N.) Children’s Fund, the U.N. Educational, Scientific, and Cultural Organization, and the U.N. Environment Program.

“one person in six lives without regular access to safe drinking water.”<sup>4</sup> According to the U.N. Food and Agriculture Organization (FAO), approximately 10% of the world’s freshwater is used domestically, 20% by industry, and 70% by agriculture.<sup>5</sup>

Energy and matter cannot be created or destroyed according to the first law of thermodynamics. This suggests that we cannot expand the overall supply of water. Yet, Euphrates-Tigris River Basin States have the capacity to increase levels of trust between co-riparians. Clean water is fundamental to both individual and national security and survival. Political fragmentation has raised water management challenges to an international level. Large-scale projects that divert rivers cause rapid change to which co-riparians often lack the ability to adjust. Water has been a significant factor in economic development, explaining why early settlement occurred along rivers and coasts. Rapid population growth has left water-scarce countries at odds with one another over international watercourses. Treaties and joint commissions can allocate water between competing users in light of year-to-year variations in surface flow.

This Article analyzes the conditions necessary for Euphrates-Tigris co-riparians to share water equitably. Part II discusses international freshwater law and its ability to balance sovereignty claims made by upper riparians with integrity claims of lower riparians. Part III applies international framework provisions to the Euphrates-Tigris River Basin. Part IV assesses the prospect for joint management of the Euphrates-Tigris watershed in light of the region’s history of conflict. Part V concludes that Euphrates-Tigris River Basin States can collaborate and build upon the work of international and regional institutions to share water equitably.

## II. Sovereignty Versus Integrity

Freshwater agreements can be traced back to 2500 B.C. when Lagash and Umma ended their conflict over the Tigris

River.<sup>6</sup> Yet, international freshwater law remains in its infancy due to polarization between the doctrines of absolute territorial sovereignty (Harmon doctrine)<sup>7</sup> and absolute territorial integrity.<sup>8</sup> An emerging doctrine of limited territorial sovereignty requires riparians to share water based on equitable utilization.<sup>9</sup>

After more than 25 years of consensus building, the U.N. General Assembly adopted the Convention on the Law of Non-Navigational Uses of International Watercourses (the Convention) in May 1997.<sup>10</sup> The Convention sets forth limited territorial sovereignty as the international standard. As a general framework agreement, the Convention seeks to prevent significant harm to downstream riparians while allowing equitable utilization by upper riparians. The Convention’s preamble refers to Agenda 21,<sup>11</sup> Chapter 18 of which emphasizes, “the holistic management of freshwater as a finite and vulnerable resource.”<sup>12</sup> As a nonbinding guide to freshwater management, Agenda 21 seeks “to make certain that adequate supplies of water of good quality are maintained for the entire population of the planet, while preserving the hydrological, biological, and chemical functions of ecosystems . . . .”<sup>13</sup> While scientific and legal experts support a drainage basin doctrine,<sup>14</sup> countries have yet

4. Three billion individuals lack adequate sanitation. Press Release, U.N. Economic & Social Commission for Western Asia, U.N. Secretary-General Kofi Annan Message on World Environment Day “Water: Two Billion People Are Dying for It!” (June 5, 2003), available at <http://www.escwa.org.lb/information/press/un/2003/june/5.html> (last visited Oct. 19, 2004). See also Leticia Diaz & Barry Dubner, *The Necessity of Preventing Unilateral Responses to Water Scarcity—The Next Major Threat Against Mankind This Century*, 9 CARDOZO J. INT’L & COMP. L. 1, 4 (2001) (“In 1850, the amount of freshwater available to each person in the world was 43,000 cubic meters per annum, whereas it is under 9,000 today.”). Egyptian Minister of Water Resources and Irrigation Mahmoud Abu Zeid notes that

[w]hile the global population has tripled in 70 years, water use has grown sixfold. As a result, the world average per capita share of freshwater declined from over 12,000 meter square in 1960 to about 8,000 meter square in 1990 and it is expected to fall down below 4,000 meter square in year 2025. Within the next 25 years, one-third of the world’s population is expected to experience severe water scarcity.

Dr. Mahmoud Abu Zeid, Minister of Water Resources and Irrigation, Egypt, *Effective Demand Management—The Way Forward for Arid and Semi-Arid Regions, International Water Demand Management Conference, Dead Sea, Jordan* (May 30 to June 3, 2004), available at [http://www.wdm2004.org/new\\_web/keynote/monday.htm](http://www.wdm2004.org/new_web/keynote/monday.htm) (last visited Oct. 30, 2004).

5. U.N. FAO, *CROPS FOR DROPS 2* (2002) [hereinafter *CROPS FOR DROPS*]. See also *WORLD WATER REPORT*, *supra* note 2, at 192, 224.

6. U.N. ENVIRONMENT PROGRAM (UNEP), *ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS 5* (2002), available at <http://www.transboundarywaters.orst.edu/publications/atlas/> (last visited Oct. 19, 2004).

7. The Harmon doctrine allows upstream riparians to do as they wish with waters within their territory, without consideration for consequences upon co-riparians. It was named after U.S. Attorney General Judson Harmon who stated:

The fact that the Rio Grande lacks sufficient water to permit its use by inhabitants of both countries does not entitle Mexico to impose restrictions on the United States which would hamper the development of the latter’s territory or deprive its inhabitants of an advantage with which nature had endowed them and which is situated entirely within its territory. To admit such a right would be completely contrary to the principle that the United States exercises full sovereignty over its natural territory . . . .

See *Treaty of Guadalupe Hidalgo*, 21 Op. Att’y Gen. 274, 283 (1895). See also Kevin P. Scanlan, *The International Law Commission’s First Ten Draft Articles on the Law of the Non-Navigational Uses of International Watercourses: Do They Adequately Address All the Major Issues of Water Usage in the Middle East?*, 19 FORDHAM INT’L L.J. 2180, 2187 (1996); Aaron Shwabach, *The United Nations Convention on the Law of Non-Navigational Uses of International Watercourses, Customary International Law, and the Interests of Developing Upper Riparians*, 33 TEX. INT’L L.J. 257, 275 (1998).

8. Absolute territorial integrity permits a country to use water within its territories as long as it does not injure a co-riparian. This “do-no-harm” requirement entitles a downstream riparian to an uninterrupted flow of water quality and quantity. Shwabach, *supra* note 7, at 275-77.

9. *Id.* at 275.

10. G.A. Res. 51/229, U.N. GAOR, 51st Sess., U.N. Doc. A/RES/51/229 (1997), reprinted in 36 I.L.M. 700 (1997), available at <http://www.un.org/law/ilc/texts/nonnav.htm> (last visited Oct. 19, 2004) [hereinafter *Convention*].

11. United Nations Conference on Environment and Development, Agenda 21, U.N. Doc. A/Conf. 151/26 (1992), reprinted in 31 I.L.M. 881 (1992) [hereinafter *Agenda 21*].

12. *Protection of the Quality and Supply of Freshwater Resources: Application of Integrated Approaches to the Development, Management, and Use of Water Resources*, Agenda 21, *supra* note 11, ch. 18.6.

13. *Id.* ch. 18.2.

14. The drainage basin doctrine forms the basis of the International Law Association’s Helsinki Rules, 52 INT’L L. ASS’N 484-533 (1966)

to be willing to grant sufficient sovereignty to institutions responsible for drainage basin management. Upper riparians, such as Turkey, feel that such an approach would push the allocation of rights too far toward the absolute territorial integrity end of the continuum.<sup>15</sup> Despite the urgent need for integrated watershed management, most countries have yet to agree to be bound by limited territorial sovereignty, let alone drainage basin management. Article 2(a) of the Convention clarifies that management should occur at the “watercourse” rather than the ecosystem level.<sup>16</sup>

#### *A. Combining Equitable Utilization and No Significant Harm*

Article 5 sets forth “equitable and reasonable utilization” as the foundation principle of the Convention.<sup>17</sup> A few months after the General Assembly adopted the Convention, the International Court of Justice (ICJ) quoted the entire equitable participation paragraph of Article 5(2) in the ICJ’s judgment in *Gabcikovo-Nagymaros Project*, a dispute between Hungary and Slovakia.<sup>18</sup> In relation to Slovakia’s unilateral diversion of the Danube River, the ICJ concluded that Hungary had a “basic right to an equitable and reasonable sharing of the resources of an international watercourse.”<sup>19</sup> The ICJ held that both Hungary and Slovakia had breached a treaty signed in 1977 by the Hungarian People’s Republic and the Czechoslovak People’s Republic to construct the *Gabcikovo-Nagymaros* system of dams and locks on the Danube.<sup>20</sup> Hungary abandoned the project stating that it threatened the environment and Budapest’s water supply. Slovakia demanded that Hungary adhere to the 1977 treaty. Slovakia unilaterally built an alternative project within its own territory, impacting Hungary’s allocation of water from the Danube. Without decreasing the gravity of Hungary’s environmental argument, the ICJ found that Hungary should have sought an alternative to abandoning its treaty

obligations<sup>21</sup> and that Slovakia should not have acted alone in diverting the watercourse.<sup>22</sup> The ICJ recognized that environmental awareness had risen over the past two decades and that new standards should be applied not only to future plans but also to the completion of existing projects.<sup>23</sup> Breach by both Parties did not terminate the treaty.<sup>24</sup> Instead, Hungary and Slovakia remained under an obligation either to carry out the treaty terms or to negotiate a mutually agreed upon solution in light of recent international water law.

Article 6 of the Convention offers factors to help cooperating riparians, such as Hungary and Slovakia in Europe or the Euphrates-Tigris River Basin States in the Middle East, to find equitable and reasonable levels of water utilization.<sup>25</sup> Unpopular with upper riparians, Article 7 provides an obligation not to cause “significant harm.”<sup>26</sup> Yet, Articles 5, 6, and 7 are not to be read in isolation.<sup>27</sup> Together they form a flexible standard with which co-riparians can balance sovereignty and integrity. Article 3 encourages riparians to enter into agreements that fine-tune provisions of the Convention to specific watercourses. Countries are also asked to “consider harmonizing” existing water treaties with these principles.<sup>28</sup> Article 24 recommends that co-riparians establish joint management mechanisms.<sup>29</sup> Since it is difficult for countries to determine whether their water uses are equita-

(codifying international laws for international rivers). See generally Shwabach, *supra* note 7, at 266.

15. Shwabach, *supra* note 7, at 263.

16. Article 2(a) explains that “[w]atercourse” means a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus.” Convention, *supra* note 10, at 704.

