



Fall 2003

Recent Developments in the Literature on Conflict Negotiation and Cooperation over Shared International Fresh Waters

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Recommended Citation

Shlomi Dinar & Ariel Dinar, *Recent Developments in the Literature on Conflict Negotiation and Cooperation over Shared International Fresh Waters*, 43 Nat. Resources J. 1217 (2003).

Available at: <https://digitalrepository.unm.edu/nrj/vol43/iss4/9>

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BOOK REVIEWS

THE STATE OF THE NATURAL RESOURCES LITERATURE

Shlomi Dinar* and Ariel Dinar** on Recent Developments in the Literature on Conflict Negotiation and Cooperation over Shared International Fresh Waters***

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*** The authors would like to acknowledge the valuable comments that were provided on a previous version of the paper by Aaron Wolf. The views expressed in the paper are those of the authors and should not be attributed to the World Bank.

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INTRODUCTION

No specific date exists as to the initial interest in conflict and cooperation over shared international fresh waters (shared waters). Although shared water conflicts in specific basins (e.g., Indus, Jordan, Mekong) have been given attention by practitioners (World Bank, Erik Johnston, UNDP, respectively) after World War II and in the late 1950s, such efforts have not yielded much analytical work¹ and extrapolation to other basins. Yet, based on our observation, we can safely say that steady efforts in the study of and publication about shared water issues culminated in the early 1990s. The Dublin and Rio conferences in 1992 most likely sparked attention to shared waters. These conferences elevated the importance of water as an "economic good" with "basic human need" in national and international arenas. The end of the Cold War, around that period, also had much influence in fostering acute interest in shared water issues, specifically as it pertained to the spheres of politics, security, and international relations. Therefore, 1992 will mark the year for which the literature review will commence. We will review only the book and special issue literature up to 2003.²

While studies regarding conflict and cooperation over water have varied in scope, work on shared waters can nonetheless be distinguished by three unique categories—theoretical, empirical, and case studies. While the book literature surveyed here does not include, to the best of our knowledge, empirical analysis of a large set of river

1. Comprehensive analyses of hydropolitical and negotiation processes in these basins have been conducted in three separate Ph.D. dissertations in the mid to late 1990s. Aaron Wolf researched the Jordan (and published his findings in a book—see *infra* note 60), Greg Browder researched the Mekong (and published his work in a paper—see *infra* note 206), and Undala Alam researched the Indus (and published her findings in a paper in a special issue—U. Z. Alam, *Questioning the Water Wars Rationale: A Case Study of the Indus Waters Treaty*, 168 *GEOGRAPHIC J.* 1341 (2002)).

2. Only when necessary did we include a few articles and publications dating before 1992.

basins, the recent journal literature does. We note an article by Hans Petter Wollebaek Toset, Nils Petter Gleditsch, and Havard Hegre³ and another article by Aaron Wolf, Shira Yoffe, and Mark Giordano.⁴ The first article attempts to explain conflict over water among basin riparians and across a large number of river basins based on several variables, while the second assembles a Geographical Information System database in order to identify basins at risk. We also note a soon-to-be-published special section on Transboundary Water Conflict and Cooperation, in *Water Resources Research*, which includes several empirical works on international treaty formation. Espey and Towfique⁵ and Song and Whittington⁶ apply conceptual models to a similar database of international water treaties.⁷ They predict the likelihood of treaty formation among riparian states, based on a set of variables. While the approach and analytical methodology differ, the results provide related conclusions.

In general, the literature on shared waters has both embodied and benefited from the tools, lessons, and underpinnings provided by different academic disciplines. Four such fields have been most instrumental: economics, international relations, negotiation theory, and international law. We discuss other disciplinary approaches, such as geography, within the context of international relations, negotiation theory, and international law.

The working hypothesis at the onset of our review is that of the two categories—theories and case studies—that encompass the work on shared waters; as published in books and special issues, case study approaches seem to be the most common. In fact, analysis of specific water basins undergoing dispute or cooperation among the respective riparian states has been the preferred strategy of water analysts. It can also be said that, while a distinct theory of conflict and cooperation over water does not exist, regional analyses of river basins and work in other disciplines indirectly related to shared waters have provided the basis for the theoretical foundation of the water field. As noted earlier, empirical work has been perhaps the most untapped and less researched category in the study of shared waters. As this review will argue, not

3. H.P.W Toset, N.P. Gleditsch & H. Hegre, *Shared Rivers and Interstate Conflict*, 19 *POLITICAL GEOGRAPHY* (2000).

4. A. Wolf, S. Yoffe & M. Giordano, *International Waters: Identifying Basins at Risk*, 5 *WATER POLICY* (2003).

5. Basman Towfique & Molly Espey, *International Bilateral Water Treaty Formation*, *WATER RESOURCES RESEARCH* (2004).

6. Jennifer Song & Dale Whittington, *Why Have Some Countries on International Rivers Been Successful Negotiating Treaties? A Global Perspective*, *WATER RESOURCES RESEARCH* (2004).

7. See *infra* note 261.

only should the theoretical aspects of the field be consolidated, but also theories and hypotheses should be empirically tested across the large pool of available data. Other directions for further research will also be proposed.

The different fields introduced above have all been invaluable in contributing to the work done on shared waters. Economics has brought to bear such concepts as game theory and institutional economics. The field of international relations has likewise sharpened ideas on conflict and cooperation over water, employing variables and concepts such as state power, interdependence, and domestic politics. The international relations field has also been instrumental in guiding discussion on water and international security issues and institutional and organizational approaches. Negotiation theory has introduced concepts such as party motivation, third party mediation, and other important tools for understanding different bargaining outcomes. Both have developed a medium for understanding the structure of negotiation and possible scenarios for cooperation and interdependence. Finally, international water law, rich in its history but relatively juvenile in its codification status as of 1997, has introduced particular legal principles such as *equitable and reasonable utilization* and the *obligation not to cause significant harm*, paramount in contributing to future resolution of conflicts over shared waters. Although not formally part of the international relations, negotiation theory, and international water law disciplines per se, geography has also been used as an important variable for explaining and analyzing conflict and cooperation over shared waters in the scope of international politics, negotiations between states, and international legal principles. (Interestingly, geographers have similarly utilized analytical notions associated with the above disciplines.)

Below we review the literature on shared waters, placing it in the context of the specific disciplines we deem most instrumental in this fairly young research field. We not only will make observations and carry out analyses, but we will also make recommendations for future work.

DISCIPLINARY APPROACHES

Economic Aspects of International Water Conflict Negotiation and Cooperation (CNC)

Although the economics discipline constitutes an important element of analyzing cooperation over shared waters, it is surprising that the literature is so poor on works related to economics. Since the seminal work in 1967 by John Krutilla on the economics of the Columbia River Agreement between the United States and Canada, there have not been

any works of this magnitude. We turn here to the work of Richard Just and Sinaia Netanyahu, which, in our opinion, is among the few that include economic considerations in one volume.

Just and Netanyahu emphasize the economics of conflict and cooperation in transboundary waters. Various works are presented that apply game theory and other economic concepts (e.g., regime theory, contract theory, water markets, bargaining theory). In one of the chapters in the book, Sinaia Netanyahu, Richard Just, and John Horowitz apply game theoretical approaches to international water, using the dispute over the Mountain Aquifer between the Israelis and the Palestinians as an example.⁸ The authors find that the asymmetric relationship between the parties may prevent a stable solution to the conflict. In another chapter, George Frisvold and David Schimmelpfenning present a framework for dealing with enforcement of water quality agreements.⁹ They argue that international water quality disputes should be resolved using the relative gains from cooperation to each of the parties involved. In another chapter, Lynne Bennett, Shannon Ragland, and Peter Yolles apply the concept of interconnected games (issue linkage) to conflict resolution in international river basins, using the Aral Sea Basin and the Euphrates River as an example.¹⁰ They conclude that issue linkages—such as trade and air pollution (for the Aral Sea Basin) and the Kurdish ethnic dispute and the Orontes River conflict (for the conflict over the Euphrates)—may be a more efficient approach than using side-payments, which are subject to instability due to the victim pays principle, in the formation of cooperative agreements. Finally, in another chapter, Just and Netanyahu discuss cooperation in the context of a multi-riparian river basin.¹¹ According to the authors, coalitions are more sustainable when they incorporate a smaller number of players rather than a larger number. This may be relevant in cases where cooperation is lacking in a river basin, yet a large number of riparians make treaty formation difficult. The authors argue that multilateral coordination in river basins with a large number of riparians may have to be preceded by bilateral agreements first—since they are easier to sustain.

8. S. Netanyahu, R.E. Just & K.J. Horowitz, *Bargaining over Shared Aquifers: The Case of Israel and the Palestinians*, in *CONFLICT AND COOPERATION ON TRANS-BOUNDARY WATER RESOURCES* 41 (R.E. Just & S. Netanyahu eds, 1998).

9. G. Frisvold & D. Schimmelpfenning, *Potential for Sustainability and Self-Enforcement of Trans-Boundary Water Agreements*, in Just & Netanyahu eds., *supra* note 8.

10. L. Bennett, S. Regland & P. Yolles, *Facilitating International Agreements Through an Interconnected Game Approach: The Case of River Basins*, in Just & Netanyahu eds., *supra* note 8.

11. R.E. Just & S. Netanyahu, *International Water Resource Conflicts: Experience and Potential*, in Just & Netanyahu eds., *supra* note 8.

This approach is also advocated by Ashok Swain, who, in an edited book by Manas Chatterji, Saul Arlosoroff, and Gauri Guha argues for a sub-basin approach to cooperation in the context of the Nile Basin.¹² Swain contends that while the basin is comprised of ten states, Egypt, Sudan, and Ethiopia hold within their territory the largest portion of the river flow and have the largest stakes in the conflict. Since a multilateral initiative addressing the concerns of all ten riparians will most likely not transpire, solid cooperation at the sub-basin level should take priority. Swain's and Just and Netanyahu's argument is still to be tested in light of the ongoing regional Nile initiative, led by the World Bank.

Taking a basin-wide approach, Peter Rogers¹³ argues that externalities can either create conflicts or hamper cooperation. According to Rogers, however, if there is a way to internalize such externalities, a basis for cooperation may exist. Several principles are of specific interest such as Pareto-admissibility and superfairness, which are both a basis for cooperation. Using three cases, the Columbia, the Ganges-Brahmaputra, and the Nile Rivers, Rogers applies a game theoretic approach to demonstrate the use of such concepts. Another game theoretic approach is applied to the Great Lakes Basin by Nir Becker and William Easter.¹⁴ Alternative diversion restrictions and coalition structures are applied to evaluate potential for basin-wide cooperation and non-cooperation among the federal governments of Canada and the United States and the relevant provinces. Dan Yaron¹⁵ develops game theory models to assess the potential for various water allocation mechanisms among the Israelis and Palestinians. He attempts to quantify the economic value of cooperation and non-cooperation between the parties over their shared water resources. Yaron concludes that whether or not a solution to the regional water problem will be of a cooperative or non-cooperative nature will depend on several political, institutional, and economic considerations that may or may not be in place.

Several chapters in an edited book by Doug Parker and Yaakov Tsur on water resource decentralization and coordination¹⁶ also deal with

12. A. Swain, *Managing the Nile River: The Role of Sub-Basin Cooperation*, in *CONFLICT MANAGEMENT OF WATER RESOURCES* (M. Chatterji, S. Arlosoroff & G. Gauri eds., 2003).

13. P. Rogers, *International River Basins: Pervasive Unidirectional Externalities*, in *THE ECONOMICS OF TRANSNATIONAL COMMONS* (P. Dasgupta, K.G. Maler & A. Vercelli eds., 1997).

14. N. Becker & K.W. Easter, *Cooperative and Noncooperative Water Diversion in the Great Lakes Basin*, in *WATER QUANTITY/QUALITY MANAGEMENT AND CONFLICT RESOLUTION* (A. Dinar & E. Loehman eds., 1995).

15. D. Yaron, *An Approach to the Problem of Water Allocation to Israel and the Palestinian Entity*, in *THE ECONOMICS OF WATER RESOURCES: THE CONTRIBUTIONS OF DAN YARON* (A. Dinar & D. Zilberman eds., 2002).

16. *DECENTRALIZATION AND COOPERATION OF WATER RESOURCE MANAGEMENT* (D. Parker & Y. Tsur eds., 1997).

economic aspects of international shared waters. In one chapter of interest, Terry Roe and Xinshen Diao¹⁷ examine the linkages between domestic policies and the international water status. The authors argue that depending on the relative size of the water sector, different water pricing policies of river riparians may either have negative or positive effects on the domestic economy as well as the international economy of the basin. For example, take a water pricing policy instituted by one country that encourages water saving behavior and a water pricing policy of another country that sustains wasteful water behavior. The authors show that the economies of the two riparians are interlinked and affected by the price policies of the other.

Following the peace agreement between Egypt and Israel, a surge of works on the potential regional "peace dividend" was launched. Elisha Kally and Gideon Fishelson were among the leading experts that investigated the economic-engineering feasibility of various joint water projects in the region. In their book, Kally and Fishelson¹⁸ outline a series of studies, most of which conclude that economies of scale and political feasibility factors encourage regional cooperation among the parties in the region. The authors analyze several cooperative projects in several basins of the Middle East. Detailed engineering-economic analyses are offered as a basis for potential cooperation.

International Relations

In this section we discuss such issues as geography, state power, domestic politics, and interdependence—variables important to understanding the hydrogeopolitics of a particular river basin. In the context of the literature we review below, there seems to be no bias toward a particular variable. Scholars tend to analyze a given conflict over water using all or at least some of the variables mentioned above. Given that an interdisciplinary approach is usually preferred for the investigation of international hydrogeopolitics, we title this section "International Relations." Below we also discuss other important elements of international relations such as the security aspects of conflict and cooperation over water; the water-war debate; and institutional, organizational, and other approaches for analyzing conflict and cooperation over shared international waters.

17. T. Roe & X. Diao, *The Strategic Interdependence of a Shared Water Aquifer: A General Equilibrium Analysis*, in Parker & Tsuri eds., *supra* note 16.

18. E. KALLY & G. FISHELSON, *WATER AND PEACE: WATER RESOURCES AND THE ARAB-ISRAELI PEACE PROCESS* (1993).

Arun Elhance, who employs a robust and rigorous analytical approach comparing conflict and cooperation across several basins,¹⁹ develops a hydropolitical analytical framework, *the structured, focused comparison approach*, modified and based on the work of Alexander George and Richard Smoke.²⁰ Elhance provides information on the geography, hydrology, and politics of six major international river basins around the world. These include the Parana-La Plata in Latin America, the Nile in Africa, the Jordan in the Middle East, the Euphrates-Tigris in the Middle East, the Ganges-Brahmaputra-Barak in the Indian sub-continent, and the Mekong in South East Asia. Elhance's analysis is geographical and considers three geographical aspects of a river basin: physical, economic, and political. Elhance argues that the geographic and hydrologic nature of an international river basin creates a complex network of environmental, economic, political, and security interdependencies between its riparian states.²¹ These interdependencies, however, may lead to either conflict or cooperation over shared waters, and Elhance admits that when it comes to hydropolitics there are often grounds for despair yet also reasons for hope.

What are some of the factors and variables that either facilitate cooperation or prolong conflict? Peter Gleick²² argues that the intensity of the conflict and the need for cooperation over freshwater are determined by several factors: (1) the degree of scarcity, mismanagement, or misallocation of water in various regions; (2) the interdependence of states regarding common water resources, which respect no political boundaries; (3) the geographic and historic criteria of water ownership vis-à-vis states; (4) whether a protracted conflict underlies the water dispute; (5) the existence of alternative sources of water or options for a negotiated agreement, and the degree of the parties' need for an agreement; and (6) the relative power of the parties.

Miriam Lowi,²³ writing in the context of the Palestinian-Israeli and Arab-Israeli water conflict, argues that conflict over water will remain unresolved so long as the difficult high political issues remain unsettled. For Lowi, water is part of the low politics sphere. As long as the conflict over symbolic issues such as territory and statehood—the protracted conflict—persists, the water conflict will not penetrate this high politics sphere. Lowi looks at three other river basins for compari-

19. A. ELHANCE, *HYDROPOLITICS IN THE 3RD WORLD: CONFLICT AND COOPERATION IN INTERNATIONAL RIVER BASINS* (1999).

20. A. George & R. Smoke, *Theory for Policy in International Relations*, in *DETERRENCE IN AMERICAN FOREIGN POLICY: THEORY AND PRACTICE* (1974).

21. ELHANCE, *supra* note 19, at 13, 226-27.

22. P. GLEICK, *THE WORLD'S WATER: 1998-1999* (1998).

23. M. LOWI, *WATER AND POWER: THE POLITICS OF A SCARCE RESOURCE IN THE JORDAN RIVER BASIN* (1993).

son and her analysis is also conducted in the greater context of international relations theory. She makes references to such concepts as relative gains concerns in enhancing conflict and the actions or coercion of an interested hegemon (whether it be an involved party or a third outside party) as a prerequisite to cooperation—all common variables in the international relations theory lingo. Lowi also attaches importance to the geographical position of a state along a river. In river basins characterized by conflict over water, Lowi argues that if the dominant power's relationship to the water resource in question is that of critical need and that hegemon is upstream, cooperation will not ensue as the hegemon has no incentive to cooperate given its overwhelming power and ability to use the resource as it deems appropriate. Only if the hegemon is interested in a cooperative regime, is heavily dependent on the resource, and is downstream will cooperation ensue. Of course, Lowi's underlying conclusion in all the river basins she reviews is that when a riparian dispute in an arid region unfolds within the context of a more comprehensive political conflict, the former cannot be effectively isolated from the latter. According to Lowi, if cooperation does take place over the shared resource in the context of a protracted conflict, usually due to outside coercion and/or the prospects of the parties agreeing to a nonintegrated water sharing accord, the negotiated regime is very specific and limited to the resource at hand.²⁴

Elhance makes a related conclusion concerning the role of domestic politics and its effects on hydropolitics in the context of the Ganges-Brahmaputra-Barak Basin. He argues that domestic political support for hydropolitical issues is often hard to generate and sustain and is vulnerable to appeals both to nationalism and group interests. A similar issue is also taken up by Meredith Giordano, Mark Giordano, and Aaron Wolf.²⁵ The authors argue that a relationship exists between intranational and international disputes over water. They consider the cases of India, Israel, and South Africa and show that, at least in the first two cases, there is a relationship between internal dynamics, international relations, and transboundary water conflicts. The authors also take into account geographical elements by choosing three countries from three different regions and assessing if quantifiable relationships exist between water related events at various geographic scales (e.g. domestic and international) and between water and non-water issues.