17. *Id.* at 705.

18. The ICJ declared:

Reestablishment of the joint regime will also reflect in an optimal way the concept of common utilization of shared water resources for the achievement of the several objectives mentioned in the Treaty, in concordance with Article 5, paragraph 2, of the Convention on the Law of the Non-Navigational Uses of International Watercourses, according to which:

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. (General Assembly Doc. A/51/869 of April 11, 1997.)

*Gabcikovo-Nagymaros Project* (Hung. v. Slov.), 1997 I.C.J. No. 92 (Sept. 25), 37 I.L.M. 162, 201, ¶ 147 (1998), available at [http://www.icj-cij.org/icjwww/idocket/ihs/ihsjudgement/ihs\\_ijudgment\\_970925\\_frame.htm](http://www.icj-cij.org/icjwww/idocket/ihs/ihsjudgement/ihs_ijudgment_970925_frame.htm) (last visited Oct. 19, 2004).

19. *Id.* at 190, ¶ 78.

20. *Id.* at 202, ¶ 155.

21. *Id.* at 186, ¶ 56. The ICJ stated:

Article 1, ¶ 1, of the 1977 Treaty describes the principal works to be constructed in pursuance of the Project. It provided for the building of two series of locks, one at Gabcikovo (in Czechoslovak territory) and the other at Nagymaros (in Hungarian territory), to constitute “a single and indivisible operational system of works.”

*Id.* at 174, ¶ 18. The Danube flows through nine countries on its path from the Black Forest to the Black Sea. The *Gabcikovo-Nagymaros* dispute occurred along a 200-kilometer stretch of the Danube that forms part of the Slovakia-Hungary border between Bratislava and Budapest.

22. The ICJ concluded:

Czechoslovakia, by unilaterally assuming control of a shared resource, and thereby depriving Hungary of its right to an equitable and reasonable share of the natural resources of the Danube—with the continuing effects of the diversion of these waters on the ecology of the riparian area of the Szigetkoz—failed to respect the proportionality which is required by international law.

*Id.* at 112, ¶ 196.

23. “[T]he Court wishes to point out that newly developed norms of environmental law are relevant for the implementation of the Treaty . . . .” *Id.* at 191, ¶ 85.

24. *Id.* at 194, ¶ 101.

25. Convention, *supra* note 10, at 706.

26. Article 7(1) states that “[w]atercourse States shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States.” *Id.*

27. Article 7(2) requires:

Where significant harm nevertheless is caused to another watercourse State, the States 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, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.

*Id.*

28. *Id.* at 704.

29. *Id.* at 711.

ble and reasonable without an understanding of the situation faced by co-riparians, Article 8 sets forth an obligation to cooperate<sup>30</sup> and Article 9 requires co-riparians to provide one another with information.<sup>31</sup> Articles 11 through 19 require notification, consultation, and negotiation before a riparian commences a water project that may significantly harm other watercourse states.<sup>32</sup> Article 10 states that water disputes should be resolved with respect to “vital human needs.”<sup>33</sup> Sustainable development can be compatible with prioritizing “vital human needs” since intergenerational equity lies at the core of sustainability. Sustainable development meets current needs without compromising the capacity of future generations to meet their own needs. The ICJ affirmed the centrality of sustainable development in *Gabcikovo-Nagymaros* by stating: “This need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development.”<sup>34</sup> Article 20 of the Convention requires riparians to “protect and preserve the ecosystems of international watercourses.”<sup>35</sup> While it takes into consideration both the fragility of the ecosystem and the capacity of a given State, the provision goes beyond significant harm to co-riparians. Article 20 encompasses significant harm to the environment in its own right.<sup>36</sup>

### B. Dispute Resolution

Article 33 calls upon countries to resolve disputes peacefully through the use of joint watercourse institutions.<sup>37</sup> Article 33 also suggests negotiation, mediation, arbitration, or submission to the ICJ.<sup>38</sup> Peaceful resolution of water disputes has been particularly difficult within the Middle East where 50% of the population relies on water that originates in a different State.<sup>39</sup> Among the nations of the Euphrates-Tigris River Basin, Iran and Syria voted for the Convention. Iraq did not participate. Viewing the provision as a violation

of “the sovereignty of countries over the parts of international watercourses located in their territories,”<sup>40</sup> Turkey felt that the Convention required compulsory dispute resolution and provided a downstream riparian with veto power over development plans.<sup>41</sup> While Turkey was 1 of only 3 States that voted against the Convention, 27 countries abstained and only 12 States have ratified the instrument.<sup>42</sup> Despite the support of the 103 countries that voted in favor of the General Assembly resolution to adopt the Convention, the slow rate of ratification calls into question the Convention’s influence.<sup>43</sup> Lacking the requisite 35 ratifications necessary for it to enter into force, the Convention is not legally binding.<sup>44</sup> Both upper and lower riparians had an opportunity to participate in the formulation of generally acceptable provisions.<sup>45</sup> They adopted a comprehensive document that addressed the global water crisis. Countries must gather the political willpower to commit to the Convention or implement a more effective international freshwater framework.

According to game theory, cooperation is more likely to occur between countries when they are involved in indefinite interactions.<sup>46</sup> States work together when they do not know when a series of interactions will end. Neighboring countries that share an international watercourse presumably must interact indefinitely. Many of these countries share water equitably with one another. International law can help increase interactions between co-riparians when trust has broken down. Direct negotiations between Euphrates-Tigris River Basin States would enable co-riparians to exchange hydrological data and information concerning domestic political constraints. The process toward integrated water resources management could begin with individual studies and technical assistance moving on to joint commissions and a Euphrates-Tigris River Basin treaty. Such measures are more likely to occur in a timely manner if seen as intermediate steps. Setting forth a goal of participatory watershed-based management allows politicians to find middle ground at the joint commission stage rather than the unilateral action stage. Forums that increase the frequency of interactions enable riparians to build trust and form stable expectations. Establishing a comprehensive regional au-

30. *Id.* at 706-07.

31. *Id.* at 707.

32. *Id.* at 707-10.

33. Article 10(2) explains that “[i]n the event of a conflict between uses of an international watercourse, it shall be resolved with reference to articles 5 to 7, with special regard being given to the requirements of vital human needs.” *Id.* at 707. The Statements of Understanding Pertaining to Certain Articles of the Convention clarify that “special attention is to be paid to providing sufficient water to sustain life, including both drinking water and water required for production of food in order to prevent starvation.” Chusei Yamada, Chairman, *Convention on the Law of Non-Navigational Uses of International Watercourses: Report of the Sixth Committee Convening as the Working Group of the Whole*, 51st Sess., Agenda Item 144, Distr. GENERAL, A/51/869 (Apr. 11, 1997), available at <http://www.un.org/law/cod/watere.htm> (last visited Oct. 28, 2004).

34. *Gabcikovo-Nagymaros Project* (Hung. v. Slov.), 1997 I.C.J. No. 92 (Sept. 25), 37 I.L.M. 162, 201, ¶ 140 (1998), available at [http://www.icj-cij.org/iccjwww/idocket/ihs/ihsjudgement/ihs\\_ijudgment\\_970925\\_frame.htm](http://www.icj-cij.org/iccjwww/idocket/ihs/ihsjudgement/ihs_ijudgment_970925_frame.htm) (last visited Oct. 19, 2004).

35. Convention, *supra* note 10, at 710.

36. Stephen C. McCaffrey, *An Overview of the U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses*, 20 J. LAND RESOURCES & ENVTL. L. 57, 66 (2000).

37. Convention, *supra* note 10, at 713.

38. *Id.* at 713-14.

39. Scanlan, *supra* note 7, at 2180. See also Christopher Kuk & David Deese, *At the Water's Edge Regional Conflict and Cooperation Over Freshwater*, 1 UCLA J. INT'L L. & FOREIGN AFF. 21, 27 (1996). Climatic and hydrological conditions, such as high evaporation rates and low rainfall, add to the complexities of water scarcity.

40. Schwabach, *supra* note 7, at 274.

41. Jordan Kahn, *1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses*, 1997 COLO. J. INT'L ENVTL. L. & POL'Y 178, 182.

42. U.N. DEPARTMENT OF PUBLIC INFORMATION, INTERNATIONAL YEAR OF FRESHWATER 2003 BACKGROUNDER: WATER WITHOUT BORDERS (2003), available at <http://www.un.org/events/water/WaterWithoutBorders.pdf> (last visited Oct. 20, 2004). See also Press Release GA/9248, United Nations, General Assembly Adopts Convention on the Law of Non-Navigational Uses of International Watercourses, 19970521 (May 21, 1997), available at <http://www.un.org/News/Press/docs/1997/19970521.ga9248.html> (last visited Oct. 28, 2004).

43. One hundred and three countries voted in favor of the Convention, 3 voted against, 37 abstained, and 33 were absent. For a complete list of the States, see Press Release, *supra* note 42. See also UNEP, *supra* note 6, at 5.

44. U.N. DEPARTMENT OF PUBLIC INFORMATION, *supra* note 42, at 2.

45. McCaffrey, *supra* note 36, at 71.

46. Repetition of negotiations increases cooperation. Jutta Brunnée & Stephen J. Toope, *Environmental Security and Freshwater Resources: Ecosystem Regime Building*, 91 AM. J. INT'L L. 26, 57 (1997). See also Franz Perrez, *The Efficiency of Cooperation: A Functional Analysis of Sovereignty*, 15 ARIZ. J. INT'L COMP. L. 515, 554 (1998).

thority would provide a setting for further communications and policy coordination. Such international institutions extend intergovernmental relations beyond treaty signing, allowing watercourse states to identify new concerns and collaborative responses to water scarcity.<sup>47</sup>

### III. Article 6 of the Convention on the Law of Non-Navigational Uses of International Watercourses

In determining equitable and reasonable use, the list of factors set forth in Article 6(1) of the Convention can help Euphrates-Tigris River Basin States understand the dimensions of the conflict and coordinate ways to address growing regional water scarcity.<sup>48</sup>

#### A. Geographic, Hydrological, and Ecological Factors

Mesopotamia is the alluvial plain between the Tigris and Euphrates Rivers. To the west the Euphrates flows from the mountains of Anatolia, into Syria, and then through Iraq. This river originates entirely within the highlands of Turkey, acquiring very little water in Syria and none in Iraq. The headwaters of the Tigris are spread across Iran, Iraq, and Turkey.<sup>49</sup> Both rivers follow a southeastern route across arid stretches of Syria and Iraq. The Euphrates and Tigris merge in southern Iraq to form the Shatt al-‘Arab, which in turn flows into the Persian Gulf.

#### B. Social and Economic Needs

Territorial disputes over the Shatt al-‘Arab were among the leading causes of the Iran-Iraq War that lasted from 1980 to 1988, when the pre-1980 status quo was reestablished.<sup>50</sup> While Iran has never made significant use of the Tigris trib-

utaries within its territory, Iraq is vulnerable to greater water scarcity if Iran decides to increase use of these tributaries.<sup>51</sup> Thus far, Iran has not announced any plans for hydrologic development of these watercourses and does not claim a share of the main stem of the Tigris.<sup>52</sup> If this situation alters, Iran should become involved with Iraqi, Syrian, and Turkish efforts to jointly manage the Euphrates-Tigris watershed. This parched region was once ancient Sumer’s Fertile Crescent. Home to the Sumerians more than 5,000 years ago, the land between the Tigris and Euphrates Rivers supported the first known irrigation system that in turn sustained the first cities.<sup>53</sup> As these urban centers continue to expand, a growing need for food combined with a decreasing supply of water has degraded both the land and Euphrates-Tigris watercourse.<sup>54</sup>

Arab governments have viewed food self-sufficiency as crucial to national security. While providing 100% of a nation’s food needs through domestic means saves foreign exchange for the purchase of goods that cannot be produced locally, a policy of food self-sufficiency does not guarantee autonomy. Droughts can leave states reliant on buying food imports or relying on food aid. Earthquakes, famines, and floods remind us of the degree to which countries are interdependent. Iraq and Syria have spent vast sums of money to maintain their aggressive agricultural programs at the expense of higher value water uses.<sup>55</sup> Social and economic water demands have risen while water quantity and quality have decreased.

#### C. Population Dependent on the Watercourse in Each State

Rapid population growth has reduced per capita water availability.<sup>56</sup> People within the Euphrates-Tigris River Basin already lack adequate water. Table 1 shows the region’s population growth rates vis-à-vis agricultural factors that impact water use.

**Table 1: Population Growth Rates and Agriculture Among Euphrates-Tigris River Basin States<sup>57</sup>**

Euphrates-Tigris Basin States	Population Growth Rate (2003 estimate)	Arable Land (2003 estimate)	Irrigated Land (1998 estimate)	Agriculture Percentage of 2003 GDP
Iraq	2.78%	11.89%	32,250 sq km	6%
Syria	2.45%	25.96%	12,130 sq km	27%
Turkey	1.16%	34.53%	42,000 sq km	12.9%
Iran	1.08%	10.17%	75,620 sq km	19%

Iran’s population is not growing as quickly as those of

47. Benvenisti, *supra* note 1, at 387-412. See also Shashank Upadhye, *The International Watercourse: An Exploitable Resource for the Developing Nation Under International Law?* 8 *CARDOSO J. INT’L L.* 61, 101 (2000). See also Brunnée & Toope, *supra* note 46, at 39; *WORLD WATER REPORT*, *supra* note 2, at 299.

48. Article 6(1) states:

Factors relevant to equitable and reasonable utilization

1. Utilization of an international watercourse in an equitable and reasonable manner within the meaning of article 5 requires taking into account all relevant factors and circumstances, including:

(a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;

(b) The social and economic needs of the watercourse States concerned;

(c) The population dependent on the watercourse in each watercourse State;

(d) The effects of the use or uses of the watercourses in one watercourse State on other watercourse States;

(e) Existing and potential uses of the watercourse;

(f) Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;

(g) The availability of alternatives, of comparable value, to a particular planned or existing use.

Convention, *supra* note 10, at 706.

49. Mohamed Sultan et al., *Water, Agriculture, and Land Cover: Lessons for the Postwar Era*, *GEOTIMES* (Oct. 2003), at [http://www.geotimes.org/oct03/feature\\_water.html](http://www.geotimes.org/oct03/feature_water.html) (last visited Oct. 22, 2004).

50. Joseph W. Dellapenna, *The Two Rivers and the Land Between: Mesopotamia and the International Law of Transboundary Waters*, 10 *BYU J. PUB. L.* 213, 220 (1996).

51. Jonathan E. Cohen, *International Law and the Water Politics of the Euphrates*, 24 *N.Y.U. J. INT’L L. & POL.* 502, 511 (1991).

52. Dellapenna, *supra* note 50, at 216, 233.

53. Janet Larsen, Earth Policy Institute, *Deserts Advancing, Civilization Retreating* (Mar. 27, 2003), at <http://www.earth-policy.org/Updates/Update23.htm> (last visited Oct. 22, 2004).

54. Sultan et al., *supra* note 49.

55. Cohen, *supra* note 51, at 510.

56. Rapid population growth has decreased per capita land and water availability. *CROPS FOR DROPS*, *supra* note 5, at 5.

57. Table derived from information provided in CENTRAL INTELLIGENCE AGENCY (CIA), *Field Listing*, in *WORLD FACTBOOK 2003* (2003) [hereinafter CIA, *WORLD FACTBOOK*], available at <http://www.cia.gov/cia/download2003.htm> (last visited Oct. 22, 2004).

Iraq and Syria. Thus far, Iran has not felt the need to divert Tigris tributaries to supply its 75,620 square kilometers (sq km) of irrigated land. Iraq and Syria face the highest risk of severe water shortfalls, given their arid climates and more rapidly growing populations.<sup>58</sup> These two countries have the highest growth rates and lowest percentages of arable land with which to feed larger populations. They already have more aggressive irrigation schemes across available farmland than Turkey, leaving few domestic options for feeding more people. Irrigation remains a major drain on the region's water supply. Chronic water shortages restrict industrial and agricultural expansion. Syria's annual population growth rate is outstripping economic growth, leaving the country with a declining per capita gross domestic product (GDP). The U.N. embargo and ongoing armed conflict have affected the agricultural sector of Iraq's GDP. While Iraq and Syria continue to object to Turkish hydrological projects, pressure to divert water outside of the Euphrates-Tigris watershed continues to mount as the population of the region grows.<sup>59</sup> Turkey's population is growing more slowly than those of Iraq and Syria. Turkey has the highest percentage of arable land in the Euphrates-Tigris River Basin. While its economy is diversified, 40% of employment remains in agriculture.<sup>60</sup>

Euphrates-Tigris River Basin States need to conduct detailed technical studies to determine present and future variables of water use within each country. Advances in technology have increased the precision and efficiency of monitoring water quality and quantity. Digital data collection and information storage have expanded. Combined with geographic information system technology, co-riparians can use remote sensing to create multi-layered analyses in which geopolitical, socioeconomic, and hydrological limitations can be assessed. Modular modeling systems allow riparians to build models together. Such models can provide negotiators with human and hydrologic trends with which to allocate water resources equitably.<sup>61</sup>

#### D. Effects of Water Use in One Country on Co-Riparians

Until the 1960s only Iraq made substantial use of the Euphrates and Tigris Rivers. Joint water project negotiations between Iraq and Syria stalled when Syria received Soviet funding to build its own dam. By late 1973 the reservoirs behind both Syria's Tabqa Dam and Turkey's Keban Dam began to fill. Iraq called upon the Arab League to intervene. Explaining that its normal flow had been reduced by one-half, Syria walked out of the Arab League technical committee established to resolve the dispute. Expecting 920 cubic meters per second (m<sup>3</sup>/sec.), Iraq reacted to receiving only 197 m<sup>3</sup>/sec. in 1975 by amassing tanks and troops along the Syrian border.<sup>62</sup> Syria followed suit, deploying its

armed forces to the Iraqi-Syrian border and closing its airspace to Iraqi flights. Iraq had not taken into account that Syria was only partially responsible for the situation. Very little rain in 1974 and diversion of the Euphrates to fill Turkey's Keban Dam also contributed to Iraq's water shortage.<sup>63</sup> By mediating an agreement, Saudi Arabia helped avert a water war over the Euphrates. While the terms of the agreement were not made public, Syria reportedly agreed to a 60/40% allocation.<sup>64</sup>

The conflict re-ignited when Syria cut 75% of the average flow to Iraq between November 23, 1989, and January 14, 1990. Knowing that its share of Euphrates water would be cut off on January 13, 1990, to fill Turkey's Ataturk Dam, Syria decided to stockpile water. Scared by the risk posed to its water supply, Syria had tried to halt construction of the Ataturk Dam in 1987 but was thwarted by Turkish surveillance. On October 21, 1989, Syrian MiGs shot down a Turkish survey plane within Turkey's borders.<sup>65</sup> Turkey proceeded to reduce the flow of the Euphrates into Syria by up to 95% for a month.<sup>66</sup>

The Ataturk Dam can store 1.5 years' worth of Euphrates water.<sup>67</sup> It is part of Turkey's vast reclamation project that will significantly reduce downstream water quantity and quality. Turkey's Güneydoğu Anadolu Projesi (GAP) is known in English as the Southeastern Anatolia Development Project. The \$32 billion project involves construction of 22 dams and 19 hydroelectric power plants on the Euphrates and Tigris Rivers and their tributaries. Turkey hopes to irrigate over 1.7 million hectares of land and generate 27 billion kilowatt hours of electricity.<sup>68</sup> With an anticipated completion date of 2010, GAP will provide 22% of Turkey's projected electricity requirements and double irrigation in southeastern Turkey.<sup>69</sup> The World Bank will not fund GAP due to the project's environmentally and politically adverse impact on the region. GAP will cut the water flow into Syria by 40% and into Iraq by as much as 90%.<sup>70</sup> Any equitable utilization argument advanced by Turkey would be weak-

58. Just as dissolved oxygen is a limiting reagent for aquatic life, water is a limiting reagent for terrestrial life. When there is not enough oxygen in a pond, fish kills occur. When there is not enough water in the desert, droughts lead to starvation.

59. Kahn, *supra* note 41, at 176.

60. *Id.*

61. Aaron T. Wolf et al., *Conflict and Cooperation: Survey of the Past and Reflection for the Future*, in WATER RESOURCES UPDATE 14 (Universities Council on Water Resources 2003), available at <http://www.transboundarywaters.orst.edu/publications/> (last visited Oct. 22, 2004).