The literature above implies that it is the combination of several factors—such as geographic or economic might and military muscle—that determine symmetry and asymmetry and conflict and cooperation

24. *Id.* at 203-04.

25. M. Giordano, M. Giordano & A. Wolf, *The Geography of Water Conflict and Cooperation: Internal Pressures and International Manifestations*, 168 *GEOGRAPHICAL J.* (No. 4, 2002).

between and among river riparians. Hussein Amery and Aaron Wolf,²⁶ for example, argue that an upstream state may use its geo-strategic position as leverage to advance its national or regional policy objectives. This, of course, can be done with relative impunity if the country is militarily and/or economically stronger than its downstream neighbors. Thomas Naff²⁷ looks at similar factors and demonstrates how the *power matrix model* may be one approach used to assess how states size up to one another along a river basin. Developed some years earlier,²⁸ the power matrix model considers three power factors: the riparian's need for water, position along a river, and projectable power or brute ability to impose its will on its rivals. Each factor is assigned a weighted value, reached on the basis of available data and the experience and perception of the analyst. By illustration only, the model yields assessment of the conflict potential in the basin, given the total power calculation for each riparian. Naff, who applies the model to the Jordan, Euphrates, and Nile River basins, concludes that (1) the greatest potential for conflict exists when a lower riparian is a more powerful actor than the upper-water controlling riparian and perceives its needs to be deliberately frustrated; (2) when an uppermost riparian is the most powerful actor in an international basin, the inherent asymmetry of power inhibits conflict potential; and (3) when relative power symmetry exists in a basin with asymmetry in interest and position, there will be a moderate but consistent potential for conflict. In a 1993 article in a special issue of *Water International*, Frederick Frey—one of the authors of this model—argues that the power matrix model, used for understanding the organization of violent conflict in transnational river basins, can be an initial step toward a much needed predictive theory of conflict and cooperation over water.²⁹

Despite the literature's emphasis that it is a combination of factors that determine conflict and cooperation over water, the relative military power of the parties seems to dominate among all the factors. The parties' degree of dependence on the resource is important and so is the geographical position of the parties, but brute military capabilities and the ability of one country to impose its will on others is most vital. Thus, the former two variables are necessary, but they are not sufficient

26. H. Amery & A.T. Wolf, *Water, Geography and Peace in the Middle East: An Introduction*, in *WATER IN THE MIDDLE EAST: A GEOGRAPHY OF PEACE* 6 (H. Amery & A.T. Wolf eds., 2000).

27. T. Naff, *Conflict and Water Use in the Middle East*, in *WATER IN THE ARAB WORLD: PERSPECTIVES AND PROGNOSSES* (P. Rogers & P. Lydon eds., 1994).

28. F. Frey, *Middle East Water: The Potential for Conflict or Cooperation*, in *WATER IN THE MIDDLE EAST: CONFLICT OR COOPERATION* (T. Naff & R. Matson eds., 1984).

29. F. Frey, *The Political Context of Conflict and Cooperation over International River Basins*, 18 *WATER INT'L* (1993).

to explain the intricacies of conflict and cooperation over water. A country may be upstream on a river and highly dependent on the resource, but if it does not have the capabilities to act on those advantages, the status quo will remain. As Tony Allan argues, citing the success of Israel as a mid-stream riparian in the Jordan Basin in attaining control over water, "non-geographical and non-environmental factors are prime determinants in water entitlement."³⁰ Similarly, according to Daniel Hillel, "in the absence of an agreed set of principles, it is typically the nation with the greater power or the stronger international alliances whose interests predominate."³¹

Water, Security, and the Water-War Debate

To launch the discussion on water and security there is perhaps no better place to start than with the "securitization of the environment" phenomenon being passionately discussed largely in the context of the international relations discipline ever since the end of the Cold War. A once traditional and very military orientated discipline, security studies has been largely closed to the idea that environmental issues and disputes, among states or other actors, may lead to violent conflict and even war. So-called non-traditional scholars in the security field have made a strong case for including natural resources and the environment in the security lingo. So-called traditional scholars have argued otherwise. The former argue that states face a variety of threats not limited to military security.³² Global deficiencies and degradation of natural resources, coupled with the uneven distribution of raw materials, can lead to economic decline, social turmoil, or forced migration, which in turn may lead to national rivalries, instability, and armed conflict.³³ Traditionalists have argued that the core assumptions of state security and survival have not changed with the end of the Cold War. Since

30. J.A. ALLAN, *THE MIDDLE EAST WATER QUESTION* 225 (2000).

31. D. HILLEL, *RIVERS OF EDEN: THE STRUGGLE FOR WATER AND THE QUEST FOR PEACE IN THE MIDDLE EAST* 271 (1994).

32. T. Naff, *Conflict and Water Use in the Middle East*, in *WATER IN THE ARAB WORLD: PERSPECTIVES AND PROGNOSSES* (P. Rogers & P. Lydon eds, 1994); *GLOBAL DANGERS: CHANGING DIMENSIONS OF INTERNATIONAL SECURITY* (S. Lynn-Jones & S. Miller eds., 1995); *CONTESTED GROUNDS: SECURITY AND CONFLICT IN THE ENVIRONMENTAL POLITICS* (D. Deudney & R. Mathew eds., 1999).

33. T. HOMER-DIXON, *ENVIRONMENT, SCARCITY AND VIOLENCE* (1999); A. Suhrke, *Environmental Change, Migration and Conflict in Managing Global Chaos: Sources of and Responses to H. Crichtley & T. Terriff "Environment and Security,"* in *SECURITY STUDIES FOR THE 1990S* (R. Shultz, R. Godson & T. Greenwood eds.); B. BUZAN, O. WAEVER & J. DE WILDE, *SECURITY: A NEW FRAMEWORK FOR ANALYSIS*, 80 (1998).

power is the essence of security and since military might is of the highest priority for achieving security, military power and security are linked.³⁴

In the context of the above discussion, it is only natural to transition to an exchange specific to water and security—particularly the water-war debate. The core argument of the water-war school has been that wars have been fought over water in the past and will be fought even more intensely over water in the future. Critics argue that the water-war message has been exaggerated. Not only is there little or no proof of wars over water, but states also have realized other means by which to contend with water scarcity.

Two articles published in the policy orientated journal *Foreign Policy*, one by John Cooley in 1984 and the other by Joyce Starr in 1991, and a book by John Bulloch and Adel Darwish in 1993, have been the main readings of the water-war school.³⁵ Similar arguments have been recently elaborated on. Arnon Soffer sees the possibility of a water-war in the future, or at least his analysis seems to hint in this direction. He argues that a water war over the Jordan River took place when Syria, Lebanon, and Jordan fought Israel—he mentions the War of Attrition between 1968 and 1970.³⁶ Soffer also argues that war over water will not take place when a downstream state is weaker than an upstream state but that a downstream state is more likely to go to war than an upstream state if the upstream state uses the water to the detriment of the downstream state.³⁷ Norman Myers³⁸ also echoes the water-war connection and argues that past territorial conquests in the Middle East were largely due to water resources. Still, he provides several future scenarios that include cooperation over water. Thomas Homer-Dixon, while denying that there will be a surge in water wars, argues that such wars are likely only in a very narrow set of circumstances such as when a downstream state is highly dependent on the shared water for its national well-being and the upstream country threatens to substantially restrict the river's flow.³⁹ The prospects for war increase when extreme antagonisms between the countries exist and the downstream country

34. K. WALTZ, *THEORY OF INTERNATIONAL POLITICS* 104, 113 (1979); J. Mearsheimer, *Disorder Restored*, in *RETHINKING AMERICA'S SECURITY: BEYOND COLD WAR TO NEW WORLD ORDER* 217 (G. Allison & G. Treverton eds., 1992); D. Baldwin, *Security Studies and the End of the Cold War*, 48 *WORLD POLITICS* 127 (1995).

35. J. Cooley, *The War Over Water*, 54 *FOREIGN POLICY* (1984); J. Starr, *Water Wars*, 82 *FOREIGN POLICY* (1991); J. BULLOCH & A. DARWISH, *WATER WARS: COMING CONFLICTS IN THE MIDDLE EAST* (1993).

36. A. SOFFER, *RIVERS OF FIRE: THE CONFLICT OVER WATER IN THE MIDDLE EAST* 250 (1999).

37. *Id.* at 248-49.

38. N. MYERS, *ULTIMATE SECURITY: THE ENVIRONMENTAL BASIS OF POLITICAL STABILITY* (1993).

39. T. HOMER-DIXON, *ENVIRONMENT, SCARCITY AND VIOLENCE* 139-41 (1999).

believes it is militarily superior to the upstream country. Given these conditions, Homer-Dixon argues, a water war is most obvious in the Nile Basin.

Skeptics, however, argue that the water-war thesis lacks any support. Aaron Wolf and Jesse Hamner⁴⁰ argue that the last all out war over water took place 4500 years ago. More recently documented armed exchanges over water are, according to the authors, minor military skirmishes over water and not war and are largely limited to the arid Middle East. In a subsequent book, Wolf⁴¹ marshals compelling evidence to show that the "hydraulic" or "hydrostrategic imperative" theory, the quest for water resources as the motivator for military conquests in the context of Arab-Israeli relations, is not based in facts. But perhaps even more importantly, Wolf and Hamner point to the more than 3600 water treaties recorded by the Food and Agriculture Organization, signed between entities or states since 805 AD. According to the authors, this demonstrates that water has been a vehicle for cooperation, "showing tremendous elegance and creativity for dealing with this critical resource."⁴² In a subsequent book, Wolf and Hamner⁴³ provide a list of some of the international water agreements—the list is part of a larger treaty database project. The authors also discuss some of the treaty characteristics repeated in the agreements under investigation.

Building on the above arguments, Wolf⁴⁴ argues that while armed conflict has indeed taken place over water, such disputes have been between tribe, water-use sector, or subnational jurisdiction. According to Wolf, geographic scale and intensity of conflict over water are inversely related. And while war over water is not strategically rational and conflict deterred especially when institutions are in place, the connection between water and stability is strong. The lack of clean water leads to instability, which can create an environment more conducive to political or even military conflict. Similarly, in the context of several river basins, Leiff Ohlsson argues that war over water is more likely to remain an unrealistic option even among extreme enemies. Furthermore, if conflict over water arises, it is usually due to non-water

40. A. Wolf & J. Hamner, *Trends in Transboundary Water Disputes and Dispute Resolution*, in *WATER FOR PEACE IN THE MIDDLE EAST AND SOUTHERN AFRICA* (2000).

41. A. Wolf, *Hydrostrategic Territory in the Jordan Basin: Water, War, and Arab-Israeli Peace Negotiations*, in *WATER IN THE MIDDLE EAST: A GEOGRAPHY OF PEACE* (H. Amery & A. Wolf eds., 2000).

42. A. Wolf & J. Hamner, *Trends in Transboundary Water Disputes and Dispute Resolution*, in *ENVIRONMENT AND SECURITY: DISCOURSES AND PRACTICES* 56-58 (M. Lowi & B. Shaw eds., 2000).

43. *Id.*

44. A. Wolf, "Water Wars" and Water Reality: Conflict and Cooperation along International Waterways, in *ENVIRONMENTAL CHANGE, ADAPTATION, AND SECURITY* (S. Lonergan ed., 1999).

issues. This is apparent in the case of the Nile if intranational conflicts are considered in relation to the bigger Nile issue; in the case of the Euphrates and Tigris, if the Kurdish ethno-religious dimension is considered (and other domestic ethnic tensions) within the context of the water conflict between Turkey and Iraq; and if one considers the basic problem of water as a state issue in India, which creates hurdles in the international management of the Ganges conflict, especially between India and Bangladesh. In the context of the Jordan River and Euphrates-Tigris, Mostafa Dolatyar and Tim Gray⁴⁵ argue that water has never been the root cause of military conflict. In both cases they marshal evidence from the distant past and modern times. They also conclude that, relative to the Jordan River Basin, the riparians of the Euphrates-Tigris River Basin have had a richer history of cooperation over their shared resources.

Anthony Turton⁴⁶ has argued that the fascination with water and war has been a distraction. Not only has the notion been debunked by evidence, but more pressing issues that require attention have been ignored due to the continued focus on water wars. Turton, writing in the context of Africa, argues that the myth has been fed to the media, which has in turn propagated the myth. This has not been helpful for development in Africa as companies, organizations, and institutions fear investment given an impending water war. Turton, therefore, provides evidence to debunk the water-war connection and provides a list of six hydropolitical issues that require immediate attention such as civil society, environmental security, and good governance. In another chapter, Turton⁴⁷ argues that the connection between water and war is likewise weak given other variables that spill over and are rather the cause for war—that is, water is not a sole cause for war or conflict. Turton bases his argument on the theory of lateral pressure developed some years back by Nazli Choucri and Robert North.⁴⁸ In addition, Turton exposes the weakness of the water-war discourse by pointing to

45. M. DOLATYAR & T. GRAY, *WATER POLITICS IN THE MIDDLE EAST: A CONTEXT FOR CONFLICT OR CO-OPERATION?* (2000).

46. A. Turton, *Water Wars: Enduring Myth or Impending Reality*, in *WATER WARS: ENDURING MYTH OR IMPENDING REALITY* (H. Solomon & A. Turton, eds., Africa Dialogue: Monograph Series, No. 2, African Center for the Constructive Resolution of Disputes, South Africa, 2000).

47. A. Turton, (2000) *Water Wars in Southern Africa: Challenging Conventional Wisdom*, in *WATER WARS: ENDURING MYTH OR IMPENDING REALITY* (H. Solomon & A. Turton eds., Africa Dialogue: Monograph Series, No. 2, African Center for the Constructive Resolution of Disputes, South Africa, 2000). For a similar discussion, see A. Turton, *Water Wars in Southern Africa: Challenging Conventional Wisdom*, in *WATER FOR PEACE IN THE MIDDLE EAST AND SOUTHERN AFRICA* (Green Cross Int'l 2000).

48. N. CHOUCRI & R. NORTH, *NATIONS IN CONFLICT: NATIONAL GROWTH AND INTERNATIONAL VIOLENCE* (1975).

the concept of second-order resources. The idea, developed by Leif Ohlsson,⁴⁹ contends that water conflict and scarcity are mitigated by institutions and efficient governance or social adaptive capacity. Therefore, the conditions of water scarcity are compounded by the scarcity of social adaptive capacity. As the case of Israel demonstrates, a state with abundance in social adaptive capacity can survive despite the scarcity of water resources. According to Turton, second order resources and not water scarcity is the defining variable in the water-war equation. Miriam Lowi⁵⁰ echoes this conclusion. She argues that while there is a positive relationship between environmental change and acute conflict, the depletion of water resources has not provoked interstate violence. Citing the examples of the Euphrates, Indus, and Jordan River basins, Lowi argues that it is usually the combination of political structural and institutional variables that is the cause of interstate conflict. While the environment is one component of a larger conflict, it is neither a necessary nor sufficient cause of conflict. In many settings, political and institutional reforms would facilitate the attenuation of environmental constraints.

Another author, Peter Beaumont,⁵¹ also rejects the water-war thesis as both simplistic and sensational but argues that water conflict short of war can still arise. Beaumont, writing in the context of the arid Middle East, argues that such conflicts will take place not over lack of water for growing of crops, as this will mean a war over low value irrigation water where the costs of war will not outweigh the benefits that may accrue from it. Rather conflicts will take place in instances where the water supplies were no longer adequate to supply the needs of a nation without a substantial loss in the overall standard of living of the country.⁵²

Tony Allan, who introduces the idea of "virtual water," is also skeptical when it comes to wars over water in arid regions like the Middle East.⁵³ According to Allan, trade in food commodities such as wheat can be used to balance a country's water budget instead of marshalling additional scarce water for crop growing. The importation

49. L. Ohlsson, *Environment, Scarcity and Conflict: A Study of Malthusian Concerns* (PhD Dissertation, Department of Peace and Development Research, University of Goteborg (1999)).

50. M. Lowi, *Water and Conflict in the Middle East and South Asia*, in *ENVIRONMENT AND SECURITY: DISCOURSES AND PRACTICES* (M. Lowi & B. Shaw, eds., 2000).

51. P. Beaumont, *Water and Armed Conflict in the Middle East—Fantasy or Reality?*, in *CONFLICT AND THE ENVIRONMENT* (N.P. Gleditsch ed., 1997).

52. *Id.* at 355, 370.

53. J.A. Allan, *The Political Economy of Water: Reasons for Optimism but Long-Term Caution*, in *WATER, PEACE AND THE MIDDLE EAST: NEGOTIATING RESOURCES IN THE JORDAN BASIN* (J.A. Allan with J.H. Court eds., 1996).

of water, embedded in grain, has been employed in several countries in the Middle East and prevented the type of scenarios predicted by the water-war school.⁵⁴ This is perhaps the appropriate place to discuss Tony Allan's more recent book. In a study of the Middle East and North Africa, Allan⁵⁵ reviews the water disputes of the region and the water politics of individual states in the context of *parallel discourses* of the region's water situation, past and future. In this context, Allan makes several greater contributions and conclusions relevant for the issue of water, politics, and security. Allan rejects the limited security minded rhetoric he believes has dominated the water field. This rhetoric has allowed the countries in the region to sustain the traditional form of their water conflict. According to Allan, virtual water has bridged the gap between the region's actual water deficit and the adequacy of the region's water resources, yet this bridge has been kept invisible by the respective governments—part of the *sanctioned discourse*—in order to continue the manufacturing of regional water insecurities.⁵⁶ These countries are more comfortable talking about water in the context of the political and socio-political lexicon. There is more to the story, however. A discourse that was constructed over time in the North and eventually employed in the North, emphasizing environmental and economic consciousness to deal with water problems and water disputes, has unsuccessfully been attempted in the Middle East and Northern Africa. These strategies have also been part of the sanctioned discourse. Allan explains, however, that to link the economic and ecological policies of what he calls "outsiders" with the political and social biases of "insiders," the local and regional discourse has to be first understood. It is then that the significance of the "alien" discourse can be illuminated to insiders. Over time, just as it happened in the North, a discourse emphasizing economic and environmental principles will be developed and take root in the Middle East and North Africa.

Another related work relevant to the water and war debate should be noted. Peter Gleick, first in 1998 and then 2000, provides three detailed chronologies of water related disputes.⁵⁷ The 1998 chronologies detail water-related conflicts in the ancient Middle East, from 3000 BC to 300 BC and since 1500 AD. The 2002 chronology includes an updated

54. J.A. Allan & M. Karshenas, *Managing Environmental Capital: The Case of Water in Israel, Jordan, the West Bank and Gaza, 1947 to 1995*, in *WATER, PEACE AND THE MIDDLE EAST: NEGOTIATING RESOURCES IN THE JORDAN BASIN* 121 (J.A. Allan with J.H. Court eds., 1996).