62. Kuk & Deese, *supra* note 39, at 49.

63. Dellapenna, *supra* note 50, at 227.

64. Transboundary Freshwater Dispute Database, *Introduction to Case Studies*, at <http://www.transboundarywaters.orst.edu/projects/casestudies/> (last visited Nov. 1, 2004) (information on website adapted from HEATHER L. BEACH ET AL., TRANSBOUNDARY FRESHWATER DISPUTE RESOLUTION: THEORY, PRACTICE, AND ANNOTATED REFERENCES (U.N. Univ. Press 2000)). See also Cohen, *supra* note 51, at 512; Scanlan, *supra* note 7, at 2199.

65. Cohen, *supra* note 51, at 517.

66. Kuk & Deese, *supra* note 39, at 49.

67. Todd McDowell, *Water Conflict and the Tigris-Euphrates Water Basin: A Status Report*, 1997 COLO. J. INT'L ENVTL. L. & POL'Y 202, 204.

68. Republic of Turkey Ministry of Foreign Affairs, *G.A.P. Project*, at <http://www.mfa.gov.tr/grupd/dc/dcd/gap.htm> (last visited Oct. 22, 2004). See also Republic of Turkey Prime Ministry Southeastern Anatolia Project Regional Development Administration, *Overall Information on Gap*, at <http://www.gap.gov.tr/English/Frames/fr1.html> (last visited Nov. 1, 2004).

69. U.S. Consulate, Adana-Turkey, *GAP Overview*, at <http://www.usconadana.org.tr/gap2.htm> (last visited Oct. 22, 2004). While hydropower could prove to be lucrative, building dams is problematic in earthquake-prone Turkey. GAP has also been an economic gamble as Turkey's public sector fiscal deficit continually exceeds its gross domestic product by 10%. CIA, *WORLD FACTBOOK*, *supra* note 57.

70. Kuk & Deese, *supra* note 39, at 48. See also Cohen, *supra* note 51, at 513. Interestingly, there is a role reversal between Turkey and Syria on the Orontes River where Syria rather than Turkey is up-

ened by the fact that it has ample sources of water beyond the Tigris and Euphrates Rivers. These rivers comprise less than one-half of Turkey's and most of Iraq's and Syria's water supply. Equity precludes Turkey from claiming the majority of the flow. Similarly, equity prevents Iraq and Syria from claiming prior use if that use has been extremely inefficient. Turkey has used water coercion to retaliate against Syrian support of Kurdish separatists in Turkey. Syria's support of the Kurdistan Workers Party is linked to a desire to slow down the pace of GAP.<sup>71</sup> Breaking this cycle is crucial to reaching an equitable water sharing agreement for the Euphrates-Tigris River Basin.

#### *E. Existing and Potential Uses of the Watercourse*

Water has been diverted from rivers within Iraq since ancient times. In contrast, Syria and Turkey have radically altered their respective uses of the Euphrates-Tigris River Basin in recent years. Kurdish unrest and international unwillingness to fund GAP without co-riparian consensus have slowed Turkey's ability to use the water that it has amassed. Turkey has offered to build a "peace pipeline" that would bring water to most countries of the Middle East. All States receiving water would divide the pipeline's \$21 billion price tag. Yet, Turkey's use of water as a tool of coercion against Syria has affected Arab willingness to rely on Turkey for water.<sup>72</sup> The Euphrates-Tigris system flows through the regions of Turkey and northeastern Iraq inhabited by Kurds. In the absence of oppression by Saddam Hussein, Kurdish populations in Iraq may request an equitable share of water as well.<sup>73</sup> With a new political climate in Iraq, the Euphrates-Tigris River Basin countries have an opportunity to talk to one another and make genuine efforts to build consensus.<sup>74</sup>

In September 2003, the newly appointed Minister of Water Resources, Abdul Latif Rasheed, declared that Iraq hopes to enter into water negotiations with Syria and Turkey. He went on to say that, "[w]e want to improve our ties with our neighbors."<sup>75</sup> Rasheed has requested \$1 billion from the Governing Council for water projects, including restoring the marshes in southern Iraq. In the 1990s, Hussein's government drained the marshes of the Shatt al-'Arab to drive out Marsh Arabs who had risen up against his administration. Rasheed explained that the new government has already begun pumping water back into these

wetlands.<sup>76</sup> Agriculture was first developed here, leading to the description of Mesopotamia as the "cradle of civilization." Draining the marshlands forced an estimated one-half million Marsh Arabs to leave and devastated the ecosystem. Restoring the Shatt al-'Arab will require a substantial reallocation of water, important to both the environmental integrity of the Euphrates-Tigris River Basin and the human rights of minority Marsh Arab culture.<sup>77</sup>

#### *F. Conservation, Cost, and Economy of Use*

Most water management systems fail to protect such instream uses as habitat for flora and fauna. Watershed integrity becomes a lower priority as pressure increases to divert larger amounts of water for agricultural, industrial, and domestic uses. Sooner or later the water left within the rivers will be inadequate to support aquatic life. Ecosystem preservation is undervalued when legal provisions limit optimum use to water diversions for consumptive uses. A minimum of five billion m<sup>3</sup> needs to flow through the Euphrates-Tigris system to sustain ecological integrity.<sup>78</sup> The water lost through evaporation and leakage from irrigation systems in Iraq and Syria could be left to flow through the Shatt al-'Arab marshlands. Improved methods of agriculture are desperately needed.<sup>79</sup> While increased irrigation in Turkey will reduce the quality of the water flowing into Syria and Iraq, preserving ecological integrity is often politically untenable since water conservation has not been a conventional water use. Sustainable utilization is considered too expensive to implement given the array of competing agricultural, industrial, and domestic demands on the Euphrates-Tigris watershed.<sup>80</sup> Yet, the true cost of conventional agriculture is also expensive. Irrigation has become the leading contributor to water scarcity and pesticides adversely affect health.<sup>81</sup> The FAO points out that the real cost of irrigated food production is unclear since it is highly subsidized. Environmental externalities such as salinization caused by irrigation are not reflected in the price of food. Up to 2% of irrigated lands have been lost to salinization annually.<sup>82</sup> Salinization and erosion have led to desertification. The U.N. Environment Program (UNEP) indicates that crop production has been reduced due to the salinization of approximately 20% of the world's irrigated land.<sup>83</sup> Euphrates-Tigris River Basin States cannot afford not to pursue environmentally sound policies.

Technological advances of the 20th century have led nations to irrigate floodplains intensively and divert entire rivers.<sup>84</sup> Hydropower has become a significant global energy source, generating 19% of the world's electricity. It is

stream. David Jacob, *Water Law Review*, University of Denver, 5 U. DENV. WATER L. REV. 554, 570 (2002).

71. In a 1987 Turkish-Syrian protocol, Turkey promised that an average flow of 500 m<sup>3</sup>/sec. of water would enter Syria, which in turn agreed to end incursions into Turkey by Kurdish separatists. Syria has given substantial support to Partiya Karkerên Kurdistan (PKK), known in English as the Kurdistan Workers Party. The PKK has used violence to promote the creation of an independent Kurdish state in southeastern Anatolia. Syria has sheltered Kurdish guerrillas and leader Abdullah Öcalan. See Cohen, *supra* note 51, at 517; Kukk & Deese, *supra* note 39, at 49; and Dellapenna, *supra* note 50, at 252.
72. Kukk & Deese, *supra* note 39, at 50. See also Cohen, *supra* note 51, at 537-38, and Dellapenna, *supra* note 50, at 235.
73. While less than 7% of Iran and 9% of the population of Syria, Kurds represent 15% to 20% of Iraq and at least 20% of Turkey. CIA, WORLD FACTBOOK, *supra* note 57.
74. Sultan et al., *supra* note 49.
75. Hazzan Hafidh, *Iraq Wants to Clinch Water Deal With Syria*, ENVTL. NEWS NETWORK, at <http://www.enr.com> (last visited Jan. 5, 2004), also available at [http://forests.org/middle\\_east/2003.asp](http://forests.org/middle_east/2003.asp) (last visited Nov. 1, 2004).

76. *Id.*

77. Naomi Lubick, *Iraq's Marshes Renewed*, GEOTIMES (Oct. 2003), at [http://www.geotimes.org/oct03/feature\\_marshes.html](http://www.geotimes.org/oct03/feature_marshes.html) (last visited Oct. 22, 2004).

78. Dellapenna, *supra* note 50, at 253.

79. *Id.* at 225.

80. Dan Tarlock, *International Water Law and the Protection of River System Ecosystem Integrity*, 10 BYU J. PUB. L. 181, 197 (1996).

81. CROPS FOR DROPS, *supra* note 5, at 10.

82. *Id.* at 16.

83. One-third of the world is experiencing desertification. Efforts to feed 6.3 billion people are transforming farmland into desert across the globe. Larsen, *supra* note 53.

84. Tarlock, *supra* note 80, at 184.

the most broadly used renewable source of electricity.<sup>85</sup> Yet, UNESCO explains that dams have degraded the environment to such a degree that various countries have dismantled them. Due to silting, most dams have not generated the energy levels that they were constructed to supply.<sup>86</sup> UNEP notes that “[d]amming of rivers has met growing demand, providing hydroelectricity and increased food production. It has also displaced up to 80 million people around the world and impacted ecosystems.”<sup>87</sup> Forced resettlement has dismantled minority cultures, exemplified by Iraq’s expulsion of the Marsh Arabs by draining the Shatt al-‘Arab and GAP’s goal of assimilating rebellious Kurds into modern Turkey.<sup>88</sup> International human rights and environmental movements have questioned the notion that large-scale water diversion projects meet the fundamental needs of present and future generations. Ecological and human rights standards should provide a threshold below which countries cannot descend when determining equitable and reasonable water use.<sup>89</sup>

### G. Availability of Alternatives of Comparable Value

Dams have led to inequitable distributions of water. They have fallen short of economic projections and led to human rights violations by displacing minority populations.<sup>90</sup> Given the political animosities of the Middle East, however, one can see why Turkey has turned to its mountains rather than neighbors. These highlands are well suited to hydroelectric generation, enabling Turkey to increase control over its energy supply.<sup>91</sup> Sharing the benefits of water equitably rather than concentrating on allocating a shrinking supply of water between a growing number of needs could alleviate the current stalemate over water allocation. Euphrates-Tigris River Basin States should consider using the profits obtained from water diverted to produce hydropower to buy drip irrigation technology for the region. Drip irrigation could lower salt concentrations that build up when irrigation water evaporates from fields. Such technology can enable Iraq, Syria, and Turkey to reduce their respective demands for water. Drip irrigation delivers water directly to the roots of crops, improving drainage. Switching from open irrigation to drip systems could reduce agricultural water demand by up to 60%.<sup>92</sup> Transferring efficient irrigation technology to water-stressed countries could reverse the trend of lower

crop yields and abandonment of formerly productive areas due to salinization.

Water is not as fungible as energy. Countries cannot substitute another substance for water in the way that they can replace fossil fuels with alternative energy sources.<sup>93</sup> Yet, States can use energy derived from solar panels, wind turbines, and even water itself to increase the supply of freshwater. Shipping and piping water are becoming viable albeit expensive and controversial options.<sup>94</sup> Scientists have developed technologies to utilize sun and salt to increase freshwater.<sup>95</sup> The global market for “desalting the sea”<sup>96</sup> is approximately \$35 billion annually and likely to double over the next 15 years according to the *2003 United Nations World Water Report*.<sup>97</sup> Oil rich countries in the Middle East operate one-half of the desalination plants in the world.<sup>98</sup> Many regions facing water scarcity have not been able to afford such energy-intensive means. Increasing the use of solar desalination could reduce both the expense and greenhouse gas emissions involved in conventional desalination. While states would have to dispose of the chemical byproduct of desalination in a responsible manner, solar desalination could provide each State with security over its own freshwater resources in regions lacking both water and trust.<sup>99</sup>

Along more conventional lines, Iraq has joined the Euphrates and Tigris Rivers via the Tharthar Canal. This provides the opportunity for Iraq to divert water from the Tigris to Iraq’s agricultural heartland located along the Euphrates.<sup>100</sup> Evaporation and salinity will result but such a transfer does provide Iraq with a higher degree of food and water self-sufficiency. The Iraqi embargo has prevented Euphrates-Tigris River Basin States from considering a food-for-oil trading relationship.<sup>101</sup> Turkey is in a better position to achieve sustainable agricultural self-sufficiency. Syria and

85. WORLD WATER REPORT, *supra* note 2, at 254.

86. Barry James, *Some Things to Know About Water*, NEW COURIER (UNESCO), Oct. 2003, at 61, available at [http://portal.unesco.org/en/ev.php?URL\\_ID=14295&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php?URL_ID=14295&URL_DO=DO_TOPIC&URL_SECTION=201.html) (last visited Oct. 25, 2004).

87. UNEP, *Dams and Development Project*, at <http://www.unep-dams.org/> (last visited Oct. 25, 2004); id21, *Constructing Dams: Not Necessarily a Good Thing?*, at <http://www.id21.org/society/s2cwc1g1.html> (last visited Jan. 11, 2004).

88. Benvenisti, *supra* note 1, at 405-06.

89. See generally the decision of the U.N. Committee on Economic, Social, and Cultural Rights to classify water as a human right, *Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social, and Cultural Rights*, U.N. ESCOR, 29th Sess., Gen. cmt. No. 15, U.N. Doc. E/C.12/2002/11 (Nov. 26, 2002), available at <http://www.unhcr.ch/html/menu2/6/gc15.doc> (last visited Oct. 28, 2004).

90. Tarlock, *supra* note 80, at 184.

91. Dellapenna, *supra* note 50, at 231.

92. Colleen Graffy, *Water, Water, Everywhere, Nor Any Drop to Drink: The Urgency of Transnational Solutions to International Riparian Disputes*, 10 GEO. INT’L ENVTL. L. REV. 399, 404 (1998).

93. *Id.* at 402.

94. Jacob, *supra* note 70, at 554.

95. University of Florida has developed a solar desalination system that uses a gravity vacuum and the sun rather than fossil fuels. Earlier solar stills obtained a 50% efficiency rate. The new design achieves 90% efficiency. See University of Florida, UF News, *Here Comes the Sun: Engineers Develop Solar Desalination System* (Sept. 16, 2003), at <http://www.napa.ufl.edu/2003news/solardesal.htm> (last visited Oct. 25, 2004).

Communities around the globe have conducted rain dances for centuries. Accurate cloud seeding can now produce rain by placing water-attracting materials such as salt within warm cloud systems. The salt particles force additional water droplets to condense within the cloud. Unlike dams or pipelines, this portable technology does not necessitate colossal construction and maintenance costs. See National Oceanic and Atmospheric Administration (NOAA), *Seeding Time After Seeding* (last visited Oct. 25, 2004), at <http://www.aoml.noaa.gov/hrd/nhurr97/CSEED.HTM>. See also North American Weather Consultants, *Cloud Seeding Frequently Asked Questions*, at <http://www.nawcinc.com/wmfaq.html> (last visited Oct. 25, 2004).

96. Diaz & Dubner, *supra* note 4, at 21 n.6.

97. Reverse osmosis, multieffect distillation, and multistage flash distillation are the most common large-scale desalination technologies. Kuwait, Saudi Arabia, and the United Arab Emirates make extensive use of dual-purpose power and desalination plants. See WORLD WATER REPORT, *supra* note 2, at 89.

98. Diaz & Dubner, *supra* note 4, at 402.

99. WORLD WATER REPORT, *supra* note 2, at 89.

100. Dellapenna, *supra* note 50, at 225.

101. The economy of southeastern Turkey has been severely impacted by the U.N. sanctions on Iraq. The region’s trade with Iraq accounted for a substantial portion of the area’s economic base before 1990. The Turkish government looks to GAP to alleviate southeastern

Iraq could save a great deal of money and manpower on large-scale water projects that lose water to evaporation and cause significant salinity problems.

Importing cereal rather than dedicating scarce water resources to water-intensive crops would allow Iraq and Syria to generate “virtual water.” Wheat requires up to five m<sup>3</sup> of water to produce one kilogram of cereal.<sup>102</sup> Iraq has the second-largest proven oil reserves after Saudi Arabia.<sup>103</sup> It would behoove Iraq to import such cereals from water-surplus regions and dedicate Iraq’s limited water resources to the production of oil and high value crops that require little water such as dates. Thomas Naff, an expert in Middle Eastern water systems at Pennsylvania State University, explains that generating the pressure needed to pump a barrel of oil requires a barrel of freshwater.<sup>104</sup> He goes on to note that, “[a]t the core of every effort to establish good health care, good government and a good economy is clean water. You can’t provide any kind of stability without it.”<sup>105</sup> Achieving societal, ecological, and economic equilibrium requires Euphrates-Tigris River Basin States to design and implement a dynamic water management system.

#### IV. From Conflict to Consensus

Euphrates-Tigris River Basin States share a common religion and heritage. Iraq, Syria, and Turkey are not only all predominately Muslim nations, they spent centuries as a single empire. The Euphrates Basin and much of the Tigris Basin fell under Ottoman rule by the early 16th century. The Ottoman and Safavid Empires shared the Tigris River without significant conflict.<sup>106</sup> After World War I, Turkey shrunk to its present size, Britain acquired a League of Nations Mandate over Iraq, and France gained a Mandate over Syria. The only progress in joint management of the basin that included all three countries came in the form of a technical committee to share hydrological data. Meetings began in 1982 between Iraq and Turkey. Syria joined in 1983. Animosity over the Ataturk Dam dealt a fatal blow to these early stages of cooperation. The committee met 16 times before being discontinued in 1992.<sup>107</sup> In the absence of such multi-

lateral mechanisms as a basinwide treaty, informal agreements have not been sufficient to guarantee that Syria and Iraq continue to receive an adequate flow of Euphrates-Tigris water.<sup>108</sup>

Iraq, Syria, and Turkey need to revive negotiations that

107. McDowell, *supra* note 67, at 204.

108. The following timeline notes the agreements made after Mesopotamia was divided into Iraq, Syria, and Turkey.

Dec. 23, 1920: The French and British created a joint committee (Convention on Certain Points Connected to the Mandates of Syria, the Lebanon, Palestine, and Mesopotamia).  
Oct. 20, 1921: France and Turkey permitted the Syrian city of Aleppo to withdraw water from the Euphrates (Agreement With a View to Promoting Peace).

May 30, 1926: General Turkish-French treaty lacking specificity (Treaty of Friendship and Good Neighborliness).

May 3, 1930: Declaration that disputes over the Tigris shall be resolved on the basis of complete equality (Final Demarcation Protocol of Commission on the Turco-Syrian Frontier).

Mar. 29, 1946: Turkish-Iraqi treaty agreeing not to alter the Euphrates’s flow in the absence of mutual consent (Protocol Relative to the Regulation of the Waters of the Tigris and Euphrates annexed to Treaty of friendship and neighborly relations).

1973: Keban and Tabqa Dams began to fill.

June 13, 1975: Treaty concerning the state frontier and neighborly relations between Iran and Iraq and protocol.

December 26, 1975: Agreement between Iran and Iraq concerning the use of frontier watercourses and protocol.

1980: Iraq and Turkey established a Protocol of the Joint Economic Committee, permitting Joint Technical Committee meetings to discuss water.

1983: Syria began participating in Joint Technical Committee meetings.

1986: Unsuccessful tripartite meeting between Iraqi, Syrian, and Turkish ministers.

1987: During a visit to Syria, Turkish Prime Minister agreed to a minimum flow of 500 m<sup>3</sup>/sec. across the Turkish-Syrian border. In a security protocol signed the same day, Syria agreed to end incursions into Turkey by Kurdish separatists (nonbinding protocols of security cooperation and economic cooperation).

April 17, 1989: Syrian-Iraqi Joint minutes concerning the provisional division of waters of the Euphrates River.

January 1990: Turkey closed the gates to the reservoir on the Ataturk Dam, the largest of the GAP dams, stopping the flow of the Euphrates for 30 days.

1990: At a tripartite meeting Iraq requested that 500 m<sup>3</sup>/sec. of water across the Syrian-Iraqi border. Turkish representatives classified the request as a technical issue and talks broke down.

April 16, 1990: Iraq and Syria agree to share whatever water reaches the Turkish-Syrian border on a basis of 58% to Iraq and 42% to Syria.

1992: The first talks between Iraq, Syria, and Turkey following the Gulf War stalled when Iraq insisted that its 6,000 year-old irrigation economy needed a flow of 700 m<sup>3</sup>/sec. across the Iraqi-Syrian border.

1993: Bilateral talks between Turkish Prime Minister and Syrian President produced a promise to resolve water allocations by the end of 1993. To date the issue remains unresolved.

October 20, 1998: Minutes between Syria and Turkey on cooperation in fighting terrorism, Annex 2.

August 23, 2001: Joint communiqué between Republic of Turkey prime ministry Southeastern Anatolia Project Regional Development Administration (GAP) and Arab Republic of Syria Ministry of Irrigation General Organization for Land Development (GOLD). GAP and GOLD agreed to collaborate on technical training.