55. T. ALLAN, *THE MIDDLE EAST WATER QUESTION: HYDROPOLITICS AND THE GLOBAL ECONOMY* (2001).

56. *Id.* at 200.

57. P. GLEICK, *THE WORLD'S WATER: THE BIENNIAL REPORT ON FRESHWATER RESOURCES 1998-1999* (1998); P. GLEICK, *THE WORLD'S WATER: THE BIENNIAL REPORT ON FRESHWATER RESOURCES 2000-2001* (2000).

version of the latter chronology, describing water conflicts since 1500 AD. Peter Gleick's chronology demonstrates that water and violence are quite regularly associated with each other. Yet, as Uitto and Wolf note,

A close read of the events [Gleick] includes reveals greater subtlety and depth to the argument that water wars may be pervasive. What Gleick and others have actually provided is a history rich with tensions, exacerbated relations and conflicting interests over water as a scarce resource. It is worth noting Gleick's careful categorization, because the violence he describes actually turns out to be water as a tool, target or victim of warfare—not the cause.⁵⁸

Steve Lonergan⁵⁹ has placed some of the above arguments in the same context, arguing that the connection between water and armed conflict is more so the case when water is a tool and target of military activity. Water is rarely the sole cause of an armed conflict. However, such a link between water and conflict is possible only under specific conditions, most likely when an upstream state is able to either block or damage the flow of a river downstream. According to Lonergan, the examples of the Nile and Euphrates show that this has either been impossible or has not led to armed conflict, respectively.

There are some conclusions that can be drawn from this fascinating debate. Conflict over water—in some cases political and in some cases prone to armed exchanges—may indeed take place. In many cases water is used as a military tool or target in a larger war over non-water issues. Most of the time, however, either the status quo of stalemate and conflict ensues or the parties realize that cooperation is more rational and cost-effective and engage in negotiations over the resource. Similarly, the rich history of cooperation over water, demonstrated in the thousands of documented treaties, not only outweighs the few examples of water-wars and military skirmishes over water but also demonstrates that shared water resources may ultimately induce cooperation rather than conflict. Finally, the security and scarcity dimension of water, as a whole, may require some scrutiny. Countries may employ different strategies or may over time develop room in their national discourse for economic and environmentally minded solutions for coping with their domestic and regional water problems. Until then, they will choose to make it a security matter.

58. J. Uitto & A. Wolf, *Water Wars? Geographical Perspectives: Introduction*, 168 GEOGRAPHICAL J. 289 (2002).

59. S. Lonergan, *Water and Conflict: Rhetoric and Reality*, in ENVIRONMENTAL CONFLICT (P. Diehl & N.P. Gleditsch eds., 2001).

Institutional, Organizational, and "New" Approaches

In his 1995 book, Aaron Wolf,⁶⁰ writing in the context of the Jordan River, argues that an interdisciplinary approach is required for the analysis of international water conflicts. The approaches espoused for application to water conflicts should include legal, political, economic game theoretical, and alternative dispute resolution. In the context of the Jordan River, Euphrates-Tigris River, and the Arabian Peninsula, Dolatyar and Gray⁶¹ employ a similar interdisciplinary approach to the issue of water scarcity—namely looking at security, economic, legal, technological, and environmental dimensions. The authors argue that,

since water plays a multifunctional role in shaping the culture, religion, economy, nutrition, health and every other aspect of human life, water related issues need to be considered in the context of the relationship between humans and their living environment rather than in isolation as an economic, legal, or technological problem.⁶²

Helen Ingram, Nancy Laney, and David Gillilan⁶³ tie global economic change to transboundary water resources. Using various approaches, including institution building, international law, and cooperative development, the authors explain the trends in transboundary water resources between Mexico and the United States. The concept of "border" is revisited by the authors, who outline several disadvantages associated with the notion of borders vis-à-vis transboundary water resources, including barriers to grassroots problem solving, the marginalizing of border residents' interests, the aggravation of perceived inequalities, and the separation of problems from solutions.⁶⁴ Instead, an integrated border economy is proposed as an integral part of any transboundary water agreement. Doing so could become possible through improved institutional design, which the authors address in their analysis. In an edited book by Joachim Blatter and Helen Ingram⁶⁵, new approaches for the study of water such as network analysis, discourse analysis, historical and ethnographic analysis and social ecology analysis are employed. According to the

60. A. WOLF, *HYDROPOLITICS ALONG THE JORDAN RIVER: SCARCE WATER AND ITS IMPACT ON THE ARAB-ISRAELI CONFLICT* (1995).

61. M. DOLATYAR & T. GRAY, *WATER POLITICS IN THE MIDDLE EAST* (2000).

62. *Id.* at 17.

63. H. INGRAM, N.K. LANEY & D.M. GILLILAN, *DIVIDED WATERS: BRIDGING THE U.S.-MEXICO BORDER* (1995).

64. *Id.*

65. *REFLECTIONS ON WATER: NEW APPROACHES TO TRANSBOUNDARY CONFLICTS AND COOPERATION* (J. Blatter & H. Ingram eds., 2001).

authors, the meaning of water and other water policy issues are not fully captured in the context of the nation state or other modern approaches, which is "beyond human control and rational calculation."⁶⁶ In a chapter by Joachim Blatter, the notions of network analysis and discourse analysis—phenomena also associated with the notion of epistemic communities in the international relations lingo of the constructivist persuasion—are explored in the context of Lake Constance.⁶⁷ Blatter considers the influence of ideas, institutions, and cross-border networks in transboundary water policies. Accordingly, this is a new political landscape where political actors, communities, and organizations are embroiled in the process of change and reconstruction—symbolic meaning and shared issue framing become extremely important.⁶⁸ According to Blatter, these non-traditional influences led to the development and success of cross-border cooperation in regulating boating and pollution on Lake Constance.⁶⁹ In another chapter written in the context of the Black Sea, Joseph DiMento⁷⁰ argues that even in a watercourse where riparians are divided by nationalist fervor, ethnic conflict, exclusionary ideologies—elements that divide actors—cross-boundary networks, a cooperative discourse, institutions, and legal regimes can emerge. In fact, DiMento concludes that despite the claims of many of the Black Sea riparians that they cannot be environmentally sensitive given their economic state and needs, efforts have emerged pointing to a new understanding of transboundary interaction and institutionalizing procedures essential for international cooperation in combating the Sea's degradation. DiMento specifically points to the role of the Black Sea Environmental Program (BSEP), developed under the auspices of the UN Environment Program and the Global Environmental Facility, in bringing together international legal principles and technical and financial instruments to support efforts by the riparian countries in their ongoing efforts at rehabilitation and protection of the Black Sea. The challenges are plentiful, DiMento admits, but the institutionalization of particular principles and values makes the process more amenable to success.⁷¹

66. *Id.* at 4.

67. J. Blatter, *Lessons from Lake Constance: Ideas, Institutions and Advocacy Coalitions*, in REFLECTIONS ON WATER: NEW APPROACHES TO TRANSBOUNDARY CONFLICTS AND COOPERATION (J. Blatter & H. Ingram eds., 2001).

68. *Id.* at 117

69. *Id.* at 94

70. J. DiMento, *Black Sea Environmental Management: Prospects for New Paradigms in Transitional Contexts*, in REFLECTIONS ON WATER: NEW APPROACHES TO TRANSBOUNDARY CONFLICTS AND COOPERATION (J. Blatter & H. Ingram eds., 2001).

71. *Id.* at 262.

Sander Meijerink⁷² also develops a unique approach—a framework for decision making on international river issues. The basin for which this framework is applied is the Scheldt Basin, which lies within France, Belgium, and The Netherlands. In a detailed analysis, Meijerink focuses on the process of the negotiations among the riparians and attempts to predict the direction in which the negotiation process will develop. The analysis covers the period of 1967–1993, which includes 14 rounds of negotiations and the final agreement that has been reached.

A useful approach through which to consider conflict and cooperation over water is suggested by Rainer Durth.⁷³ Durth begins with the assumption that it is difficult to foster cooperation between upstream and downstream states given the asymmetry and the implicit externalities that flow in the downstream direction. But Durth argues that the level of state and basin integration may make the difference in the degree of cooperation. The approach compares international water conflicts in politically and economically integrated areas such as Europe to water conflicts in non-integrated areas such as the Middle East. Durth argues that the perceptions of justice and equity are perceived in drastically different ways by integrated and non-integrated areas—varied perceptions of the two terms in non-integrated areas while more consensus in integrated areas. In the scope of negotiations, agreement on just procedures may need to precede agreement on just outcomes in non-integrated areas. Similarly, national prestige rather than economic outcomes and benefits are valued in non-integrated areas. The economic benefits that could accrue from cooperation are therefore either ignored or left untapped. Durth points to the degree of institutionalism as an important catalyst to promote cooperation and govern river basins and compares the examples of the Euphrates and Rhine rivers, assessing requirements for international cooperation, the role of governments, the existence of commissions, and the participation of the private sector in river management. Another new approach to cooperation over water is offered by Ulrich Kuffner,⁷⁴ who advocates a concept of sharing international rivers by jointly managing them to the maximum mutual benefit through an international agency. This approach is advocated instead of dividing the waters and managing them separately. Kuffner criticizes the traditional solutions to water division among parties that

72. S. MEIJERINK, *CONFLICT AND COOPERATION ON THE SCHELDT RIVER BASIN* (1999).

73. R. Durth, *Transboundary Externalities and Regional Integration*, in *WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION* (W. Scheumann & M. Schiffler eds., 1998).

74. U. Kuffner, *Contested Waters: Dividing or Sharing?*, in *WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION* (W. Scheumann & M. Schiffler eds., 1998).

are often stipulated in agreements on the account that they are based on a rather rigid allocation formula and do not provide for adjustments to changing conditions. Kuffner supports the interconnection of water systems between states, with the aim of buying and selling water when the need arises or when the surplus in one system allows the transfer of some water to an adjacent system. The solution would require pipeline and canal connections and agreements regarding water trade, specifying the price and quality of water. Companies and agencies from neighboring countries could then conclude agreements on the sale and purchase of water. He cites the example of the Lesotho Highlands Project as a possible case to emulate in the Jordan River Basin. Implied in Kuffner's analysis is a challenge to the notion of state sovereignty. Kuffner also seems to neglect the fact that rights to the water will still have to be assigned to companies by governments, which means that water quantities will still have to be divided among countries. Kuffner's non-traditional view of state sovereignty, however, reminds us that water respects no political boundaries and states are interdependent when it comes to developing shared water resources.

In a book published by Green Cross International,⁷⁵ the notion of interdependence in water management is discussed in detail. The report discusses issues such as international water law, national sovereignty, security, rights to water, environmental protection, and interstate cooperation and provides short descriptions of several international water river basins such as the Ganges, Aral Sea, Danube, Mekong, Mahakali, Euphrates-Tigris, Nile, and several river basins in South Africa. Most importantly, however, the report makes several proposals for water management and cooperation between states that are based on the international, international basin, national, and local levels. At the international level the report recommends not only the strengthening of international organizations and the coordination between them to assist states in conflict over a river basin but also recommends funding regulations for international lending institutions that abide by the conditions of inter-basin cooperation and environmental responsibility. At the international basin level, the report recommends the creation of river basin authorities to oversee the interests of all states, peoples, and ecosystems and the opening up of communication between states, including dialogue between different interest groups, minorities, and locals. At the national level, the report recommends the establishment of high-level government representation dedicated to water issues that would raise the profile of water on the national agenda and allow for more senior level negotiations. At the local level, the report recommends

75. GREEN CROSS INTERNATIONAL, NATIONAL SOVEREIGNTY AND INTERNATIONAL WATERCOURSES (2000).

greater communication between decision makers and those who will be directly affected by changes in water policies and larger projects. Such a broad based participatory approach can engender more sustainable and stable projects.

Institutional approaches have also been developed in the literature on shared waters. Two separate chapters in a special issue of *International Negotiation* on international water resources, one by Ainun Nishat and Islam Faisal,⁷⁶ writing in the context of the Ganges-Brahmaputra-Meghna Basin, and the other by Aysegul Kibaroglu and Olcay Unver,⁷⁷ writing in the context of the Euphrates-Tigris River Basin, emphasize the utility of institutional mechanisms for cooperation over shared waters. Nishat and Faisal discuss the role of the Joint Rivers Commission (JRC) in the context of the agreements and memorandums of understanding signed between India and Bangladesh, primarily for sharing the Ganges. According to the statutes of the JRC the parties are to discuss mutual water issues within the auspices of the Commission and find effective solutions to these problems in its institutional capacity. But the authors argue that while the JRC has been instrumental in the cooperative framework between the two countries, it requires more authority in identifying and implementing effective solutions, should engage in regular collection and sharing of data, and should be extended in scope to include other water issues that have emerged over time. Kibaroglu and Unver analyze the history and implications for future negotiations and cooperation over the Euphrates-Tigris within the scope of the Joint Technical Committee (JTC). The authors suggest particular principles, rules, norms and decisionmaking procedures for a more effective JTC. All four authors admit or imply, however, that, despite the utility of the institutions created, political constraints such as lack of political will on the part of one of the parties and the relative power discrepancies among the countries combined with their distinct underlying interests may scuttle the effectiveness of the institution. In a later book, Kibaroglu expands on some of the ideas she introduces in her chapter in the special issue.⁷⁸ Her book discusses theoretical aspects of cooperation such as institutional, constructivist, and functionalist thinking. She also reviews relevant principles of international water law as well as the work of international agencies and water policy organizations—stressing the need for comprehensive and integrated

76. A. Kibaroglu & O. Unver, *An Institutional Framework for Facilitating Cooperation in the Euphrates-Tigris River Basin*, 5 INT'L NEGOTIATION (No. 2, 2000).

77. A. Nishat & I. Faisal, *An Assessment of the Institutional Mechanisms for Water Negotiations in the Ganges-Brahmaputra-Meghna System*, 5 INT'L NEGOTIATION (No. 2, 2000).

78. A. KIBAROGLU, *BUILDING A REGIME FOR THE WATERS OF THE EUPHRATES-TIGRIS RIVER BASIN* (2002).

national development plans. Her main aim is to apply these analyses and principles to building a cooperative regime among the Euphrates-Tigris Basin countries for using the existing water resources effectively and equitably. According, to Kibaroglu, it is the lack of financial and technical capacities, combined with institutional deficiencies that constitute impediments to cooperation and further development of the basin's waters.

In a special issue of *International Journal of Water Resources Development*, Alfred Duda and David La Roche⁷⁹ discuss the importance of basin-wide institutions and international organizations in the management of transboundary water conflicts and the facilitation of cooperation. Using the case of the Danube River, the authors argue that states experiencing larger political conflicts should cooperate over issues such as water and environment. Such cooperation can help ameliorate the larger conflict. Another important point is that nations should try to develop and test out joint management mechanisms of shared freshwater resources rather than employ compensation or allocation mechanisms. International institutions such as the Global Environmental Facility (GEF) have the capacity to facilitate both of these recommendations. A similar article by Juha Uitto and Alfred Duda⁸⁰ considers the role of the GEF in promoting cooperation in the Aral Sea, Bermejo River, and Lake Tanganyika.

Anders Jagerskog⁸¹ also discusses the role of regimes and institutions. Jagerskog discusses the 1955 Johnston negotiations over the Jordan River, which culminated in a water-sharing scheme never recognized by the states. He argues however, that this unrecognized agreement actually helped regulate the relations between Israel and Jordan and has facilitated more friendly relations. The author recognizes the limitation of regime theory, arguing that water is sometimes subordinate to other more contentious areas of dispute. Regardless, the author also discusses the 1994 Agreement between Jordan and Israel, which included an agreement on the water dispute. He then assesses the quality of the regime by looking at its effectiveness, robustness, and resilience in relation to events on the ground. He applies similar tools to the Joint Water Committee established between Israel and the Palestinian Authority. Another chapter praising the role of institutions

79. A. Duda & D. La Roche, *Sustainable Development of International Waters and Their Basins: Implementing the GEF Operational Strategy*, 13 INT'L J. WATER RESOURCES DEV. (Sept. 1997).

80. J. Uitto & A. Duda, *Management of Transboundary Water Resources: Lessons from International Cooperation for Conflict Prevention*, 168 GEOGRAPHICAL J. (Dec. 2002).

81. A. Jagerskog, *Contributions of Regime Theory in Understanding Interstate Water Cooperation: Lessons Learned in the Jordan River Basin*, in *HYDROPOLITICS IN THE DEVELOPING WORLD: A SOUTHERN AFRICAN PERSPECTIVE* (A. Turton & R. Henwood, eds., 2002).

and rules is by Roland Henwood and Nicci Funke.⁸² According to the authors, if water related problems are perceived to develop into a threat, the water issue will become "securitized." The chances of this taking place are if a water dispute or regional water issue is part of the foreign policy paradigm of the countries rather than the international relations paradigm. Foreign policy is much more limited and relates more to the national interest of the state. The concept is very specific and the underpinning actions and characteristics are very limited. International relations, on the other hand, is more inclusive and broader in scope, referring to all forms of interactions including interaction between governments, non-governmental organizations, trade, values, ethics and communication—issues that will not create undue tensions. The situation unique to Southern Africa places the water issue in the foreign policy sphere. The authors argue that this trend reflects badly on regional development and stability in Southern Africa. Cooperation rather than conflict must be the basis for the states' interaction and the "desecuritization" of water can only be achieved through provisions that create and institutionalize the capacity to manage shared watercourse systems effectively.

The book by Turton and Henwood, however, is about much more. The authors' main goal is to demonstrate that the notion of hydrogeopolitics should be extended. The authors argue that Arun Elhance's definition of hydrogeopolitics as "the systematic analysis of interstate conflict and cooperation regarding international water resources" does not take into account the rich literature on water, the environment, society, and culture. According to one of the chapters by Anthony Turton,⁸³ hydrogeopolitics should cover all political interactions over water and hence its definition should be "the authoritative allocation of values in society with respect to water." This is similar to the proposals made above by Dolatyar and Gray. In fact, according to Turton, the issue of scale (ranging from the individual to the international level) and range (issues such as water and conflict, water for food, and the social and political value of water) should be incorporated into any definition of hydrogeopolitics. Such a definition will "hopefully develop the discipline further by embracing a wider range of issues than just conflict in international river basins." The book by Turton and Henwood also includes works that suggest moving away from the river basin as a unit of reference and instead allowing for inter-basin analysis. To a certain extent, the inter-basin phenomenon could be considered a unit of

82. R. Henwood & N. Funke, *Managing Water in International River Basins in Southern Africa: International Relations or Foreign Policy*, in Turton & Henwood eds., *supra* note 81.

83. A. Turton, *Hydrogeopolitics: The Concept and Its Limitations*, in Turton & Henwood eds., *supra* note 81.

analysis assuming that cooperation is possible and externalities are internalized. Because intra-basin transfers are still in the eye of the professional storm/debate, with still many outstanding issues to be resolved (both theoretical and empirical), it seems that the inter-basin as a unit of analysis is still in a preliminary theoretical phase of development. A compelling chapter on the issue of inter-basin transfers of water between Southern African Development Communities (SADC) countries is authored by Piet Heyns.⁸⁴ The work sets in our view all the necessary items for consideration for policy makers in evaluating the feasibility of inter-basin transfers. Since inter-basin transfers within the jurisdiction of one country have recently become rather "popular," the suggested framework could be applied to assist in the analysis. Still, and as suggested above, international transfers are more complicated and more is needed in the suggested framework to address it.

To conclude with the institutional theme discussed above, we cite the works of Meredith Giordano and Aaron Wolf.⁸⁵ The authors argue that the difference between conflict and cooperation over water is attributed to the degree of institutionalism embodied in a river basin. Specifically, the authors marshal evidence to show how institutions can serve to defuse tensions especially in basins with large numbers of water infrastructure projects. In fact, co-riparian relations are more cooperative in basins with established water treaties—by extension higher levels of institutionalism. In addition to reviewing international legal principles and conventions that have refined principles of shared water management, the authors cite the actual treaties states have negotiated over shared waters. Yet, despite the rich history of water treaties, Giordano and Wolf argue that a review of the agreements from the last half-century reveals an overall lack of robustness. Similarly, water quality issues have played a minor role in co-riparian agreements. The authors review other attributes identified in negotiated treaties they deem to be instrumental for successful cooperation such as conflict resolution mechanisms, benefit sharing instead of water quantity sharing, and needs-based approaches rather than rights-based approaches. The authors' broad approach to treaty analysis allows them to make specific recommendations for fostering higher levels of institutionalism in different river basins through several key factors such as equitable distribution of benefits, flexible criteria for water allocation and water quality, and conflict resolution mechanisms.

84. P. Heyns, *Interbasin Transfer of Water between SADC Countries: A Development Challenge for the Future*, in Turton & Henwood eds., *supra* note 81.

85. M. Giordano & A. Wolf, *Sharing Waters: Post-Rio International Water Management*, 27 NAT. RESOURCES F. (2003).

Negotiation

In this section we discuss the relationship between the study of conflict and cooperation over shared waters and negotiation theory. We identify such concepts as pre-negotiation, third-party intervention, culture and negotiation, the position of states along a river as a form of power, asymmetrical negotiations, and economic discrepancies among the parties.

The special issue of *International Negotiation* discussed earlier, also presents works dealing with water conflict, negotiation, and cooperation issues. Basins included are the Mekong, Jordan, Ganges-Brahmaputra-Meghna, Euphrates-Tigris, and Nile. The various works focus mainly on the negotiation process of the respective governing agreements. In addition, the special issue contains several works that apply methodologies from different contexts. For example, Wolf⁸⁶ describes the process of negotiation over water by indigenous societies and draws conclusions for international water issues. In another work, Shlomi Dinar⁸⁷ applies aspects of international relations and negotiation theory to the basins described in the special issue. Dinar demonstrates the advantages of using an integrated approach by combining two disciplines, international relations and negotiation theory, when analyzing an international water conflict. Dinar argues that concepts and notions associated with international relations theory articulated to understand and analyze conflict and cooperation should complement principles cited in the negotiation literature such as pre-negotiation, the motivations of the parties to negotiate, domestic politics and bargaining, and third-party intervention. Conclusions that could be drawn from the special issue are that water and regional security coincide and that negotiations are often subject to domestic and international factors contingent also on the bargaining process itself.

In an edited book, Guy Oliver Faure and Jeffrey Rubin⁸⁸ introduce perhaps one of the less analyzed concepts in the process of negotiations over water—culture. While the authors argue that their book is not about water but rather about culture and negotiation, the case studies they use are river basins from across the globe. Francis Deng⁸⁹ discusses the intricacies of the conflict over the construction of the Jonglei Canal between North and South Sudan. The Canal was never

86. A. Wolf, *Indigenous Approaches to Water Conflict Negotiations and Implications for International Waters*, 5 INT'L NEGOTIATION (2000).

87. S. Dinar, *Negotiations and International Relations: A Framework for Hydropolitics*, 5 INT'L NEGOTIATION (2000).

88. CULTURE AND NEGOTIATION: THE RESOLUTION OF WATER DISPUTES (G.O. Faure & J. Rubin eds., 1993).

89. F. Deng, *Northern and Southern Sudan: The Nile*, in Faure & Rubin eds., *supra* note 88.

completed given the ongoing internal conflict but was intended to channel water to Northern Sudan and Egypt for irrigation purposes. His review also reflects how a domestic conflict, fueled by identity and spiritual values, can easily spill onto the international arena. Randa Slim⁹⁰ considers the case of the Euphrates River. Slim analyzes how the clash of political cultures between Turkey and Syria and Iraq and between Iraq and Syria has contributed to the conflict over the Euphrates. Miriam Lowi and Jay Rothman⁹¹ review the case of the Jordan River. The authors argue that, given the intractable conflict between the Arabs and Israelis, it is only when the larger political issues (e.g., identity, recognition, and security) are discussed seriously that cooperation on water can advance in a more meaningful manner and at the same time help the negotiation process on the larger issues gain more momentum. Vladimir Pisarev⁹² considers the cultural aspects of negotiations over the Black Sea. Pisarev argues that when negotiations began 20 years ago, the issue of environmental protection was not salient among the parties. Ethnocultural and historical perceptions, which were often distorted, also played a role in the negotiations. But Pisarev also notes that a broad ecological culture has played a large role, over the years, in the national priorities of the sea's riparians. His analysis culminates with the draft treaty reached by the states in 1992. Perhaps the more convincing case study that is used to show the connection between culture and negotiations (in this case successful negotiation) is that of the Rhine River, written by Christophe Dupont.⁹³ The author argues that an emergent integrated culture of common values and a homogeneous and converging cooperative strategy facilitated the negotiation process. At the same time, Dupont also stresses shared ecological and environmental norms of how to tackle the pollution problem and emotional ties to the River, combined with an institutional and European wide culture, as key variables of success in the Rhine. Thus, while culture may be one of the many attributes that can be considered in analyzing the outcomes of negotiations, it is often overshadowed by more important elements that provide a better understanding of the directions particular water disputes take.

90. R. Slim, *Turkey, Syria, Iraq: The Euphrates*, in Faure & Rubin eds., *supra* note 88.

91. M. Lowi & J. Rothman, *Arabs and Israelis: The Jordan River*, in Faure & Rubin eds., *supra* note 88.

92. V. Pisarev, *Turkey, Bulgaria, Romania, and the Soviet Union*, in Faure & Rubin eds., *supra* note 88.

93. C. Dupont, *Switzerland, France, Germany and the Netherlands: The Rhine*, in Faure & Rubin eds., *supra* note 88.

Another element of the negotiations process is *power*. According to William Zartman and Jeffrey Rubin,⁹⁴ however, the conventional definition of power, where the state with the mightiest military and the strongest economy (recall that these were concepts discussed in the international relations section) will have its way in negotiations, should be scrutinized. As Zartman and Rubin argue, the weaker state has something the stronger state values but the stronger state chooses not to take by stealth or force but rather by the give and take of negotiations. Alternatively, the stronger side is not strong enough (or does not deem it efficient) to take what it wants by force and can do better by giving a sense of equality to the weaker party.⁹⁵ The edited volume also includes a chapter on Indo-Nepali water relations. The author, Dipak Gyawali,⁹⁶ considers the overwhelming aggregate power (military and economic might) of India versus the issue-specific power (owning the sites where hydroelectric plants can be built) of Nepal. Relying on negotiation concepts and tactics developed by William Habeeb,⁹⁷ Gyawali argues that while India and Nepal have negotiated agreements that have been perceived by some political parties in Nepal to have overwhelmingly benefited India, the issue of hydroelectric generation has not been permanently settled. Only a fraction of the benefits that can accrue if large storage dams are built deeper in Nepal has been attained so far. Gyawali reviews some of the inner political workings of the India-Nepal water relationship, arguing that Nepal has been able to increase its bargaining power. Nonetheless, stalemate has ensued over the question of larger cooperative projects, not least due to the struggle between the brute power of one state and the recently articulated and realized issue-specific power of another. As Terrence Hopmann⁹⁸ argues, outcomes of negotiations should be determined less by the military and brute power of the parties and more by a tactical schemata based on a definition of power as a situational and behavioral characteristic of negotiations where outcomes depend not only on absolute capabilities but on the interaction among the parties, bargaining skills, and on the way such resources are organized.⁹⁹

94. I. Zartman & J. Rubin, *Symmetry and Asymmetry in Negotiation*, in POWER AND NEGOTIATION (I. Zartman & J. Rubin eds., 2000).

95. *Id.* at 289.

96. D. Gyawali, *Nepal-India Water Resource Relations*, in Zartman & Rubin eds., *supra* note 94.

97. W. HABEEB, POWER AND TACTICS IN INTERNATIONAL NEGOTIATION: HOW WEAK NATIONS BARGAIN WITH STRONG NATIONS (1988).

98. T. HOPMANN, THE NEGOTIATION PROCESS AND THE RESOLUTION OF INTERNATIONAL CONFLICTS (1998).

99. *Id.* at 107.

Victor Kremenyuk and Winifred Lang¹⁰⁰ also discuss location and geography as an element of power in environmental negotiations. The authors argue that a downstream nation is more likely to ask for strict controls of water pollution than an upstream nation. In the same edited volume, Guy Oliver Faure and Jeffrey Rubin argue that when it comes to pollution issues, for example, the upstream interest may be far less inclined to take the problem seriously, let alone to bear responsibility for devising an appropriate solution, than the downstream interest.¹⁰¹ According to Richard Matthew, downstream states are more likely to be concerned about the future and more willing to participate in a collective management scheme than upstream states.¹⁰² In such a scenario, parties differ in their dependence on an agreement as well as their motivation to negotiate at all.

Economic discrepancies among states also factor into negotiations over water. The literature here deals with the limited resources and assets that a poor nation can bring to bear relative to a richer nation. As a negotiating tactic, a bargaining strategy held by the weaker party is to deprive the stronger actor of what it desires. According to Gunnar Sjostedt and Bertram Spector, cooperation from the poorer country will ensue if the richer country provides economic and financial incentives.¹⁰³ Weak states may use their incapacity, relative to stronger states, to comply with certain provisions desired in a cooperative management, as a leverage to receive benefits.

In a recently published book, Scott Barrett¹⁰⁴ develops a theory for interstate environmental cooperation. He considers the notion of asymmetries as an element of international environmental agreements. The theory is applied to global shared resources such as the ozone layer and to regional water resources such as the Aral Sea in Central Asia and the Rhine in Europe. In the context of asymmetrical negotiations (either geographic or economic asymmetries), Barrett argues that to encourage participation in and enforcement of a treaty, concessions can be extracted and financial and technological aid can be guaranteed in return for

100. V. Kremenyuk & W. Lang, *The Political, Diplomatic and Legal Background*, in INTERNATIONAL ENVIRONMENTAL NEGOTIATION 8, 9 (G. Sjostedt ed., 1995).

101. G. Faure & J. Rubin, *Organizing Concepts and Questions*, in INTERNATIONAL ENVIRONMENTAL NEGOTIATION 22, 23 (G. Sjostedt ed., 1995).

102. R. Matthew, *Scarcity and Security: A Common-Pool Resource Perspective*, in ANARCHY AND THE ENVIRONMENT: THE INTERNATIONAL RELATIONS OF COMMON POOL RESOURCES 171 (J.S. Barkin & G.E. Shambaugh eds., 1999).

103. G. Sjostedt & B. Spector, *Conclusion*, in INTERNATIONAL ENVIRONMENTAL NEGOTIATION 311-12 (G. Sjostedt ed., 1995).

104. S. BARRETT, ENVIRONMENT AND STATECRAFT: THE STRATEGY OF ENVIRONMENTAL TREATY-MAKING (2003).

compliance. Similarly, according to two writings, one by Oran Young¹⁰⁵ and the other by Arild Underdal,¹⁰⁶ those states that believe they have been treated fairly and their core demands have been addressed will be more inclined to make agreements work and will stand by their commitments. Defection from an agreement is therefore more likely when "one party perceives it has been bullied or deceived into accepting a solution giving it payoffs substantially below what its opponent would in fact have been ready to concede."¹⁰⁷

Economic differences among the parties reflect their attitudes toward the environment. Richer nations and poorer nations may value the same resource in completely different ways. Poor countries may have more of a propensity to pollute to the detriment of wealthier countries with higher pollution standards. According to Compte and Jehiel,¹⁰⁸ mutually beneficial agreements between states with heterogeneous preferences may require side payments. Similarly, Lisa Martin¹⁰⁹ argues that heterogeneities in capabilities and preferences create possibilities for tradeoffs among international actors. For example, states that have intense interests in environmental protection are willing to make economic sacrifices. In essence, this is a kind of *exchange* whereby a state may agree to forego benefits on some issues in return for concessions on others.¹¹⁰

The literature, therefore, provides interesting insight on water and negotiations. To induce cooperation, in general, or pollution abatement, in particular, in asymmetric situations—whether it be positional or economic asymmetry—side-payment transfers or issue linkage will have to be the strategies employed. The geographical upper hand of an upstream state may thus give it an advantage in negotiations with a downstream state. At the same time, the relative economic disparity of one country and its propensity to pollute, relative to another country, may win it some concessions in negotiations over pollution abatement.

105. O. YOUNG, *INTERNATIONAL GOVERNANCE: PROTECTING THE ENVIRONMENT IN A STATELESS SOCIETY* 134-35 (1994).

106. A. Underdal, *The Outcomes of Negotiation*, in *INTERNATIONAL NEGOTIATION: ANALYSIS, APPROACHES, ISSUES* (V. Kremenyuk ed., 2d ed. 2002).

107. *Id.*

108. O. Compte & P. Jehiel, *International Negotiations and Dispute Resolution Mechanisms: The Case of Environmental Negotiations*, in *INTERNATIONAL ENVIRONMENTAL NEGOTIATIONS: STRATEGIC POLICY ISSUES* 64 (C. Carraro ed., 1997).

109. L. Martin, *Heterogeneity, Linkage and Common Problems*, in *LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS* 73 (R. Keohane & E. Ostrom ed., 1995).

110. *Id.* at 81-82.

INTERNATIONAL WATER LAW

In this section, we discuss the evolution of international water law. The literature includes not only a general assessment of international legal clauses but also application to particular river basins. In the context of both these approaches, it is especially interesting to note the controversy between upstream and downstream countries.

In 1997, the UN Convention on the Non-Navigational Uses of International Water Courses was adopted by the United Nations—considered to be an international framework agreement for use by states in negotiating water disputes. Perhaps most notably, the Convention has officially put to rest the historic conflict between the two extreme principles of *absolute territorial sovereignty* (the right of an upstream state to take any action vis-à-vis the shared waters in its territory regardless of the adverse effect on downstream states) and *absolute territorial integrity* (the right of a downstream state to an uninterrupted flow of a fixed quantity of usable water and the right not to be harmed by any action taken upstream). Article 5, *equitable and reasonable utilization*, was that compromise and it establishes that states have a right to utilize their shared waters in an equitable and reasonable manner and at the same time the duty to cooperate in the protection and development of those shared waters. Similarly, *the obligation not to cause significant harm*, Article 7, establishes that states are obliged to undertake all necessary measures to ensure that such utilization does not lead to significant harm on the part of another riparian state. Article 6 provides a non-exhaustive list of how equitable utilization may be determined. The Convention was adopted by a vote of 103 for and three against, with 27 abstentions and 33 members absent. However, the Convention has yet to be ratified by a sufficient number of countries to enter into force—the ratification deadline (May 20, 2000) has passed.

Much work on international water law has, of course, preceded the 1997 Convention. Writing in 1993, McCaffrey¹¹¹ reviews an array of rules of international law that concern shared water resources. He first discusses the importance of the numerous treaties collected by the Food and Agriculture Organization in the search for general principles of law and argues that in this context most treaties embody elements of the two compromise principles discussed above—*equitable utilization* and the *obligation not to cause significant harm*. McCaffrey then reviews draft resolutions of three highly authoritative international legal organizations, such as the International Law Association (ILA) and International Law Commission (ILC) of the United Nations, that were

111. S. McCaffrey, *Water, Politics and International Law*, in *WATER IN CRISIS* (P. Gleick, ed., 1993).

responsible for drafting the 1997 Convention, which reflects state practice and customary law. In his review of the resolutions adopted by the different organizations, McCaffrey clearly shows that while equitable utilization and prevention of harm are considered the two main legal clauses, each legal organization puts different degrees of weight on both. Despite the differences, McCaffrey argues that the work of such organizations is most welcome and, without question, will contribute to the resolution of international water controversies.¹¹²

Nurit Kliot, writing in 1994, attempts to apply the 1991 Draft Rules of the ILC¹¹³ and 1966 Helsinki Rules of the ILA to three Middle Eastern river basins.¹¹⁴ Kliot chose perhaps some of the most politically charged river basins in the world for applying a still growing and evolving international water law. Her analysis not only demonstrates how particular rules apply to particular positions and realities in each river basin but also speaks to some of the deficiencies in the Draft Articles and the Helsinki Rules, making recommendations as to how they may be improved upon when applied to actual river basins. Another account of international law in the context of the Middle East is provided by Samir Ahmed.¹¹⁵ Perhaps most interesting about Ahmed's analysis is his stipulation that the 1929 and 1959 Agreements signed exclusively between Egypt and Sudan, and ignoring the other Nile River riparians, continue to be valid despite the changing geopolitics in the region. These two agreements have been quite controversial among the other Nile river riparians, but Ahmed bases his contention on international law, in general, and Articles 11 and 12 of the 1978 Vienna Convention on Succession of States in respect to Treaties and the 1969 Vienna Convention on the Law of Treaties, in particular, which recognize the legality of such treaties. Ahmed also applies the 1966 Helsinki Rules to the Nile Basin. John Waterbury¹¹⁶ reviews the Nile River, Tigris-Euphrates, and Jordan River basins. Like Kliot, Waterbury analyzes the hydropolitics of each basin and the positions of each state in the context of international water law. Waterbury provides a descriptive and brief overview from various reports and newspaper articles of the interests and principles advanced by Middle Eastern riparians to defend their claims of transboundary waters. These are based on principles such as:

112. *Id.* at 99.

113. The ILC is the body associated with the United Nations, which was responsible for drafting the Articles that culminated in the 1997 Convention.