January 6, 2004: Syrian President Bashar al’ Assad makes the first visit by a Syrian head of state to Turkey.

August 11, 2004: Turkey helps Syria extinguish a border forest fire.

See Dellapenna, *supra* note 50, at 238; WORLD WATER REPORT, *supra* note 2, at 314; UNEP, *supra* note 6, at 51 (Agreements of Asia);

Anatolia’s political and economic problems. Forbidding Turkey and Iraq from trading eliminated Turkey’s principal source of oil and proceeds generated by delivering some of that oil from Turkey on to Europe. *Id.* at 231.

102. The virtual water content would be 6 cubic meters (m<sup>3</sup>) per kilogram (kg) of poultry meat. For cattle, with a conversion factor of 10 to 1, the virtual water content of 1 kg of beef would be 15 m<sup>3</sup>. WORLD WATER REPORT, *supra* note 2, at 203.

Proponents of genetic engineering believe that developing plants that consume less water can avert a water crisis. Yet, most genetically engineered crops tend to require substantially more water than traditional varieties. Shermakaye Bass, *Water Worries*, 6 BLUE MAG., at <http://www.bluemagazine.com/> (last visited Oct 25, 2004). See also Colorado State University Department of Soil and Crop Sciences, *Cropping Options for Limited Water Supplies in Northeast Colorado*, 2003, at <http://www.colostate.edu/Depts/SoilCrop/drought.htm> (last visited Oct. 25, 2004). Research is also being conducted to develop salt-tolerant plants. See generally Marcia Wood, U.S. Department of Agriculture, *New Salt-Tolerant Plants Developed*, at <http://www.ars.usda.gov/is/pr/2003/030129.htm> (last visited Oct. 25, 2004).

103. Sultan et al., *supra* note 49.

104. Amanda Onion, ABC News, *Postwar Iraq to Face Big Water Problems* (Apr. 18, 2004), at <http://abcnews.go.com/Technology/story?id=97667&page=1> (last visited Oct. 25, 2004).

105. *Id.*

106. Dellapenna, *supra* note 50, at 236.

have been deadlocked since 1993 to address the effect that Turkey's water projects have had on Syria and the combined impact of Turkish and Syrian projects on Iraq. Both downstream riparians reject Turkey's claim to absolute sovereignty of the Euphrates-Tigris waters. Syria and Iraq fear that GAP provides Turkey with complete control over the water supply of the region. At best GAP will cut 50% of the average flow of the Euphrates into Syria, approximately 500 m<sup>3</sup>/sec. This leaves Syria and Iraq in conflict over the remaining 500 m<sup>3</sup>/sec. of water.

#### A. Existing Regional Organizations

Upon Syrian and Iraqi requests, the League of Arab States (Arab League) has urged Turkey to accept an international treaty.<sup>109</sup> While existing regional organizations can be useful in resolving disputes, several factors make the Arab League ill-suited to manage the Euphrates-Tigris River Basin. Divisions between Members on a wide range of issues hinder the Arab League's ability to provide a forum for conflict resolution. Turkey may be Muslim but it is not Arab and therefore cannot become a Member of the Arab League. As a result, arbitration cannot become binding since such dispute resolution mechanisms are only available to Members, pursuant to Article 5 of the Arab League Pact.<sup>110</sup> A Member and a non-Member can choose to mediate a dispute under the auspices of the Arab League. The fact that the Arab League asked Turkey to mediate during the Iran-Iraq War indicates that the league is not necessarily the best facilitator when one of the Parties is not a Member, as was the case with Iran. Since then Turkish desire to join the European Union (EU) has not been viewed with favor among its Arab neighbors, nor have they responded positively to Turkey signing a military agreement with Israel. Iraq and Syria became founding Members in 1945. As the upper riparian on the Euphrates-Tigris system, Turkey has little incentive to face two Arab opponents in an Arab forum. Thus, it would not be surprising for Turkey to refuse Arab League involvement even if the league were in a position to mediate. As a Member of the North Atlantic Treaty Organization (NATO), Turkey has military as well as geographic advantage vis-à-vis Iraq and Syria. Significant pressure on the part of the United States and Europe appears to be necessary to induce Turkey to provide co-riparians with more water. Thus, international law and extra-regional pressure may offer the most likely means of establishing joint management of the watercourse.<sup>111</sup>

#### B. U.N. Involvement

The United Nations should ensure peace and security in the Middle East by helping co-riparians draft a multilateral treaty suited to dynamic management of the Euphrates-

Tigris River Basin. Iraq, Syria, and Turkey can coordinate subsequent water sharing arrangements, ideally through the formation of an integrated management authority. If these states prove unable to establish such an institution or the institution is unable adequately to address problems that arise, then the United Nations should once again provide assistance. Gross violations of equitable and reasonable utilization should be subject to U.N. sanctions.<sup>112</sup> Such measures may be morally enforced through the General Assembly or mandated by the Security Council pursuant to Chapter VII of the U.N. Charter.<sup>113</sup>

The United Nations has already played a significant role in Iraq. Averting a water war would help restore international peace and security. On the other hand, since China voted against the Convention, the Security Council may not be able to reach agreement regarding international watercourses. It is also not clear that water tensions in the Euphrates-Tigris River Basin amount to a threat to international peace and security pursuant to Article 39 of the U.N. Charter.<sup>114</sup> In the absence of such a threat, the principle of subsidiarity suggests that resolution of the dispute occur at the regional level. Even if the international community does not agree that the Euphrates-Tigris River Basin dispute merits U.N. intervention, third parties to the conflict may still play a positive role in persuading basin States to codify a water sharing agreement.<sup>115</sup>

International law provides a framework for cooperation by holding everyone within a river basin to the same standard. Economists can offer incentives to internalize environmental externalities and determine whether water is being undervalued.<sup>116</sup> Scientists and engineers can provide reliable hydrological data. In this way, countries can find efficient, accurate solutions to technical issues. Negotiators have the responsibility to incorporate fairness into the distribution process in order to achieve sustainable sharing of water resources.<sup>117</sup> Consistent and coherent technological information should be made available to co-riparians. In addi-

112. The U.N. Charter states:

The Security Council may decide what measures not involving the use of armed force are to be employed to give effect to its decisions, and it may call upon the Members of the United Nations to apply such measures. These may include complete or partial interruption of economic relations and of rail, sea, air, postal, telegraphic, radio, and other means of communication, and the severance of diplomatic relations.

U.N. CHARTER art. 41, ¶ 1 (1945).

113. Cohen, *supra* note 51, at 554.

114. "The Security Council shall determine the existence of any threat to the peace, breach of the peace, or act of aggression." U.N. Charter art. 39, ¶ 1.

115. Article 33(2) of the Convention provides that

[i]f the Parties concerned cannot reach agreement by negotiation requested by one of them, they may jointly seek the good offices of, or request mediation or conciliation by, a third party, or make use, as appropriate, of any joint watercourse institutions that may have been established by them or agree to submit the dispute to arbitration or to the International Court of Justice.

Convention, *supra* note 10, at 713.

116. Equilibrium and efficiency are fundamental to both economics and law. "Economics studies rational behavior, defined as the pursuit of consistent ends by efficient means." ROBERT COOTER & THOMAS ULEN, *LAW AND ECONOMICS 1* (HarperCollins Publishers 1988).

117. Katrina Smith, *Fairness in Water Quality: A Descriptive Approach*, 4 DUKE ENVTL. L. & POL'Y F. 85, 89 (1984).

Cohen, *supra* note 51, at 511-13. See also BBC News, United Kingdom (U.K.) Edition, *Assad Makes Landmark Turkey Visit* (Jan. 6, 2004), at [http://news.bbc.co.uk/1/hi/world/middle\\_east/3370917.stm](http://news.bbc.co.uk/1/hi/world/middle_east/3370917.stm) (last visited Oct. 25, 2004) [hereinafter BBC News, *Assad*]; BBC News, U.K. Edition, *Turkey Aids Syria on Forest Fire* (Oct. 27, 2004), at [http://news.bbc.co.uk/1/hi/world/middle\\_east/3959097.stm](http://news.bbc.co.uk/1/hi/world/middle_east/3959097.stm) (last visited Oct. 30, 2004).

109. Kuk & Deese, *supra* note 39, at 49. See also McDowell, *supra* note 67, at 206.

110. Cohen, *supra* note 51, at 529.

111. *Id.* at 530.

tion to transparency, accountability is essential to equitable allocation. Joint commissions, authorities, and other institutions need to be responsive to all stakeholders.<sup>118</sup>

Cooperation must increase both on a regional and an international level. The international community has been discussing the codification of international freshwater law for over 30 years. The final report of the U.N. Water Conference at Mar del Plata in 1977 concluded: "It is necessary for States to cooperate in the case of shared water resources in recognition of the growing economic, environmental and physical interdependencies across international frontiers. Such cooperation must be exercised on the basis of the equality, sovereignty and territorial integrity of all States."<sup>119</sup>

Scientific contributions can depoliticize negotiations.<sup>120</sup> Determining water use variables within each country allows leaders to present one another with fundamental needs. Sharing technical expertise allows co-riparians to respond to unexpected water shortfalls of a temporary nature and come to terms with long-term water scarcity. Most importantly, leaders must agree on ways in which to enforce mutually agreed-upon decisions.<sup>121</sup> Article 8 of the Convention provides:

1. Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse.
2. In determining the manner of such cooperation, watercourse States may consider the establishment of joint mechanisms or commissions, as deemed necessary by them, to facilitate cooperation on relevant measures and procedures in the light of experience gained through cooperation in existing joint mechanisms and commissions in various regions.<sup>122</sup>

Joint commissions and authorities can provide long-term continuity between countries. When disputes arise they can be resolved in an amicable and timely fashion when forums already exist. The Convention's Article 33 suggests a framework within which Euphrates-Tigris River Basin States can structure dispute settlement provisions. If Turkey does not find Article 33(3)'s six-month deadline politically feasible, then perhaps the parameter can be extended or some other means can be mutually agreed upon in order for disputes to be resolved before they escalate into hostilities. "Impartial fact-finding" after six months does not provide a stringent obligation.<sup>123</sup>

The Convention suggests that commissions consist of one representative from each country and a neutral chairman. If the Parties cannot agree upon a suitable chairman, then either side may request that the U.N. Secretary-General appoint the chairman. Thus, the U.N. Secretary-General may

be able to help end the deadlock over GAP and other aspects of water allocation in the Euphrates-Tigris River Basin.