114. N. KLIOT, *WATER RESOURCES AND CONFLICT IN THE MIDDLE EAST* (1994).

115. S. Ahmed, *Principles and Precedents in International Law Governing the Sharing of Nile Waters*, in *THE NILE: SHARING A SCARCE RESOURCE* (P. Howell & J.A. Allan eds., 1994).

116. J. Waterbury, *Transboundary Water and the Challenge of International Cooperation in the Middle East*, in *WATER IN THE ARAB WORLD: PERSPECTIVES AND PROGNOSSES* (P. Rogers & P. Lydon eds., 1994).

equity, reason, and appreciable harm. Joseph Dellapenna¹¹⁷ also reviews the hydrogeopolitics of the Jordan and Nile River basins in the context of international water law. He demonstrates how the positions and subsequent favored legal principles of the riparians have evolved over the years. Despite their evolution, Dellapenna describes how the principles have been opposed at their core, depending on the geographical location of the states, and argues that the tension between opposing principles can only be managed if the water is cooperatively managed by the respective states in such a way as to assure equitable participation in the derived benefits. Like Kliot and Waterbury, Daniel Hillel¹¹⁸ considers the Nile, Jordan, and Euphrates-Tigris. Hillel's book includes a deep historical and religious analysis transcending the link between the basins' ancient civilizations and subsequent modern state systems and water. Most interesting is a chapter on legal criteria for sharing international waters and a small section describing how antecedents to rules regulating water allocation can be found in the Middle East itself. Islamic law and edicts issued by medieval Jewish sages, Hillel argues, had also evolved a sophisticated set of principles to regulate water management in order to minimize conflict. These traditions, however, have not been extended to international rivalries over water rights.¹¹⁹

Perhaps the most comprehensive, not to mention a convenient, compilation of pre-Convention writings can be found in two special issues of *Natural Resources Journal*.¹²⁰ The two volumes include some of the key thinkers on international water law. The writings reveal some of the developments and evolution of international water law in the 1990s—specifically the clash between Articles 5 and 7 in the context of the ILC alluded to above by McCaffrey.

In the spring volume of the 1996 *Natural Resources Journal*, Stephen McCaffrey¹²¹ exposes the conflict between Articles 5 and 7 but argues that the equitable utilization principle has its critics principally because the Article says little about pollution issues and speaks more to water allocation. McCaffrey acknowledges the difficulty of applying one rule to different problems yet argues, in principle, that the no-harm rule, as the dominant rule, could create more problems than it would resolve. Comparing the absolute priority given to the no-harm rule in the 1991

117. J. Dellapenna, *Rivers as Legal Structures: The Examples of the Jordan and the Nile*, 36 NAT. RESOURCES J. 217 (1996).

118. D. HILLEL, *RIVERS OF EDEN: THE STRUGGLE FOR WATER AND THE QUEST FOR PEACE IN THE MIDDLE EAST* (1994).

119. *Id.* at 269.

120. 36 NAT. RESOURCES J. 151 (1996); 36 NAT. RESOURCES J. 441 (1996).

121. S. McCaffrey, *An Assessment of the Work of the International Law Commission*, 36 NAT. RESOURCES J. 297 (1996).

Draft Articles (“watercourse states shall utilize an international watercourse in such a way as not to cause appreciable harm...”) to the changes made in the 1994 Draft Article (“watercourse states shall exercise due diligence to utilize an international watercourse in such a way as not to cause significant harm...”; “where despite the exercise of due diligence, significant harm is caused....the states whose use causes the harm shall in the absence of an agreement...consult with the state suffering the harm...”), McCaffrey demonstrates that while the primacy of the no-harm rule was not completely reversed the regime was softened considerably. Writing in the same volume, Patricia Wouters¹²² also assesses the conflict between Articles 5 and 7 but does so in the context of the 1994 Draft Articles of the ILC and as they are reflected in state practice. Despite the changes made to the 1991 Draft Articles, Wouters argues that the work of the ILC still does not concur with state practice. As Wouters explains, the no harm rule was maintained as the governing rule over watercourse law in the 1994 Draft Articles—combined also with Article 21 (pollution issues) where the no harm rule is reinforced. However, using several treaties from Europe, Asia, and the Middle East, Wouters shows that it is unlikely that states will embrace a dominant no significant harm approach to watercourse development. Rather states recognize that harm may take place, but accept this “so long as the use is equitable and reasonable and the harming state undertakes efforts to limit the transboundary harm.” Weighing in on the lively debate between Articles 5 and 7 in the context of the 1994 Draft Articles, Joseph Dellapenna¹²³ argues that with the re-written Article 7, equitable utilization becomes the primary rule. He explains this by arguing that if one reads the second obligation of Article 7, the obligation to consult over mitigating harm, as explanatory rather than as an independent duty, the problem of which principle prevails is solved. Dellapenna also argues that “if harm can be prevented or reduced by reasonable adjustments the harmful use is neither equitable nor reasonable. If this is so, the Article also makes explicit the obligation to compensate for inequitable and unreasonable uses.” Equitable and reasonable use, therefore, prevails. In the summer 1996 issue of *Natural Resources Journal*, Albert Utton¹²⁴ also considers the debate between Articles 5 and 7, but his contribution is more in the area specific to pollution issues. Utton argues that the confusion caused by the apparent

122. P. Wouters, *An Assessment of Recent Developments in International Watercourse Law through the Prism of the Substantive Rules Governing Use Allocation*, 36 NAT. RESOURCES J. 417 (1996).

123. J. Dellapenna, *Rivers as Legal Structures: The Examples of the Jordan and the Nile*, 36 NAT. RESOURCES J., 217 (1996).

124. A. Utton, *Which Rule Should Prevail in International Water Disputes: That of Reasonableness or That of No Harm*, 36 NAT. RESOURCES J. 635 (1996).

conflict between the two Articles could have been reduced if equitable utilization were used for water quantity issues and if the no harm rule had been used for water quality matters. Utton actually proposes a way by which to incorporate the pollution issue into Article 7 and rewrite it according to those standards. This would mean that Article 5 would be the preeminent principle in water quantity issues and Article 7 the principle for water pollution issues. Accordingly,

a state could go forward with a project if on balance the benefits outweighed the costs. However, if the project caused adverse and significant changes in water quality or harm to the ecological system, then the harming state would have to exercise due diligence or consult with the harmed state over reasonableness, mitigation and compensation.

A short but detailed account of the actual negotiations that took place up to the 1997 Convention is offered by Jorg Barandat and Aytul Kaplan.¹²⁵ The authors reveal the heated debates that took place and the impending conflicts. Specifically they discuss the role of upstream countries such as Turkey, Ethiopia, India, China, Switzerland, Slovakia, and France in changing the substance of the Convention Draft in such a way as to make it less binding. Conversely, the main objective of downstream countries like Syria, Portugal, Egypt, the Netherlands, Iraq, and Hungary was to raise the environmental standards and press for consultation and rules of conduct.

In a World Bank Technical Paper edited by Salman Salman and Laurence Boisson de Chazournes, the 1997 UN Convention on International Water Courses is reviewed in an article by Stephen McCaffrey.¹²⁶ McCaffrey assesses the utility of the Convention and reviews the different articles and their use in water negotiations. Most importantly, McCaffrey considers the final versions of Article 5 and Article 7. McCaffrey argues that the Convention intends for equitable utilization to take priority over the no harm rule. But McCaffrey also admits that despite the exhaustive list provided by Article 6 of what constitutes equitable utilization, cooperation and negotiation between and among states is key for this determination.

125. J. Barandat & A. Kaplan, *International Water Law: Regulations for Cooperation and the Discussion of the International Water Convention*, in *WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION* (W. Schuermann & M. Schiffler eds., 1998).

126. S. McCaffrey, *The UN Convention on the Law of Non-Navigational Uses of International Watercourses: Prospects and Pitfalls*, in *INTERNATIONAL WATERCOURSES: ENHANCING COOPERATION AND MANAGING CONFLICT* (S. Salman & L. Boisson de Chazournes eds., Proceedings of a World Bank Seminar, World Bank Technical Paper No. 414, July 1988).

In another World Bank Technical Paper edited by Salman Salman, the issue of ground water and international law is reviewed. According to the introductory chapter by Asit Biswas,¹²⁷ the issue of ground water has received cursory attention and has often been considered the "poor cousin" to surface water. An out-of-sight, out-of-mind mentality has resulted in its contamination and overuse. Increasingly, however, it is realized that the issue is of high priority. In two separate chapters by Stephen McCaffrey¹²⁸ and David Freestone,¹²⁹ the authors discuss the issue of ground water in the context of international water law and international environmental law.¹³⁰ McCaffrey reviews the relevance of the 1997 Convention to groundwater issues and international agreements and finally looks at the work of international legal organizations and expert groups in the field of groundwater. McCaffrey's analysis demonstrates how groundwater conflicts can be resolved or managed in the context of international legal principles. While international legal principles adopted in the UN Convention apply to surface water and ground water alike, McCaffrey reminds us that legal principles relating to confined ground water—ground water that does not intersect with surface water (like fossil aquifers)—are not so clear. In general, however, the law of international ground water is still in its embryonic stages. Freestone considers international environmental legal principles and their relevance to transboundary ground water. Drawing primarily on the 1992 Rio Declaration on Environment and Development, Freestone argues that recommendations as to how ground water should be exploited are suggested. Not only does the exploitation of transboundary ground water need to be conducted in the context of sustainability but also under the recognition that it is an international resource and is not the exclusive property of the state under which this resource extends.

In an effort to apply international water law to a specific groundwater aquifer, Yoram Eckstein and Gabriel Eckstein¹³¹ discuss the Mountain (West Bank) Aquifer shared between the Israelis and Palestinians. After reviewing some of the hydrogeological and

127. A. Biswas, *Water Crisis: Current Perceptions and Future Realities*, in *GROUNDWATER: LEGAL AND POLICY PERSPECTIVES* (S. Salman, ed., Proceedings of a World Bank Seminar, World Bank Technical Paper No. 456, Nov. 1999).

128. S. McCaffrey, *International Groundwater Law: Evolution and Context*, in *GROUNDWATER: LEGAL AND POLICY PERSPECTIVES* (S. Salman ed., Proceedings of a World Bank Seminar, World Bank Technical Paper No. 456, Nov. 1999).

129. D. Freestone, *International Environmental Law: Principles Relevant to Transboundary Groundwater*, in *GROUNDWATER: LEGAL AND POLICY PERSPECTIVES* (S. Salman ed., Proceedings of a World Bank Seminar, World Bank Technical Paper No. 456, Nov. 1999).

130. McCaffrey, *supra* note 128; Freestone, *supra* note 129.

131. Y. Eckstein & G. Eckstein, *Groundwater Resources and International Law in the Middle East Peace Process*, Special Issue: *Transboundary Aquifers*, 28 *WATER INT'L* (June 2003).

hydropolitical issues entailed, the authors consider the 1966 Helsinki Rules and 1986 Seoul Rules as they apply to ground water. Most interesting about the authors' analysis, however, is their discussion of the 1997 UN Convention. The authors argue that under the definition of a "watercourse" and "ground water" set forth by the Convention, the Mountain Aquifer cannot be accounted for and the authors provide specific examples. Given that the Convention is not applicable to the Mountain Aquifer, Eckstein and Eckstein discuss other legal principles that may be relevant for its management. Karin Kemper, Eduardo Mestre, and Luiz Amore¹³² also discuss the applicability of international water law to ground water and review the case of the Guarani Aquifer system, shared by Argentina, Brazil, Paraguay, and Uruguay. After discussing this recently recognized transboundary resource and the projects devised by the riparians to manage it, the authors review the legal principles required for appropriate use of the aquifer. The authors consider different legal clauses and texts assessed by international organizations and legal societies, culminating their discussion of international water law with the 1997 UN Convention. Like Eckstein and Eckstein, Kemper et al. consider the definition of "watercourse" and "ground water" and argue that applying the 1997 UN Convention to the Guarani Aquifer may be problematic. Although the authors also point to the Bellagio Draft Treaty as a possible outline for aquifer management in the Guarani case, they argue that, given groundwater law's embryonic development, the riparian states will have a challenging task ahead.

One major work reviewing the 1997 UN Convention is by Attila Tanzi and Maurizio Arcari.¹³³ The authors not only take the reader through an historical context of how international water law has developed and evolved but also review the entire Convention, its principles and articles. Their survey reveals and emphasizes several important points: (1) The equitable utilization principle and the no harm rule, rather than competing with each other, are part of the same normative setting. This applies to both water allocation and pollution. One does not prevail over the other. (2) While the Convention is primarily interested in the economic exploitation of water, its reference to general rules and standards of environmental law constrains the freedom of co-riparians. While the no harm principle does not necessarily refer to pollution issues, pollution is one of the mainstays of the principle. Thus the "subjectivism inherent in the unilateral or agreed assessment of the equitable character of a use finds a limit in the

132. K. Kemper, et al., *Management of the Guarani Aquifer System: Moving Towards the Future*, Special Issue: *Transboundary Aquifers*, 28 WATER INT'L (June 2003).

133. A. TANZI & M. ARCARI, THE UNITED NATIONS CONVENTION ON THE LAW OF INTERNATIONAL WATERCOURSES: A FRAMEWORK FOR SHARING (2001).

objective requirements of protection and preservation of the watercourse." (3) The authors also argue that it is this balance inherent in the Convention that makes it a suitable reference in actual or potential negotiations. And while the Convention has not entered into force, its authority is not subject in codification. The authors argue, rather, that its relevance is demonstrated in the way it is used in other international agreements as a catalyst and impetus for ending disputes. The authors mention the 1994 Treaty of Peace between Israel and Jordan and the 1995 Interim Agreement on the West Bank and Gaza between Israel and the Palestinians and the treaties' use of principles adopted in the Convention to resolve the associated water disputes.

The 1997 UN Convention is also reviewed in a book by Salman Salman and Kishor Uprety.¹³⁴ More importantly, however, the book considers international water law in the context of South Asian rivers and their associated agreements among the riparians. The authors review the Indus, Kosi, Gandaki, Mahakali, and Ganges River Treaties, and in that context the authors make three important observations: (1) The ever important principle of equitable utilization was defined and developed by the respective countries in the context of their negotiations according to their needs, interests, and sentiments; (2) Despite the above observation, even the most recent South Asian water treaties have not incorporated more current thinking on equitable and sustainable use of a common watercourse. Instead the bargaining processes were typified by different posturing strategies between upstream and downstream states citing principles ranging from territorial sovereignty and prior-appropriation to riparian rights and equitable utilization; and finally (3) Issues such as water allocation and rights to benefits created were sometimes ambiguously defined or did not satisfy the desires of all parties.

Manuel Schiffler¹³⁵ also reviews several treaties in the context of the UN Convention. He considers treaties from the Middle East and North Africa, East Asia, and Europe. His aim is to assess the agreements while considering several guiding principles crucial to their effectiveness: the importance of links with non-water issues, the consideration of other riparian rights in bilateral agreements, the distribution of the risk of droughts among the treaty parties, the consideration of water quality factors, the provisions for the enforcement of the treaties, and the application of other principles embodied in the 1997 UN Convention and

134. S. SALMAN & K. UPRETY, *CONFLICT AND COOPERATION ON SOUTH ASIA'S INTERNATIONAL RIVERS: A LEGAL PERSPECTIVE* (2002).

135. M. Schiffler, *International Water Agreement: A Comparative View*, in *GROUNDWATER: LEGAL AND POLICY PERSPECTIVES* (S. Salman ed., Proceedings of a World Bank Seminar, World Bank Technical Paper No. 456, Nov. 1999); *WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION* (W. Schuemann & M. Schiffler eds., 1998).

the 1966 Helsinki Rules. He makes recommendations for future negotiations over shared waters.

Finally, in another work on the connection between individual treaties and the 1997 Convention, Phera Ramoeli reviews the SADC Protocol on Shared Water Courses.¹³⁶ While the SADC Protocol was originally signed in 1995, it recently (in 2000) was modified and expanded to align itself with the UN Convention on the Law of Non-Navigational Uses of Shared Watercourses. Ramoeli explains how the harmonization process between a general international convention and a regional protocol took place. Interestingly, harmonization is discussed and encouraged in Article 3 of the UN Convention. The modified SADC Protocol can provide an appropriate lesson for other river basins considering the same procedure.

We conclude with two separate books, one edited by Patricia Wouters¹³⁷ and the other authored by Stephen McCaffrey.¹³⁸ In a book that also reviews the evolution of international legal principles, Wouters compiles a set of articles on international water law authored by Charles Bourne. The book spans not only the issues of river utilization and pollution but also discusses such matters as disputed works, information exchange among river riparians, and the duty of riparians to consult and negotiate. The book culminates with a set of articles related to Canadian international water issues. McCaffrey's book provides a thorough account of international water law both before and after the 1997 Convention. McCaffrey considers the 1997 UN Convention and the ever important Articles 5 and 7, arguing that there is no need to reconcile both principles since they are two sides of the same coin. Of course, and as McCaffrey has argued before, equitable utilization is the basis for this reconciliation. Perhaps most interesting about McCaffrey's book, however, is his discussion of the four principal theories pertaining to international watercourse law, including absolute territorial sovereignty, absolute territorial integrity, limited territorial sovereignty (equitable utilization), and the community of interest principle. McCaffrey discusses the evolution of these principles both in the context of legal interpretations and state practice, assessing each principle. In his book, McCaffrey also considers international rulings made by courts and tribunals, arbitral awards, and decisions of national courts—all which reflect on the principles discussed. McCaffrey also considers current and

136. P. Ramoeli, *The SADC Protocol on Shared Watercourses: Its Origins and Current Status*, in *HYDROPOLITICS IN THE DEVELOPING WORLD: A SOUTHERN AFRICAN PERSPECTIVE* (A. Turton & R. Henwood eds., 2002).

137. *INTERNATIONAL WATER LAW: SELECTED WRITINGS OF PROFESSOR CHARLES B. BOURNE* (Patricia Wouters ed., 1997).

138. STEPHEN McCAFFREY, *THE LAW OF INTERNATIONAL WATERCOURSES: NON-NAVIGATIONAL USES* (2001).

past conflicts over international waters. His book culminates with an analysis of the relatively ignored issue of groundwater and international water law.

CASE STUDIES

As can be seen above, the study of conflict and cooperation over shared waters is often articulated and developed in the context of case studies. It is difficult to discuss broad concepts that make up a large part of the field without referring to particular river basins. The theories that constitute the field, therefore, are largely formulated in the context of individual rivers and their associated riparians. The case study approach is common for several reasons. First, it is, in many cases, the data collection stage of possible application for multi-basin comparisons. Second, in the absence of sufficient tools to address generic problems across a large number of basins, and given the interdisciplinary approach often needed to analyze conflict and cooperation over shared waters, the case study approach is probably where most analysts feel most comfortable starting. Finally, the case study approach also allows for a thorough investigation of a particular river basin.

Given the multitude of case studies present in the literature, we believe that no assessment of the past ten years of water literature is complete without a more thorough review of some of the other key writings on individual river basins. These writings also make up the theoretical foundations and speak to the development of the water field. Consequently, they naturally fit into one or more of the various disciplines discussed above. For the sake of convenience, we mention these studies here according to region. Given the array of topics these readings cover, some titles discussed above will reappear below.

Middle East and North Africa

The hopes for a solution to the water dispute between the Israelis and Palestinians—over the Mountain Aquifer—in the late 1980s and early 1990s yielded many second track dialogues among technical experts from both sides. The edited book by Jad Isaac and Hillel Shuval¹³⁹ is one example of such feats. Among the various works presented in this book, we note those that focus on allocations and institutions—it is now especially interesting to consider these proposals in retrospect. J.W. Moore¹⁴⁰ suggests an allocation regime that is based on several factors

139. WATER AND PEACE IN THE MIDDLE EAST (J. Isaac & H. Shuval eds., 1994).

140. J.W. Moore, *An Israeli-Palestinian Water-Sharing Regime*, in Isaac & Shuval eds., *supra* note 139.

such as existing utilization, recharge area, natural flow, and population. Three other chapters in this book suggest novel (H. Zarour and Jad Isaac¹⁴¹ and innovative (Norman Dudley¹⁴²) approaches for allocation of the waters of the Mountain Aquifer between the Israelis and the Palestinians, as well as a set of principles for equitable allocation of the shared waters between Israelis, Palestinians, Jordanians, Lebanese, and Syrians (Hillel Shuval¹⁴³). The edited book by Eran Feitelson and Marwan Haddad¹⁴⁴ is another example of cooperation between Israeli and Palestinian technical experts. Among the various works, we note four different chapters. The introductory chapter by Marwan Haddad, Eran Feitelson, and Shaul Arlosoroff¹⁴⁵ discusses particular principles required for managing a joint aquifer. Another chapter by Aaron Wolf¹⁴⁶ discusses the evolution of the parties' positions during negotiations from that focusing on "rights" to that focusing on "needs." Wolf argues that in addition to other creative solutions often employed by states negotiating a shared international watercourse, the notion of "needs" rather than "rights" can be an appropriate mechanism for solving disputes such as that over the Mountain Aquifer. Finally, two related chapters, one by Eran Feitelson and Marwan Haddad¹⁴⁷ and the other by Marwan Haddad, Eran Feitelson, Shaul Arlosoroff, and Taher Nassereddin,¹⁴⁸ follow up on the more generic principles offered in the introductory chapter. The authors provide a more detailed account of possible joint management bodies, approaches for more efficient water use, and resource protection structures.

Two chapters in the book by Green Cross International also discuss the issue of Israeli-Arab hydropolitics. The chapter by Hillel

141. H. Zarour & J. Isaac, *A Novel Approach to the Allocation of International Water Resources*, in Isaac & Shuval eds., *supra* note 139.

142. Norman J. Dudley, *An Innovative Institutional Arrangement with Potential for Improving the Management of International Water Resources*, in Isaac & Shuval eds., *supra* note 139.

143. Hillel Shuval, *Proposed Principles and Methodology for the Equitable Allocation of the Water Resources Shared by the Israelis, Palestinians, Jordanians, Lebanese and Syrians*, in Isaac & Shuval eds., *supra* note 139.

144. MANAGEMENT OF SHARED GROUNDWATER RESOURCES: THE ISRAELI PALESTINIAN CASE WITH AN INTERNATIONAL PERSPECTIVE (E. Feitelson & M. Haddad eds., 2001).

145. M. Haddad, E. Feitelson & S. Arlosoroff, *The Management of Shared Aquifers*, in Feitelson & Haddad eds., *supra* note 144.

146. A. Wolf, *From Rights to Needs*, in Feitelson & Haddad eds., *supra* note 144.

147. E. Feitelson & M. Haddad, *A Sequential Flexible Approach to the Management of Shared Aquifers*, in Feitelson & Haddad eds., *supra* note 144.

148. M. Haddad, E. Feitelson, S. Arlosoroff & T. Nassereddin, *A Proposed Agenda for Joint Israeli-Palestinian Management of Shared Groundwater*, in Feitelson & Haddad eds., *supra* note 144.

Shuval¹⁴⁹ is of special interest because it considers a possible water deal between Israel, Syria, and Lebanon. Shuval argues that if certain water allocations are provided to Syria and Lebanon from Israel's current intake—based on the 1955 Johnston Plan—this lost water can be easily replaced by desalination. Furthermore, purchasing water from Lebanon and the construction of dams on the Yarmuk could likewise facilitate a water deal between past enemies and enhance the cooperative management of the Jordan River Basin. Another chapter by Wayne Owens and Kenley Brunsdale¹⁵⁰ also considers the issue of large-scale desalination for augmenting water supplies in Israel, Jordan, and the Palestinian Authority. Munther Haddadin,¹⁵¹ like Shuval, also considers the hydrogeopolitics between Israel and Syria and Israel and Lebanon. But Haddadin also assesses the water negotiations between Israel and Jordan and Israel and the Palestinians in the same context. Haddadin also reviews the sticking points for any water deal that may be finalized between Israel, Syria, and the Palestinians. He reviews and presents the successful water agreement between Israel and Jordan as testimony to the notion that water is a source of cooperation. In the same special issue, Hussein Amery¹⁵² provides a less somber assessment of water as a cooperative resource. He cites perhaps one of the most recent examples of a water dispute—that between Israel and Lebanon over the Wazzani Springs and the Hatzbani River, a source and tributary of the Jordan River. Amery provides an interesting analysis of both the hydrogeopolitical and overall political relations between Israel and Lebanon. According to Amery, the parties reached the brink of war over water but this was due to a multitude of factors including coalescence of drought, decades of duelling and distrust, developmental needs, and a territorial dispute. Jochen Renger¹⁵³ also considers the hydrogeopolitics between Israel, Syria, Jordan, and the Palestinians. Renger concludes that Israel's water conflict with Jordan and the Palestinians is a genuine water conflict while its conflict with Syria is about larger security concerns and national prestige. Renger assesses the general positions of each state and entity

149. H. Shuval, *The Water Issues on the Jordan River Basin between Israel, Syria and Lebanon Can Be a Motivation for Peace and Regional Cooperation*, in *WATER FOR PEACE IN THE MIDDLE EAST AND SOUTHERN AFRICA* (Green Cross Int'l 2000).

150. W. Owens & K. Brunsdale, *Solving the Problem of Fresh Water Scarcity in Israel, Jordan, Gaza and the West Bank*, in *Green Cross Int'l*, *supra* note 149.

151. M. Haddadin, *Water in the Middle East Peace Process*, 168 *GEOGRAPHICAL J.* (No. 4, 2002).

152. H. Amery, *Water Wars in the Middle East: A Looming Threat*, 168 *GEOGRAPHICAL J.* (No. 4, 2002).

153. J. Renger, *The Middle East Peace Process: Obstacles to Cooperation over Shared Waters*, in *WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION* (W. Scheumann & M. Schiffler eds., 1998).

and concludes that questions of security and territory overwhelm the water issue.

While analyses of the Arab-Israeli water conflicts have been expansive, so have been the ideas for resolving it using technical and non-traditional means. Non-conventional mechanisms will surely have to be a part of any larger water agreement in the region, and the literature has recognized this. Masahiro Murakami,¹⁵⁴ for example, reviews prospects for utilizing groundwater aquifers and employing other technical and non-conventional strategies, such as desalination of seawater and brackish water, to solve the regional water dispute and for use by individual countries suffering from water scarcity. Murakami considers the merits of possible projects such as a joint Israel-Palestinian-Jordanian Mediterranean-Dead Sea conduit and desalination plant, which would produce both desalinated drinking water and power using both hydropower and solar-hydropower. Another project suggested by Murakami, this time specific to Jordan, is adding mini-hydropower plants and a reverse osmosis desalination plant to the existing Disi-Aqba water pipeline system, thus conserving the non-renewable freshwater of the Disi aquifer, and instead developing the brackish ground water in closely located sandstones.¹⁵⁵ Richard Just, John Horowitz, and Sinaia Netanyahu¹⁵⁶ also review several possible projects in the Jordan Basin. They indicate the probable participants for every project, their costs, and water quantity to be supplied. Some of these projects include a Kinneret-Yarmouk project, a Litani-Hasbani project, and the importing of Nile River water to Gaza. In another book by Asit Biswas, Johns Kolars, Masahiro Murakami, John Waterbury, and Aaron Wolf,¹⁵⁷ the issue of augmenting the scarce water supplies of the Middle East is discussed. The authors place their discussion in the context of the "periphery" (countries such as Turkey and Iraq) and the "core" (such as Jordan, Israel and the Palestinians) of the Middle East. They argue that the waters originating in the "core" will not suffice for the area's future needs, especially if population growth remains unchecked or if current agricultural practices are continued. The authors argue that water will

154. M. MURAKAMI, *MANAGING WATER FOR PEACE IN THE MIDDLE EAST: ALTERNATIVE STRATEGIES* (1995); see also M. Murakami, *Alternative Strategies in the Inter-state Regional Development of the Jordan Rift Valley*, in *CENTRAL EURASIAN WATER CRISIS: CASPIAN, ARAL AND DEAD SEAS* (I. Kobori & M. Glantz eds., 1998).

155. M. MURAKAMI, *MANAGING WATER FOR PEACE IN THE MIDDLE EAST: ALTERNATIVE STRATEGIES* 185 (1995).

156. R. Just, J. Horowitz, & S. Netanyahu, *Peace and Prospects for International Water Projects in the Jordan-Yarmouk River Basin*, in *DECENTRALIZATION AND COORDINATION OF WATER RESOURCE MANAGEMENT* (D. Parker & Y. Tsur eds., 1997).

157. *CORE AND PERIPHERY: A COMPREHENSIVE APPROACH TO MIDDLE EASTERN WATER* (A. Biswas et al. eds., 1997).

have to be augmented by desalination and/or water imports from the "periphery." In general, the book provides a convenient source of other possible water augmenting projects discussed in the context of the Middle East.

Arnon Soffer¹⁵⁸ also considers non-conventional solutions to water scarcity in the Middle East such as importing water and cloud seeding. Yet most interesting about Soffer's book is his review of some of the political changes that took place in the Middle East since 1992 such as the Israeli-Palestinian Declaration of Principles and subsequent agreements and their relevance to water up to 1997. Soffer also reviews the 1994 Jordanian-Israeli water agreement and assesses the obligations of the parties. Perhaps one of the most compelling, not to mention first-hand accounts, of the 1994 negotiations is written by Munther Haddadin.¹⁵⁹ Haddadin, the Jordanian Minister of Water and Environment at the time and chief Jordanian water negotiator in the peace talks, provides a personal interpretation of the discussions and the behind-the-scenes events. His book covers the entire history of the water conflict highlights the different aspects of the dispute and the various disciplines involved in its analysis. Haddadin also discusses the international and regional political environment in the region at the time, which pushed the parties towards resolving the conflict. Haddadin elaborates on the stability of the treaty and the various obstacles that created challenges to its implementation. In another account of the negotiations over the Jordan River Basin, Uri Shamir¹⁶⁰ analyzes the discreet and informal negotiations that took place between Israel and Jordan over the Yarmouk River in the 1980s and the 1994 negotiations between Israel and Jordan over the Jordan River. Ines Dombrowsky¹⁶¹ also analyzes the water accords that were negotiated in the Middle East peace process between Israel and Jordan. Perhaps most striking about Dombrowsky's analysis is an assessment of the Israeli and Palestinian water dispute and the cooperation among the parties. In two interesting tables,¹⁶² Dombrowsky evaluates the status of implementation of agreed

158. A. SOFFER, *RIVERS OF FIRE: THE CONFLICT OVER WATER IN THE MIDDLE EAST* (1999).

159. MUNTHUR J. HADDADIN, *DIPLOMACY ON THE JORDAN, INTERNATIONAL CONFLICT AND NEGOTIATED RESOLUTION* (2001).

160. U. Shamir, *The Negotiations and the Water Agreement between The Hashemite Kingdom of Jordan and the State of Israel*, PCCP, UNESCO (2001-2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/jordan_shamir_2.pdf.

161. I. Dombrowsky, *Water Accords in the Middle East Peace Process: Moving Towards Cooperation?* in *SECURITY AND ENVIRONMENT IN THE MEDITERRANEAN* (Brauch et al. eds., 2003); see also I. Dombrowsky, *The Jordan River Basin: Prospects for Cooperation Within the Middle East Peace Process?* in *WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION* (W. Scheumann & M. Schiffler eds., 1998).

162. *Id.* at 737, 739.

projects and derives some trajectories as to the likelihood of cooperation among these riparians.

In the context of the Israeli-Palestinian water dispute, Sharif Elmusa¹⁶³ provides a legal, historical, economic, and political account of the water conflict and prospects for its resolution. Elmusa discusses the water resources shared between the two parties and the history of the conflict and argues that international legal principles need to be instrumental in guiding the parties to resolution. In another book, Martin Sherman¹⁶⁴ provides an Israeli perspective of the Israeli-Palestinian dispute over the Mountain Aquifer. Sherman summarizes the four main conflicting issues between the two riparians: (a) rights to the waters, (b) Jewish immigration to Israel as a factor in the availability of these waters, (c) the right of the Palestinians to develop the water of the Mountain Aquifer, and (d) whether or not Palestinians should control the water. Sherman then comes up with two paradigms—an economic one and a political one—for assessing the conflict and prospects for its resolution. The economic paradigm asserts that dealing with the poverty on the Palestinian side is an essential condition for solving the water conflict. However, the political paradigm—both the internal politics (of both sides) and the politics of the Arab-Israeli conflict—suggests that cooperation among the parties (leading to poverty alleviation and thus water conflict resolution) is a remote possibility. In a more positive account of the Israeli-Palestinian water dispute, Aaron Wolf¹⁶⁵ provides a detailed analysis of the Jordan River Basin and considers cooperative watershed development, which include possible political and bargaining options through confidence building. In a more recent book, Alwyn Rouyer¹⁶⁶ provides an intricate account of the Israeli-Palestinian water conflict. Most distinct about Rouyer's work is that it provides a thorough analysis and review of the water agreements between the two sides since their mutual recognition in 1993 and up to 1999. Rouyer considers the agreements' implementation and importance, reviews other solutions beyond water sharing, and assesses the state of Palestinian water infrastructure. Finally, in the context of the Israeli-Palestinian water

163. S. ELMUSA, *WATER CONFLICTS: ECONOMICS, POLITICS, LAW AND PALESTINIAN-ISRAELI WATER RESOURCES* (1998).

164. MARTIN SHERMAN, *THE POLITICS OF WATER IN THE MIDDLE EAST, AN ISRAELI PERSPECTIVE ON THE HYDRO-POLITICAL ASPECTS OF THE CONFLICT* (1999).

165. A. Wolf, *Principles for Confidence-Building Measures in the Jordan River Watershed*, in *CENTRAL EURASIAN WATER CRISIS: CASPIAN, ARAL AND DEAD SEAS* (I. Kobori & M. Glantz eds., 1998).

166. A. ROUYER, *TURNING WATER INTO POLITICS: THE WATER ISSUE IN THE PALESTINIAN-ISRAELI CONFLICT* (2000).

dispute, Eran Feitelson and Marwan Haddad¹⁶⁷ remind us that allocation of the resource under dispute is not always the feasible solution to the water conflict. The basic premise in the Feitelson-Haddad approach in terms of the Mountain Aquifer is that joint management could be a better, less complicated, and more stable solution. The joint management of ground water implies that several prerequisites and supportive policies have to be in place. It implies that a legal framework has to be developed. In addition, a dispute resolution mechanism has to be available, and other resources such as land have to be considered. With lessons learned from other cases, the approach supported by Feitelson and Haddad is further developed to include a flexible sequential implementation process that could lead to a stable agreement among the parties.

The Nile River basin case is taken up in an edited book by Paul Howell and Tony Allan.¹⁶⁸ Of special interest are three different chapters by C.O. Okidi,¹⁶⁹ Paul Howell,¹⁷⁰ and Zewdie Abate¹⁷¹ and two other chapters by Tony Allan.¹⁷² The chapters by Okidi and Howell review the hydropolitics of the Nile River in the context of several agreements and projects that were established in the region under both colonial rule and independence. In addition to considering an array of agreements concluded prior to World War I, Okidi also reviews some of the projects and plans the Nile River riparians have either completed or are considering since the 1959 Agreement. Howell provides an account of the conflict between downstream states like Egypt and the upstream states or East African states such as Kenya and Uganda and reviews the development potential of power and irrigation in Ethiopia—one of the most disenchanting of the Nile River countries. Abate also considers the need for integrated development of the Nile waters, considering such issues as water allocation, compensation from winners to losers, and inter-regional power development. In the two chapters written by Allan, the evolving water demands, national development options, and water management strategies of the Nile riparians are considered. Policies for harmonized development and management are also considered. Allan

167. E. Feitelson & M. Haddad, *A Sequential Flexible Approach to the Management of Shared Aquifers*, in Feitelson & Haddad eds., *supra* note 144.

168. THE NILE: SHARING A SCARCE RESOURCE (P. Howell & J.A. Allan eds., 1994).

169. C.O. Okidi, *History of the Nile and Lake Victoria Basins through Treaties*, in Howell & Allan eds., *supra* note 168.

170. P. Howell, *East Africa's Water Requirements: The Equatorial Nile Project and the Nile Waters Agreement of 1929*, in Howell & Allan eds., *supra* note 168.

171. Z. Abate, *The Integrated Development of Nile Waters*, in Howell & Allan eds., *supra* note 168.

172. J.A. Allan, *Evolving Water Demands and National Development Options*, in Howell & Allan eds., *supra* note 168; J.A. Allan, *The Nile Basin: Water Management Strategies*, in Howell & Allan eds., *supra* note 168.

reviews the economic and political contexts that affect or determine the relationships of the Nile Basin states. He considers the time factor embedded in the hydropolitics of the region, arguing that downstream states see the water issue with much more urgency than the upstream states, largely given the lack of investment capital for use by upstream states. Allan also considers different development scenarios of the Nile waters in countries such as Sudan and Ethiopia and states in East Africa. In another book by Peter Rogers and Peter Lydon, Yahia Abdel Mageed¹⁷³ also reviews the 1929 and 1959 treaties and their implications for Sudan and Egypt and the Eastern African countries.