### C. Mesopotamia—The Land Between the Rivers<sup>124</sup>

Conflict arises when physical and political changes occur within a watershed at a rate beyond which a community can come to terms with those changes. Rapid physical change results when large-scale diversion projects, such as dams, alter the water supplies of lower riparians. Within the Euphrates-Tigris River Basin this development followed rapid political change. "Internationalized" basins occur when water administration originating within a cohesive political entity rapidly becomes fragmented into two or more countries. The collapse of the Ottoman Empire and subsequent colonization of the new States by Britain and France set the stage for wounded international relations and an inability to form regional institutions responsible for equitable water use.<sup>125</sup>

Insisting on prior use rights that date back to antiquity, Iraq has requested that Turkey recognize the integrity of the watercourse, causing "no harm" to existing downstream uses. Syria has held to the doctrine of limited territorial sovereignty, ratifying the Convention in 1998.<sup>126</sup> While Syria remains one of the few countries to have ratified the Convention, Turkey is one of three nations to have voted against the Convention's adoption. The Turkish government opposes prior notification to co-riparians regarding water projects and the obligation not to significantly harm downstream countries. Syria is deeply disturbed by Turkey's relationship with Israel, and Turkey cannot tolerate Syria's support of Kurdish insurgents. Syria's expulsion of Kurdish rebel leader Ocalan and his subsequent capture by Turkey have decreased Turkey's animosity toward Syria. Yet Turkey's military alliance with Israel continues to complicate Syria's ability to cooperate with Turkey. Syria and Iraq have suppressed their own differences and have presented united opposition to Turkey.<sup>127</sup> Syrian President Bashar al' Assad's January 2004 visit to Turkey marks a thaw in relations. It is the first visit by a Syrian head of state to Turkey and indicates that an equitable water sharing agreement is plausible.<sup>128</sup>

Stretching from southeastern Europe to southwestern Asia, Turkey is a blend of European and Muslim cultures. While Turkey is the only Middle Eastern Member of NATO, Turkish efforts to increase economic ties within Europe have yet to result in European willingness to help finance GAP.<sup>129</sup> As a candidate for EU membership, Turkey might be willing to allow more water to flow to Syria and Iraq in order to gain entry into the EU.<sup>130</sup> With regime change in Iraq, Euphrates-Tigris River Basin States have an opportunity to establish integrated yet adaptable water management that can respond to increasing socioeconomic demands and decreasing water availability.<sup>131</sup> Adaptable approaches

118. WORLD WATER REPORT, *supra* note 2, at 372.

119. *Report of the United Nations Water Conference*, Mar del Plata, Argentina, General Assembly, U.N. Doc. E/CONF.70/29 (1977), at 53. See generally Joseph Dellapenna, *Treaties as Instruments for Managing Internationally Shared Water Resources: Restricted Sovereignty vs. Community of Property*, 26 CASE W. RES. J. INT'L L. 27, 52 (1994); Dellapenna, *supra* note 50, at 52.

120. Graffy, *supra* note 92, at 440.

121. Dellapenna, *supra* note 50, at 55.

122. Convention, *supra* note 10, at 706.

123. *Id.* at 713.

124. Dellapenna, *supra* note 50, at 214.

125. Wolf et al., *supra* note 61, at 9-10.

126. Dellapenna, *supra* note 50, at 252-53.

127. McDowell, *supra* note 67, at 207.

128. BBC News, *Assad*, *supra* note 108.

129. Dellapenna, *supra* note 50, at 231.

130. Onion, *supra* note 104.

131. Iraq invaded Kuwait in August 1990. In the Gulf War of January-February 1991, coalition forces liberated Kuwait. Iraqi noncom-

make room for input by non-State actors and address the needs of non-signatory riparian States. Advances in information collection and monitoring allow countries to review the equity and sustainability of a given policy. Joint institutions can identify ways to allocate water in light of a common knowledge base concerning basin priorities and hydrological variables. Distributing benefits of water and agreeing to specific conflict resolution measures increases the life-span of joint management.<sup>132</sup>

#### D. Dynamic Response to Water Management

One of the best examples of an international commission possessing decisionmaking authority is the International Joint Commission that governs watercourse relations between Canada and the United States.<sup>133</sup> These two countries have considerable cultural and economic ties.<sup>134</sup> They have sought to prevent uncoordinated development of the longest unguarded border on earth. Canada (originally negotiating through Great Britain) and the United States have permitted the International Joint Commission to issue binding orders upon the basis of equitable utilization regarding diversion of boundary waters.<sup>135</sup> Nongovernmental representation

pliance with U.N. Security Council obligation to destroy long-range missiles and weapons of mass destruction, combined with a lack of cooperation with U.N. inspections, continued for 12 years. In March 2003, a U.S.-led invasion of Iraq overthrew Saddam Hussein. These forces remain in Iraq.

132. WORLD WATER REPORT, *supra* note 2, at 319.

133. Article 7 of the *Treaty Between Great Britain and the United States Relating to Boundary Waters and Boundary Questions* states that

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

*Treaty Between Great Britain and the United States Relating to Boundary Waters and Boundary Questions*, Jan. 11, 1909, U.S.-Canada, 36 Stat. 2448 [hereinafter 1909 Boundary Waters Treaty].

134. The Great Lakes-St. Lawrence River system comprises one-fifth of the world's surface freshwater and is home to the industrial epicenters of each country. Geographically, Canada is the second and the United States is the third largest country. Both are leading forces in the global market. Their economies are technologically advanced and highly diversified. CIA, WORLD FACTBOOK, *supra* note 57.

135. Industry rather than agriculture has had the greatest impact on the Great Lakes Basin. Water quality provisions have lagged significantly behind water allocation measures. In 1987, Canada and the United States signed a pollution protocol, Article IV of which requires the two governments and the Commission to identify and work toward the elimination of critical pollutants. Canada and the United States currently divert between one-half to three-fourths of the average flow of the Niagara River. In addition to allocating water quantity between each country, the 1909 Boundary Waters Treaty prohibited polluting shared waters. This provision was seldom enforced. Instead, both states courted industries with cheap electrical power generated by massive hydroelectric projects. An industrial corridor boomed, dumping billions of gallons of toxic chemicals directly into the Niagara River. While a practical location for chemical production, the Niagara Falls region is geologically ill-suited to chemical spills. Beneath a thin layer of silt and sand, bedrock dolomite and shale form aquifers and subterranean cracks that deposit groundwater into the river. Chemical plants dumped sludge into open pits. As the city of Niagara grew, schools and neighborhoods were located on this land. The Love Canal disaster brought prominence to the human toll of chemical contamination. See New York State Department of Health, *Love Canal Health Study—August 1997*, at <http://www.health.state.ny.us/nysdoh/environ/lovecan.htm> (last visited Oct. 28, 2004); U.S. Environmental Protection Agency,

within the International Joint Commission has proven particularly effective. Each country has an equal number of representatives. These individuals have the authority to make independent decisions without being bound by government instructions.<sup>136</sup>

The 1909 Boundary Waters Treaty is among the earliest non-navigational international watercourse treaties and has become a model for integrated management. In drafting the treaty, the United States agreed to be bound by International Joint Commission arbitration. In turn, Canada respected United States sovereignty reservations by agreeing to leave out tributaries from the treaty's purview. While "rival" may be derived from the Latin word for river,<sup>137</sup> riparians do not have to compete over water. Rival has been defined as, "one of two or more striving to reach or obtain that which one only one can possess."<sup>138</sup> By sharing water benefits, Canada and the United States have shown how zero-sum disputes can become positive-sum cooperation. Equitable distribution of benefits allocates hydropower and other benefits derived from water rather than the water itself.<sup>139</sup> Almost a century after its creation, the 1909 Boundary Waters Treaty remains an adaptable framework for cooperation.<sup>140</sup>

In contrast to the 1909 Boundary Waters Treaty, the Indus Waters Treaty<sup>141</sup> between India and Pakistan resolved a conflict between countries that despised one another. It did so through partition rather than integration. The Indus River and its tributaries carry much of the melt-water of the western Himalayas across the wide plains of the northern Indian subcontinent. Dating back to antiquity and enhanced by British engineering, the irrigation network along the Indus had become the most extensive in the world by the signing of the Indian Independence Act of August 15, 1947.<sup>142</sup> The vast irrigation system was developed under a single administrative entity that could resolve provincial water conflicts by executive order. Indian independence, however, internationalized the Indus dispute. When the British partitioned India in 1947, India's East Punjab controlled the headwaters for most of these rivers while Pakistan's West Punjab gained more irrigated farmland. A bloodbath ensued, induced by population displacement and unresolved territorial disputes between Hindus and Muslims. Ethnic and religious strife

*Love Canal*, at <http://www.epa.gov/history/topics/lovecanal/> (last visited Oct. 25, 2004); OFFICE OF TECHNOLOGY ASSESSMENT, HABITABILITY OF THE LOVE CANAL AREA: AN ANALYSIS OF THE TECHNICAL BASIS FOR THE DIVISION ON THE HABITABILITY OF THE EMERGENCY DECLARATION AREA—A TECHNICAL MEMORANDUM (No. OTA-TM-M-13) (1983); University Buffalo, University Archives Love Canal Collection, *Background on the Love Canal*, at [http://ublib.buffalo.edu/libraries/projects/lovecanal/background\\_lovecanal.html](http://ublib.buffalo.edu/libraries/projects/lovecanal/background_lovecanal.html) (last visited Oct. 25, 2004).

136. Graffy, *supra* note 92, at 424.

137. Daniel Webster, *Webster's New International Dictionary* (River-side Press 1924). See also Smith, *supra* note 117, at 100.

138. *Id.*

139. Hydropower generation accounts for 57.9% of Canada's production of electricity. CIA, WORLD FACTBOOK, *supra* note 57.

140. WORLD WATER REPORT, *supra* note 2, at 319. Literally it means the inhabitant of the opposite bank of a river.

141. Sept. 19, 1960, India-Pak., 419 U.N.T.S. 125.

142. Like Mesopotamia, the Indus Valley has been irrigated since ancient times. The 8th century brought Arabs and the 12th century saw the arrival of Turks. Britain controlled India by the 19th century. While Gandhi led a nonviolent movement that regained independence in 1947, partition of the subcontinent into the secular state of India and the Muslim state of Pakistan proved to be far from peaceful.

prevented the new States of India and Pakistan from resolving their water conflict.