The Nile River issue is also taken up by Manuel Schiffler,¹⁷⁴ who reviews some of the large projects undertaken in the region and reviews the positions and interests of Egypt, Sudan, and Ethiopia. Schiffler envisions a hypothetical situation where an agreement is concluded for the entire basin and outlines his reasoning, starting his analysis with the agreement on peace and joint cooperation between Ethiopia and Egypt in 1991 and the Nile 2002 conferences, which began with the 1993 Aswan meeting. Schiffler points to the Arusha Conference, held in 1995, which saw the establishment of an Expert Council, which was in-turn given the task of working out a framework agreement on the allocation of the waters of the Nile between all the riparians. Dale Whittington, John Waterbury, and Elizabeth McClelland¹⁷⁵ also discuss the possibility of a new Nile Waters Agreement. The authors restrict their analysis to the Blue Nile and provide a brief analysis of the 1959 Nile Agreement. They argue that developments on the ground have necessitated a renegotiation of the 1959 Agreement, which should include such principles as the exploitation of joint gains, allocation of long-term water yields, and the establishment of regional water markets. Alan Nicol¹⁷⁶ provides another account of the Nile Basin outlining the history, politics, and legal issues embodied in the hydropolitics of the river. Most interesting about the author's account is the detailed analysis of the Nile Basin Initiative—the most recent attempt at fostering cooperation and coordination among the Nile riparians—and its major programs,

173. Y.A. Mageed, *The Central Region: Problems and Perspectives*, in *WATER IN THE ARAB WORLD: PERSPECTIVES AND PROGNOSIS* (P. Rogers & P. Lydon eds., 1994).

174. M. Schiffler, *Conflicts over the Nile or Conflicts on the Nile?*, in *WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION* (W. Scheumann & M. Schiffler eds., 1998).

175. D. Whittington, J. Waterbury & E. McClelland, *Toward a New Nile Waters Agreement*, in *WATER QUANTITY/QUALITY MANAGEMENT AND CONFLICT RESOLUTION* (A. Dinar & E. Loehman eds., 1995).

176. A. Nicol, *The Nile: Moving Beyond Cooperation*, PCCP, UNESCO (2002–2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/nile.pdf.

illustrating the nature of the national and basin-wide institutional and process complexity within the basin. Henrike Peichert¹⁷⁷ surveys the Nile Basin Initiative in detail.

In his book on the Nile basin, Tesfaye Tafesse¹⁷⁸ introduces one new feature into the analysis of the hydropolitics in the basin that has not been previously published in such detail—the analysis of the treaties, starting with the turn of the nineteenth century and ending with the recent basin-wide cooperation that is now in the making. In doing so, Tafesse adds the time variable to the analysis of the relationship between the main riparians—Egypt, Ethiopia, and Sudan. Another feature that is introduced by Tafesse is the positions of the greater set of riparians, including also the White Nile riparians. However, while Tafesse provides great detail in the case of Egypt, Ethiopia, and Sudan (Blue Nile riparians), fewer details are provided for the White Nile riparians. Here we would refer the reader to the quantitative analysis in Dinar and Alemu,¹⁷⁹ which addresses the riparian positions of the White Nile.

It is interesting to contrast the work by Tesfaye Tafesse with that of John Waterbury.¹⁸⁰ While Tafesse's work is rich in physical details and accounts for the time element, Waterbury emphasizes the political dynamics and the forces that affect the direction in which the Nile riparians are moving in their negotiations. The time element is introduced in Waterbury's analysis by analyzing the three major treaties signed among the three main riparians between 1929 and 1959. Waterbury also introduces additional concepts from international relations, negotiation theory, and game theory in application to the Nile.

To discuss the case of the Euphrates-Tigris River Basin, we return here to the article by Aysegül Kibaroglu and Olcay Unver¹⁸¹ and Aysegül Kibaroglu's 2002 book.¹⁸² In both works, the latter more detailed than the former, the authors provide an intricate description of the negotiations and consultation between Turkey, Iraq, and Syria, starting in the turn of the nineteenth century until the mid 1990s. The approach used by the authors could be a model for dealing with other case studies of a single basin. The works cover both physical and political geography

177. Henrike Peichert, *The Nile Basin Initiative: A Catalyst for Cooperation*, in SECURITY AND ENVIRONMENT IN THE MEDITERRANEAN (Brauch et al. eds., 2003).

178. TESFAYE TAFESSE, THE NILE QUESTION: HYDROPOLITICS, LEGAL WRANGLING, MODUS VIVENDI AND PERSPECTIVES (2001).

179. A. Dinar & S. Alemu, *The Process of Negotiation over International Water Disputes—The Case of the Nile Basin*, 5 INT'L NEGOTIATION 311-30 (2000).

180. JOHN WATERBURY, THE NILE BASIN, NATIONAL DETERMINANTS OF COLLECTIVE ACTION (2002).

181. A. Kibaroglu & O. Unver, *An Institutional Framework for Facilitating Cooperation in the Euphrates-Tigris River Basin*, 5 INT'L NEGOTIATION (No. 2, 2000).

182. A. KIBAROGLU, BUILDING A REGIME FOR THE WATERS OF THE EUPHRATES-TIGRIS RIVER BASIN (2002).

related aspects of the conflict. The authors show that the main obstacle facing the basin riparians is most likely Turkey's view that the Euphrates-Tigris should be considered as one basin. This is opposite the view of Iraq and Syria, which consider the Euphrates and the Tigris Rivers as two separate basins with different water flow regimes. Waltina Scheumann¹⁸³ provides another assessment of the obstacles facing the three riparians. She argues that the conflict among Turkey, Syria, and Iraq is about issues other than water. She also considers the support given by Syria to organizations such as the Secret Army of Liberation of Armenia (SALA) and the Kurdish Workers Party (PKK) starting in the 1980s, groups that were acting against Turkey. According to Scheumann, water became part of this larger game and was embroiled in the conflict over Syria's support for SALA and the PKK. While the countries are still pursuing uncoordinated strategies on the two rivers, now that Syria's support for such groups has all but terminated and Syria and Turkey are improving their bilateral ties, progress on the Euphrates-Tigris Basin is more probable. Another interesting feature in this chapter is a table outlining the record of cooperation between the three parties and the associated security issues on the Euphrates-Tigris Basin starting in 1946 and ending in 2001.¹⁸⁴ In another book, Schuemann¹⁸⁵ shows that due to the slow implementation of Turkey's projects, which have also sparked much conflict among the riparians, their potential impact on the Euphrates River's water balance has been low. She therefore discounts some of the objections voiced by Syria and Iraq vis-à-vis Turkey. Similarly, she argues that the projects built upstream by Turkey, despite their negative effects downstream, provide benefits to downstream states such as flood control and the trapping of sediments. She argues that compensation and cost sharing may be employed to account for these benefits.

A book edited by Asit Biswas¹⁸⁶ covers several river basins in the Middle East (Jordan, Litani, and Nile) but of special interest are two chapters, one by John Kolars¹⁸⁷ and the other by Ozden Bilen¹⁸⁸ on the Euphrates-Tigris River Basin. Kolars reiterates Turkey's pivotal

183. W. Scheumann, *The Euphrates Issue in Turkish-Syrian Relations*, in SECURITY AND ENVIRONMENT IN THE MEDITERRANEAN (Brauch et al. eds., 2003).

184. *Id.* at 756.

185. W. Scheumann, *Conflicts on the Euphrates: An Analysis of Water and Non-water Issues*, in WATER IN THE MIDDLE EAST: POTENTIAL FOR CONFLICTS AND PROSPECTS FOR COOPERATION (W. Scheumann & M. Schiffler eds., 1998).

186. INTERNATIONAL WATERS OF THE MIDDLE EAST: FROM EUPHRATES-TIGRIS TO NILE. NEW DELHI: (Asit K. Biswas ed., 1994).

187. J. Kolars, *Problems of International River Management: The Case of the Euphrates*, in Biswas ed., *supra* note 186.

188. O. Bilen, *Prospects for Technical Cooperation in the Euphrates-Tigris Basin*, in Biswas ed., *supra* note 186.

geographic location and political power as a central actor in the basin and reviews the history of the conflict. Bilen discusses the applicability of technical solutions to the conflict with special emphasis on water transfers from the Tigris to the Euphrates. Another interesting analysis of the cooperation potential in the Euphrates and Tigris is undertaken by Serdar Guner.¹⁸⁹ The author investigates possible alliances between the three riparians. Using game-theoretic and game-tree applications, Guner considers how the prospects of larger amounts of water released by Turkey and Syria's support of the PKK combine to produce a cooperative outcome that also benefits Iraq. Posing Iraq as a dummy player that has no choices but does have stakes in the possible outcome of the Turkey-Syria issue linkage, Guner finds that Turkey-Iraq and Syria-Iraq alliances are probable in balancing threats in the basin. In addition, a Turkey-Syria alliance cannot target Iraq given that Iraq cannot threaten the former's water supply. Iraq therefore becomes the swing state that tips the balance either in favor of Syria or Turkey. If Turkey does not release additional water and Syria continues to support the PKK, Iraq prefers an alliance with Syria against Turkey. If Turkey releases additional water but Syria continues to support the PKK, Iraq prefers an alliance with Turkey. Yahia Bakour and John Kolars¹⁹⁰ also take up the issue of the Euphrates River and provide a short review of the history of the conflict between Turkey, Syria, and Iraq. Perhaps most provocative about this article is its blunt speculation of how each country will behave vis-à-vis the basin and the actions each state may take. Bakour and Kolars, like Guner, make reference to possible alliances. They also discuss possible alternatives to the status quo of stalemate and conflict, such as data predicting future water availability, which can in turn encourage innovative and within-nation conservation plans.

To close the discussion on Middle East case studies, we note some of the underground water aquifers in a relatively understudied region, the Arabian Peninsula and North Africa. Several authors should be noted. Jamil Al Alawi and Mohammed Abdulrazzak¹⁹¹ provide an assessment of the water stocks in the Peninsula but also discuss some of the important deep fossil aquifers, which are the most dependable sources for water for urban consumption and extensive agricultural activities. The fact that many of these aquifers are shared raises the issue

189. A. Guner, *Water Alliances in the Euphrates-Tigris Basin*, in ENVIRONMENTAL CHANGE, ADAPTATION, AND SECURITY (S. Lonergan ed., 1999).

190. Y. Bakour & J. Kolars, *The Arab Mashrek: Hydrologic History, Problems and Perspectives*, in WATER IN THE ARAB WORLD: PERSPECTIVES AND PROGNOSSES (P. Rogers & P. Lydon eds., 1994).

191. J. Al Alawi & M. Abdulrazzak, *Water in the Arabian Peninsula: Problems and Perspectives*, in Rogers & Lydon eds., *supra* note 190.

of sharing and cooperative management. Dolatyar and Gray¹⁹² also provide an extensive analysis of the hydropolitics and the shared groundwater aquifers in the Peninsula. Perhaps most interesting about their analysis is that despite the increasing depletion of shared aquifers, Arabian Peninsula countries are turning to desalination. Recycling of wastewater is still in its early stages. A book by Greg Shapland¹⁹³ also considers the Disi Aquifer shared between Saudi Arabia and Jordan while the book by Arnon Soffer¹⁹⁴ considers various North African aquifers.

South and South East Asia

In a chapter that can easily be associated with the water and war debate, Udala Alam¹⁹⁵ showcases the 1960 Indus River Treaty between India and Pakistan as an example of a cooperative venture between two mortal enemies. Alam argues that rather than go to war over the disputed resource, as the water-war school would predict, the two countries were able to safeguard their water supplies through cooperation. The author assesses the reasoning behind the expectations for a water war, the cooperation that instead ensued, and the water negotiations that took place. Coining the term water rationality, the author argues that water is too important to fight over. Keith Pitman¹⁹⁶ also reviews the history of the conflict and the Indus Treaty in the context of the World Bank's efforts to foster cooperation between the two countries.

The issue of the management and sharing of the Ganges is taken up by Tauhidul Anwar Khan.¹⁹⁷ The author discusses the history of water resources and energy development in the Basin. Khan then considers the dispute over the Ganges and the history of negotiations between India and Pakistan (before Bangladesh became an independent state) and then between India and Bangladesh. The author traces the obstacles faced by the two parties as they attempted to reach a satisfactory solution to the sharing of the dry season flows of the Ganges and reviews the proposals

192. M. DOLATYAR & T. GRAY, *WATER POLITICS IN THE MIDDLE EAST: A CONTEXT FOR CONFLICT OR CO-OPERATION?* (2000).

193. G. SHAPLAND, *RIVERS OF DISCORD: INTERNATIONAL WATER DISPUTES IN THE MIDDLE EAST* (1997).

194. A. SOFFER, *RIVERS OF FIRE: THE CONFLICT OVER WATER IN THE MIDDLE EAST* (1999).

195. U. Alam, *Questioning the Water Wars Rationale: A Case Study of the Indus Waters Treaty*, 168 *GEOGRAPHICAL J.* (No. 4, 2002).

196. K. Pitman, *The Role of the World Bank in Enhancing Cooperation and Resolving Conflict on International Watercourses: The Case of the Indus Basin*, in *INTERNATIONAL WATERCOURSES: ENHANCING COOPERATION AND MANAGING CONFLICT* (S. Salman & L. Boisson de Chazournes eds., World Bank Technical Paper No. 414, 1998).

197. A.T. Khan, *Management and Sharing of the Ganges*, 36 *NAT. RESOURCES J.* 455 (1996).

made by each government. This issue was finally resolved between the parties in a 1996 treaty when new, more accommodative governments came to power in both states. The author concludes by suggesting that harnessing the entire potential of the basin will require multilateral coordination. A detailed analysis of the 1996 Treaty is provided by Salman Salman.¹⁹⁸ While the author considers the intricacies of the treaty, he concludes by suggesting that perhaps one of the main outcomes of the accord is that it not only provided for agreement on the Bangladeshi project to store wet season flow of the Ganges but also created a momentum for discussing other sensitive issues.

An edited book by Asit Biswas and Juha Uitto¹⁹⁹ also deals with the Ganges-Brahmaputra-Meghna Basin while another edited book by Asit Biswas and Tsuyoshi Hashimoto²⁰⁰ covers a broader set of rivers of the Asian continent, including the Salween and the Mekong. B.G. Verghese²⁰¹ discusses the hydropolitics between Nepal and India and between India and Bhutan. Perhaps most interesting in this chapter is the juxtaposition of Nepal and Bhutan vis-à-vis India. Verghese demonstrates that despite Bhutan's smaller size and more modest hydropower potential, relative to Nepal, Bhutan has rapidly pulled ahead in negotiations with India over water resource development. This may be an important lesson for Nepal as it considers negotiating larger hydropower and irrigation projects with India. Jayanta Bandyopadhyay authors another review of water issues associated with Nepal, Bhutan, and India, in an edited book by Manas Chatterji, Saul Arlosoroff, and Gauri Guha.²⁰² Bandyopadhyay reviews the physical, hydrological, and political aspects of the basin's shared waters and assesses some of the plans to store monsoon runoff in the Himalayan rivers. The author considers the economic, technical, and social viability of these plans and then reviews the difficulties in fostering effective regional collaboration, which will be crucial to the damming and storing plans envisioned by the parties. In that context, Bandyopadhyay reviews the bilateral relations among the basin riparians. In her concluding remarks, Bandyopadhyay argues that lingering negotiations on important

198. S. Salman, *Sharing the Ganges Waters between India and Bangladesh: An Analysis of the 1996 Treaty*, in Salman & Boisson de Chazournes eds., *supra* note 196.

199. SUSTAINABLE DEVELOPMENT OF THE GANGES-BRAHMAPUTRA-MAGHNA BASINS (A.K. Biswas & J.I. Uitto eds. 2001).

200. ASIAN INTERNATIONAL WATERS: FROM GANGES-BRAHMAPUTRA TO MEKONG (A.K. Biswas & T. Hashimoto eds., 1996).

201. B.G. Verghese, *Towards an Eastern Himalayans River Concord*, in Biswas & Hashimoto eds., *supra* note 200.

202. J. Bandyopadhyay, *Water Management in the Ganges Brahmaputra Basin: Emerging Challenges for the 21st Century*, in CONFLICT MANAGEMENT OF WATER RESOURCES (M. Chatterji, S. Arlosoroff & G. Guha eds., 2002), (England and Vernon: Ashgate).

regional plans are a testament to the gap between collaboration and the lack of research initiatives on crucial issues. Grand regional projects, however, have to be placed in the context of sustainability and environmental norms. Similarly, the political culture of the region combined with the lack of trust among the states, national sovereignty, and interests have scuttled efforts to reach uniform views on regional projects. An effective institutional mechanism needs to emerge. The author concludes by remarking that collaboration on the people-to-people level is making some interesting headway in the basin, stressing sustainability, ecosystem based decisions, and multilateralism.

Two other chapters in the edited book by Biswas and Hashimoto, one by Tsuyoshi Hashimoto²⁰³ and the other by Pushpa Raj Onta, Ashim Das Gupta, and Rainer Loof,²⁰⁴ discuss the Salween River—a river that has received little attention but is of great development potential and thus conflict among its three riparians. Both chapters discuss the region-wide development potential of the river from irrigation to hydropower. Both chapters also consider benefit-sharing and cost-allocation schemes and provide a learned observation of the social, technical, institutional, and environmental aspects involved.

The book by Biswas and Hashimoto also includes three chapters on the Mekong River. One chapter by George Radosevich²⁰⁵ is of particular interest. Radosevich, who was contracted by UNDP as a senior advisor to assist in the negotiations over the Mekong, provides an account of what took place during the negotiations. He provides an historical account of the relations and hydropolitics among the Mekong riparians and offers a chronology of key events leading to the completion and acceptance of the Mekong Agreement. Radosevich concludes that it was the genuine interest of the parties to negotiate and commitment to an agreement of principles and institutional mechanisms that was fundamental to the success of the cooperative relationship. Greg Browder²⁰⁶ takes the reader through a description of the 1995 Mekong River agreement negotiations. He too describes the process of negotiations, relying, among other things, on interviews with principals in the actual negotiations. After providing some background information on the Mekong, Browder presents the negotiation process in the context of a “negotiation analysis” approach based on a review of state interests

203. T. Hashimoto, *Regional Cooperative Development for the Salween River*, in Biswas & Hashimoto eds., *supra* note 200.

204. R.P. Onta, D.A. Gupta & R. Loof, *Potential Water Resources Development in the Salween River Basin*, in Biswas & Hashimoto eds., *supra* note 200.

205. G. Radosevich, *The Mekong—A New Framework for Development and Management*, in Biswas & Hashimoto eds., *supra* note 200.