India claimed absolute territorial sovereignty, insisting that water within its territory belonged entirely to India. An imbalance of power contributed to the sluggish pace of negotiations, which lasted from 1951 to 1960. India's relative political cohesion and geographic advantage gave it an incentive to stall. Non-State actors contributed significantly to India's and Pakistan's ability to construct a treaty.<sup>143</sup> The former head of the Tennessee Valley Authority indicated that an engineering perspective could contribute to resolving the political stalemate. He suggested that India and Pakistan agree to divide the Indus River Basin geographically. India would have unrestricted use of the three eastern rivers while Pakistan would completely control the three western rivers.<sup>144</sup> The World Bank played a significant role by providing mediation, support staff, funding, and proposals. Financial assistance and creativity can lead to political breakthroughs. The World Bank helped persuade the international community to contribute nearly \$900 million.<sup>145</sup> The Indus Waters Treaty obligated Pakistan to build a canal system, decreasing its dependence on Indus tributaries given to India by utilizing previously less-developed rivers.<sup>146</sup> India was able to cover the expense of construction with the help of a World Bank-administered development fund.<sup>147</sup> The treaty requires India and Pakistan to exchange information and establish joint monitoring mechanisms to ensure enforcement.<sup>148</sup>

Dispute resolution authority subjects Parties to binding arbitration of technical questions.<sup>149</sup> A neutral expert addresses technical issues.<sup>150</sup> If conflicts rise to the level of a dispute then the permanent Indus River Commission will agree to mediation or arbitration.<sup>151</sup> One representative from

each country comprises the Indus River Commission. These representatives are often engineers rather than politicians.<sup>152</sup> India and Pakistan constructed and carried out this agreement amidst skirmishes, threats, and full-scale war. Neither State sabotaged water projects during hostilities.<sup>153</sup> With help from the international community, water relations can become a cornerstone for rebuilding positive relations rather than a catalyst for conflict.

While the Indus River Commission has endured two Indian-Pakistani wars, its partition approach is not as well-suited to the geo-politics of the Euphrates-Tigris River Basin. Co-riparian agreement to partition is not the only obstacle. Vast quantities of water will be lost through evaporation if storage capacity is constructed upon the scorching plains of Iraq and Syria rather than Turkey's cold mountain gorges.<sup>154</sup> Iraqi canals and reservoirs would provide better salt works than water management systems. Triplication of drainage diversion projects would add to salinity issues, not to mention infrastructure expense. Parallel canals on either side of the Iraqi-Syrian border are unnecessary, particularly in areas where integrated management could share water without a canal. Cooperation would be far less costly to both national budgets and the environment than unilateral overdevelopment within each state. Unlike the Indus Valley, the Euphrates-Tigris River Basin does not appear to be amenable to division. Violations would be difficult and costly to monitor. Engineers, economists, and environmentalists all favor integrated basinwide management.<sup>155</sup>

Conflicts between and within Euphrates-Tigris River Basin States are among the worst in the world. In this regard, the basin has comparable obstacles to overcome as those of India and Pakistan. Kurdish populations have been ill treated by every nation within which Kurds reside.<sup>156</sup> The human rights of Marsh Arabs should not be pitted against the Kurds of Anatolia. Both need water and respect. Local Kurdish communities need to be consulted regarding development on the scale of GAP. A regional organization could provide a forum for public input. Regional interaction over water could also have positive externalities for other sectors. Iraqi political, economic, and social isolation has led to mistrust. At a minimum a regional management authority should involve Iraq, Syria, and Turkey. Given its co-riparian status on the Tigris River, Iran should also become a Mem-

143. Graffy, *supra* note 92, at 425-27.

144. Article 2(1) provides that "all the waters of the Eastern Rivers shall be available for the unrestricted use of India, except as otherwise expressly provided in this Article," and Article 3(1) states that "Pakistan shall receive for unrestricted use all those waters of the Western Rivers." Indus Waters Treaty, arts. 2(1), 3(1).

145. Transboundary Freshwater Dispute Database, *Indus Water Treaty*, at <http://www.transboundarywaters.orst.edu/projects/casestudies/indus.html> (last visited Oct. 25, 2004).

146. Article 4(1) requires that

Pakistan shall use its best endeavors to construct and bring into operation, with due regard to expedition and economy, 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, on 15th August 1947, were dependent on water supplies from Eastern Rivers.

Indus Waters Treaty, art. 4(1).

147. Article 5(1) states that

[i]n consideration of the fact that the purpose of part of the system of works referred to in Article IV(1) is the replacement, from the Western Rivers and other sources, of water supplies for irrigation canals in Pakistan which, on 15th August 1947 were dependent on water supplies from the Eastern Rivers, India agrees to make a fixed contribution of Pounds Sterling 62,060,000 towards the costs of these works.

*Id.* art. 5(1).

148. *Id.* art. 6.

149. *Id.* art. 9(5).

150. *Id.* art. 9(2)a.

151. Article 8(4) explains that "the purpose and functions of the Commission shall be to establish and maintain cooperation between the

Parties in the development of the waters of the Rivers." *Id.* art. 8(4). See also Dellapenna, *supra* note 50, at 46.

152. Article 8(1) provides that, "India and Pakistan shall each create a permanent post of Commissioner for Indus Waters, and shall appoint to this post, as often as a vacancy occurs, a person who should ordinarily be a high-ranking engineer competent in the field of hydrology and water-use." Indus Waters Treaty, art. 8(1). See also WORLD WATER REPORT, *supra* note 2, at 314.

153. Dellapenna, *supra* note 50, at 261.

154. This is also true regarding the geo-politics of Ethiopia and Egypt on the Nile.

155. The U.N. champions regional watershed management as often as possible. Dellapenna, *supra* note 50, at 257-58.

156. Recent animosity stems from the 1978 creation of the PKK. Calling for an independent Kurdistan, this Marxist-Leninist separatist group instigated insurgency activities in Anatolia involving terrorism. The PKK has adhered to a cease-fire since September 1999, after the capture of PKK leader, Abdullah Ocalan, in Kenya. Roughly 4,000-5,000 PKK militants are located in northern Iraq, where they have had several clashes with Turkish military units. In April 2002, the PKK renamed itself the Kurdistan Freedom and Democracy Congress (KADEK), and it became the Kurdistan People's Congress (KHK) in November 2003.

ber. It has only been two decades since Iran and Iraq fought the bloodiest war in the Middle East's recent history. On the other hand, increased population and water scarcity will not slow to the pace of reticent politics. A continued stalemate will lead to severe human rights abuses and environmental devastation. Just as Canada and the United States share a common cultural heritage, Euphrates-Tigris River Basin States have a shared background and legal base within which to build consensus. Traditional Islamic law has treated water as a communal resource rather than private property since the Code of Hammurabi.<sup>157</sup> This indicates that Euphrates-Tigris River Basin States can build upon a collective tradition of allocation of water for the welfare of the whole society and extend the community resource principle to include basinwide integrated management.<sup>158</sup>

## V. Conclusion

Customary international law recognizes that riparian States alone have legal rights to a given international watercourse.<sup>159</sup> Limited territorial sovereignty is emerging as a customary rule of international law and is supported by the Convention, the *Gabcikovo-Nagymaros* case, a growing number of regional water treaties, and the majority of the most highly qualified scholars.<sup>160</sup> In its *Gabcikovo-Nagymaros* decision, the ICJ has unequivocally condemned unilateral action. By establishing a comprehensive set of procedural rules, the Convention provides a framework within which States can exchange technical information and notification of water projects. Joint water management commissions and authorities enhance adaptable co-riparian cooperation. The growth of international organizations and multinational institutions is a tribute to nations' willingness to reallocate power. Yet, claims of sovereignty as unfettered autonomy continue to hinder cooperation between nations. UNESCO suggests that gradual degradation of water quantity and quality is more likely to occur than armed conflict.<sup>161</sup> The *World Water Report* notes:

Quite simply, sustainable development is not being achieved. It is not being achieved through water supply, sanitation, natural or urban ecosystems, nor through food security industry, energy or economic and social advancement.

157. Dellapenna, *supra* note 50, at 260.

158. The Shari'a originally meant "the path to the watering place." *Id.* at 260-61.

159. Dellapenna, *supra* note 50, at 35.

160. *Id.* at 36.

161. WORLD WATER REPORT, *supra* note 2, at 319.

The everyday lives of billions of people are not being made more secure.<sup>162</sup>

A year after the International Year of Freshwater, countries remain polarized between the doctrines of absolute territorial sovereignty and absolute territorial integrity. State recognition that sovereignty includes an obligation to cooperate as international interdependence grows has yet to translate into a binding international convention on freshwater. Either a minimum of 23 additional States need to ratify the Convention in a timely manner or the international community must gather the requisite collective willpower to draft a convention that can become binding upon the majority of States. Adopting international laws and assuring their compliance can be facilitated through the creation of joint commissions and authorities. Regional water agreements can help drip irrigation and other technological breakthroughs reach fields before salinization further reduces irrigable land.<sup>163</sup>

The geo-politics of the Euphrates-Tigris River Basin are marked by a scarcity of both water and trust. The Euphrates and Tigris Rivers did not become international rivers until after World War I. Since then rapid political and physical changes have outstripped institutional capacity to resolve disputes. Water scarcity combines with rapid population growth, a view of water as a national commodity, and reliance upon water originating from foreign sources. Until a multilateral agreement is reached, water projects such as GAP will destabilize Middle Eastern relations. A long-term commitment to equitable and reasonable use allows water allocations to be altered if use becomes inequitable or unreasonable.

Ostriches stick their heads in the sand to search for water. Human ingenuity has led to sophisticated hydrological analysis. Creativity can also transcend polarization between upper and lower riparian States. The ancestors of Euphrates-Tigris River Basin inhabitants introduced the first written language to humanity. Their descendants must gather the willpower to put words to paper, committing to equitable and sustainable water use.

162. *Id.* at 508. As this Article was going to press, UNESCO helped support the International Conference on "Regional Hydro-Political Challenges of Sustainable Management of Transboundary River Basin," which opened in Beirut on October 26, 2004. The conference seeks to increase co-riparian legal and nonlegal management of international watercourses. UNESCO.ORG, *60% of Water Resources of the Arab Region Come From Outside the Region and Are Shared With Other Countries*, at [http://portal.unesco.org/en/ev.phpURL\\_ID=23317&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.phpURL_ID=23317&URL_DO=DO_TOPIC&URL_SECTION=201.html) (last visited Oct. 30, 2004).

163. Kukuk & Deese, *supra* note 39, at 57.