206. G. Browder, *An Analysis of the Negotiations for the 1995 Mekong Agreement*, 5 INT'L NEGOTIATION (No. 2, 2000).

and alternatives to agreement. Browder explains that the converging foreign policy interests of the parties combined with unattractive alternatives to a negotiated agreement facilitated the negotiations. The help of a third party, UNDP, was also instrumental in facilitating cooperation. Browder's step-by-step description of the negotiation process provides another example for those interested in taking note of state interests, bargaining strategies, third-party intervention, and subsequent party alternatives when considering other river basin negotiations.

The Mekong River and specifically the establishment of the 1995 Mekong River Commission are also analyzed by Jeffrey Jacobs.²⁰⁷ The author reviews the physical aspects of the Mekong and traces the institutional mechanisms formulated among the Mekong River riparians including the Mekong Committee, the Interim Mekong Committee, and finally the Mekong River Commission. Jacobs considers the Commission's shift in emphasis from a project-orientated focus to one of better management and preservation of existing resources. The case of the Mekong River is also reviewed by Ti Le-Huu and Lien Nguyen-Duc,²⁰⁸ who provide a detailed account not only of the institutional, economic, and political developments in the basin and subsequent negotiations but also address the national needs of each of the basin countries and the cooperative framework embodied in the region.

Africa

In an edited book by Solomon and Turton, a chapter by Peter Ashton²⁰⁹ provides some Southern African examples of water related conflicts. Ashton discusses three cases: the Okavango, Chobe, and Orange rivers. Ashton argues that, while water disputes may lead to regional instability, the means to prevent it rests in developing participatory and consensus building approaches and institutional and legal structures. In the same book, Richard Meissner²¹⁰ assesses the

207. J. Jacobs, *The Mekong River Commission: Transboundary Water Resources Planning and Regional Security*, 168 GEOGRAPHICAL J. (No. 4, 2002).

208. T. Le-Huu & L. Nguyen-Duc, *Mekong Case Study*, PCCP, UNESCO (2001-2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/mekong_ti_le_huu_2.pdf.

209. P. Ashton, *Southern African Water Conflicts: Are They Inevitable or Are They Preventable?*, in *WATER WARS: ENDURING MYTH OR IMPENDING REALITY?* (H. Solomon & A. Turton eds., 2000). For a similar discussion, see P. Ashton, *Southern African Water Conflicts: Are They Inevitable or Are They Preventable?*, in *WATER FOR PEACE IN THE MIDDLE EAST AND SOUTHERN AFRICA* (Green Cross Int'l 2000).

210. R. Meissner, *Hydropolitical Hotspots in Southern Africa: Will There Be a Water War? The Case of the Kunene River*, in Solomon & Turton eds., *supra* note 209; see also R. Meissner,

water-war argument in the context of the Kunene River. He considers the physical characteristics of the river basin and outlines the associated hydropolitics from 1926 to 2000. Meissner argues that the friendly relations between Angola and Namibia have led to cooperation in the river basin.

An entire edited book by Anthony Turton, Peter Ashton, and Eugene Cloete²¹¹ is dedicated to the Okavango River. While the book contains sixteen chapters on issues such as instream flow, flood, trade, management challenges, and recommendations for cooperative use of the river, we will focus on the first²¹² and last chapters²¹³—written by the editors of the book. The authors set out to test three hypotheses, which they outline in the first chapter: (1) the extent of the hydropolitical complex in the Okavango River Basin, (2) the larger definition of hydropolitics that moves away from a focus on conflict and to cooperation and expands the scope and range of the definition, and (3) the coping strategies available to states in preventing the probability of conflict over water. The last chapter discusses the content of the other chapters in the context of these hypotheses. As for the first hypotheses, the authors claim that while Namibia, Botswana, and Angola lack few alternatives to the Okavango River Basin, the notion of the hydropolitical complex allows for the consideration of inter-basin transfers of water to facilitate cooperation among the states. As for the second hypothesis, the authors argue that the definition of hydropolitics in the context of the Okavango River requires expansion and notions such as the natural and physical phenomenon of the basin, the dependency of the basin states on the river, their development needs, the cordial relations between the “hydropolitical” elite, and the need for basin wide coordination to secure funding for projects should be taken into account. Only then can cooperation, rather than conflict, be perceived as a possible outcome. As for the third hypothesis, the authors argue that good policy options are key to preventing conflict over the river. They point to the role of the basin wide organization, OKACOM, in harmonizing the policies of the three states.

Hydropolitical Hotspots in the Southern Africa: The Case of the Kunene River, in Green Cross Int'l, *supra* note 209.

211. TRANSBOUNDARY RIVERS: HYDROPOLITICAL DRIVERS IN THE OKAVANGO RIVER BASIN (A. Turton, P. Ashton & E. Cloete eds., 2003).

212. A. Turton, P. Ashton & E. Cloete, *An Introduction to the Hydropolitical Factors in the Okavango River Basin*, in Turton, Ashton & Cloete eds., *supra* note 211.

213. A. Turton, P. Ashton & E. Cloete, *Hydropolitical Drivers and Policy Challenges in the Okavango River Basin*, in Turton, Ashton & E. Cloete eds., *supra* note 211.

In a book produced by Green Cross International,²¹⁴ several other Southern African cases are reviewed. A chapter by R.T. Mochebelele²¹⁵ discusses the issue of the Lesotho Highlands Water Project between South Africa and Lesotho over the Senuqu/Orange River. Mochebelele reviews the treaty that governs the project, the hydropolitics between the two countries, and the potential conflicts in the basin. The author concludes that the project's 11-year successful implementation has signaled the treaty's great achievements. In another chapter, authored by Joanne Leestemaker,²¹⁶ the case of upstream and downstream-induced water conflicts is discussed. Leestemaker considers the position of Mozambique as a downstream state in all nine river basins it shares with its SADC neighbors. Leestemaker describes some of the problems that have been created by uncoordinated management between upstream countries and Mozambique. Discussing specifically the Incomati River basin, Leestemaker argues for the creation of a basin-wide authority to explore cooperative solutions.

Mikiyasu Nakayama²¹⁷ also edits a detailed book on Southern African rivers. The book contains chapters on specific rivers such as the Orange, Okavango, Zambezi, and Kunene. One chapter by Piet Heyns²¹⁸ provides an account of the rivers mentioned above plus other rivers such as the Cuvelai, Incomati, Limpopo, Maputo, Pungue, Rovuma, Save, Umbeluzi, and Congo River basins. Heyns provides a brief account of the physical aspect of each river and outlines the political dimensions of conflict and cooperation among the riparians. Another chapter by Abdullahi Elmi Mohamed²¹⁹ considers the Limpopo and Orange Rivers in both a comparative and detailed manner. In the same edited book, Meredith Giordano and Aaron Wolf²²⁰ provide another comparative approach to the analysis of Southern African rivers. The authors provide an analysis of the bilateral and multilateral agreements signed over water in Southern Africa and divide them according to treaties that establish general watercourse commissions, treaties that concern single watercourses, and treaties that concern specific watercourse projects. The

214. WATER FOR PEACE IN THE MIDDLE EAST AND SOUTHERN AFRICA (Green Cross Int'l 2000).

215. R.T. Mochebelele, *Good Governance and the Avoidance of Conflicts; The Lesotho Highlands Water Project Experience*, in Green Cross Int'l, *supra* note 214.

216. J. Leestemaker, *The Domino Effect: A Downstream Perspective in Water Management in Southern Africa*, in Green Cross Int'l, *supra* note 214.

217. INTERNATIONAL WATERS IN SOUTHERN AFRICA (M. Nakayama ed., 2003).

218. P. Heyns, *Water-Resources Management in Southern Africa*, in Nakayama ed., *supra* note 217.

219. E.A. Mohamed, *Joint Development and Cooperation in International Water Resources*, in Nakayama ed., *supra* note 217.

220. M. Giordano & A. Wolf, *Transboundary Freshwater Treaties*, in Nakayama ed., *supra* note 217.

authors also account for the water related events (cooperative versus conflictive) in the region between 1948 and 1999 and conclude that there is an overall commitment among the Southern African countries to cooperate over shared water resources.

In a detailed study, Alvaro Carmo Vaz and Pieter van der Zaag²²¹ analyze the hydro-politics of the Incomati River basin. Most interesting is the authors' historical-political account of the river basin from before 1948 to 2002. Another fascinating aspect of the authors' analysis is their detailed description of the treaties and legal regimes that govern the basin among its riparians. Vaz and van der Zaag include a table with reference to the developments that have taken place in the basin and the actions and/or agreements that followed in an annex section. They also discuss the changing needs of the basin riparians vis-à-vis the Incomati and the need for an appropriate agreement. They review the most recent interim agreement that has been discussed among the riparians.

Rafik Hijri and David Grey²²² discuss additional basins in Africa including the Volta River basin, Lake Victoria, and several other Southern African rivers. The authors consider the emerging regional stresses and provide an analysis of the institutional and political challenges of cooperation for the water bodies discussed. They also review some of the programs and initiatives being employed in the respective regions.

We close our review of African Rivers with a short but interesting monograph on Africa's international rivers. Claudia Sadoff, Dale Whittington, and David Grey²²³ discuss the riparian dynamics of numerous international African rivers. While the authors do not discuss each particular international water body in detail, they provide several tables that depict not only the African river basins but also their respective riparians. In another table, the authors also include the GDP per capita of the riparians, their irrigated land, and the proportion of energy supply derived from hydropower. One other table considers the geographical attributes of each river. Of particular interest is the reference to benefit sharing mechanisms, and the authors provide some examples of regional treaties that incorporate such principles as direct payments for water, direct payments for benefits, purchase agreements, and financing arrangements.

221. C.A. Vaz & P. van der Zaag, *Sharing the Incomati Waters: Cooperation and Competition in the Balance*, PCCP, UNESCO (2001-2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/columbia2.pdf.

222. H. Rafik & D. Grey, *Managing International Waters in Africa: Process and Progress*, in *INTERNATIONAL WATERCOURSES: ENHANCING COOPERATION AND MANAGING CONFLICT* (S. Salman & L. Boisson de Chazournes eds., World Bank Technical Paper No. 414, 1998).

223. C. SADOFF, D. WHITTINGTON & D. GREY, *AFRICA'S INTERNATIONAL RIVERS: AN ECONOMIC PERSPECTIVE* (2002).

Central Asia

We begin the review of water issues in Central Asia with a 1992 special issue of *Post-Soviet Geography*.²²⁴ While the articles are largely not related to conflict and cooperation over shared waters, the first introductory chapter by Phillip Micklin²²⁵ sets the stage for both the water dispute over the Syr Darya and Amu Darya and the environmental crisis in the Aral Sea just after the fall of the Soviet Union. Another chapter on the Central Asia water dispute and the Aral Sea crisis is written by Michael Glantz, Alvin Rubinstein, and Igor Zonn.²²⁶ The authors provide a review of the political roots of the conflict from the 1950s on and consider the desiccation of the Aral Sea—its social and ecological causes and consequences. Perhaps most importantly, however, the authors argue that in addition to any technical alternatives—like transbasin water transfers and water diversions—that may be proposed to stop the gradual disappearance of the Sea, coordinated decisions at the highest levels of the respective governments will be required. Reliance on cotton production will have to give way to more environmentally friendly crops and, by extension, policies will have to support more efficient uses of local and regional water sources. International lending institutions will have to help the Central Asian republics promote such policies. Tsuneo Tsukatami²²⁷ also argues that involving the international community in the development of the Aral region and the enhancement of cooperation among the states is paramount. The author also considers the cotton monoculture that evolved in the region, the environmental problems that ensued, and prospects for cooperation in the region. He reviews possible recommendations for handling the Aral problem. Laurence Boisson de Chazournes²²⁸ reviews the legal and institutional aspects of the Aral region. Her main conclusions are that the legal frameworks adopted by the Central Asian republics need to be strengthened and that technical and scientific activities are important for implementing such legal instruments.

224. 33 POST-SOVIET GEOGRAPHY (No. 5, 1992).

225. P. Micklin, *The Aral Sea Crisis: Introduction to the Special Issue, id.*

226. M. Glantz, A. Rubinstein & I. Zonn, *Tragedy in the Aral Sea Basin: Looking Back to Plan Ahead*, in CENTRAL ASIA: ITS STRATEGIC IMPORTANCE AND FUTURE PROSPECTS (H. Malik ed., 1994).

227. T. Tsukatami, *The Aral Sea and Socio-Economic Development*, in CENTRAL EURASIAN WATER CRISIS: CASPIAN, ARAL AND DEAD SEAS (I. Kobori & M. Glantz eds., 1998).

228. L. Boisson de Chazournes, *Elements of a Legal Strategy for Managing International Watercourses: The Aral Sea Basin*, in INTERNATIONAL WATERCOURSES: ENHANCING COOPERATION AND MANAGING CONFLICT (S. Salman & L. Boisson de Chazournes eds., World Bank Technical Paper No. 414, 1998).

Victor Dukhovny and Vadim Sokolov²²⁹ provide an extensive account of the hydropolitics of the Syr Darya and Amu Darya. They discuss not only the physical aspects of the rivers but also the demographics and economy of the region. The authors analyze the institutional and legal variables involved, technical aspects of water management, and the strengths and weaknesses of the current system. Their analysis is applied both to the region at large and individual countries. They also make reference to the time period when the five republics were part of the Soviet Union and relate it to the current era. While the authors provide detailed recommendations on both the national and international level for improved water management, they also refer to the Interstate Commission, an umbrella authority currently facilitating cooperation among the five republics. A chapter by Stefan Klotzli²³⁰ describes the history of the conflict and offers some ways in which to resolve it. One suggested strategy is the promotion of efficiency of eco-regional cooperation through the strengthening of technical and institutional capacities of the regional institutions. Stuart Horsman²³¹ also reviews the conflict between the five republics but provides a more current account with special attention to the hydropolitical tensions between the countries and the utility of the agreements negotiated among them. Horsman surveys the positions of each riparian and also discusses the positions of other proximate actors outside the Syr Darya and Amu Darya basins that may have an impact on the five republics and their water requirements.

Two other books on Central Asian water issues include one by Michael Glantz²³² and the other by Erika Weintal.²³³ While the book by Glantz focuses on the environmental consequences produced by the overdrawing of water from the Syr Darya and Amu Darya, two chapters make interesting references to the shared aspects of the two rivers. The first chapter, written by Glantz²³⁴ himself, provides decision makers with five steps they may take immediately to encourage sustainable resource management in the Aral Sea basin. One important suggestion made is

229. V. Dukhovny & V. Sokolov, *Lessons on Cooperation Building to Manage Water Conflicts in the Aral Sea Basin*, PCCP, UNESCO (2001-2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/aral_sea_basin_2.pdf.

230. S. Klotzli, *The Aral Sea Syndrome and Regional Cooperation in Central Asia: Opportunity or Obstacle?*, in *CONFLICT AND THE ENVIRONMENT* (N.P. Gleditsch ed., 1997).

231. S. Horsman, *Water in Central Asia: Regional Cooperation or Conflict?*, in *CENTRAL ASIAN SECURITY: THE NEW INTERNATIONAL CONTEXT* (R. Allison & L. Jonson eds., 2001).

232. *CREEPING ENVIRONMENTAL PROBLEMS AND SUSTAINABLE DEVELOPMENT IN THE ARAL SEA BASIN* (M. Glantz ed., 1999).

233. E. WEINTAL, *STATE MAKING AND ENVIRONMENTAL COOPERATION: LINKING DOMESTIC AND INTERNATIONAL POLITICS IN CENTRAL ASIA* (2000).

234. M. Glantz, *Sustainable Development and Creeping Environmental Problems in the Aral Sea Region*, in Glantz, *supra* note 225.

the need to employ side-payments and compensation schemes between downstream and upstream states—an issue currently being debated among the riparians. Another chapter by Igor Zonn²³⁵ surveys the irrigation and cotton regime that was developed and enforced during the Soviet control of Central Asia. A good understanding of past practices could pave the way to employing informed strategies for the future. Weinthal also looks at the history of the Central Asian water situation. However, she focuses in detail on the political ramifications of the water dispute, the environmental crisis of the Aral Sea, and the prospects for its resolution in the context of the Central Asian republics as developing independent states. Perhaps most interesting in Weinthal's book is the argument she makes for linking domestic and international politics. She attempts to explain how the five republics were able to cooperate over their shared water resources—an arduous task, at best, as states are still struggling through their developmental stage and transformation from Soviet husbandry. Her analysis points to the role of non-governmental organizations and international organizations in shaping the form of water institutions in the basin, swaying the parties away from conflict and competition and encouraging domestic development and transition. In essence, Weinthal points to the side-payments that were provided by international organizations to the five republics, which then led to the strengthening of state sovereignty, which in turn provided a promising environment for interstate cooperation and compensated domestic constituencies.²³⁶

We close with an article by Sergei Vinogradov, in a special issue of *Natural Resources Journal*,²³⁷ who also considers the hydropolitics of Central Asia. In addition to analyzing the water conflict between the Central Asian republics, the author considers the ongoing cooperation among them and looks specifically at the 1992 treaty and its institutional capacities. Most interesting, however, for Central Asian hydropolitics outside the Aral Sea Basin is the author's brief but informative analysis of other Central Asian rivers and an agreement between Russia and Kazakhstan over shared waters.

235. I. Zonn, *The Impact of Political Ideology on Creeping Environmental Changes in the Aral Sea Basin*, in Glantz, *supra* note 225.

236. WEINTHAL, *supra* note 233, at 52-72.

237. S. Vinogradov, *Transboundary Water Resources in the Former Soviet Union: Between Conflict and Cooperation*, 36 NAT. RESOURCES J. 393 (1996).

Europe

Carel H.V. De Villeneuve²³⁸ reviews the case of the Rhine in a special issue of *Natural Resources Journal*. The author considers the last 100 years of attempts to grapple with the pollution in the Rhine River and shows how small and gradual efforts among the riparians have worked well for cooperation. De Villeneuve also assesses the performance of the International Commission for the Protection of the Rhine against Pollution and argues that the riparians' focus on single issues such as pollution and hydropower is making way for integrated quantity and quality management of the Rhine. Ine Frijters and Jan Leentva²³⁹ author another study of the Rhine. While the authors describe the physical and political aspects of the Rhine and the hydropolitics among the riparian states, the majority of their study is dedicated to the institutional and legal aspects of the basin. They discuss the various commissions governing the Rhine and the conflict resolution methods embodied in these institutions.

Another European river considered in the special issue of *Natural Resources Journal* is the Danube. Joanne Linnerooth-Bayer and Susan Murcott²⁴⁰ review the geography and ecology of the Danube River and assess the conflicts and political issues of the river and efforts at building cooperative institutions. The authors emphasize that the Danube is shared by both western European and former Soviet countries, complicated by ethnic and nationalistic tensions in the latter. While the promotion of ecological and economic conditions of the river has not fully come to fruition given the economic deterioration that engulfed the ex-socialist countries, there is a shared realization that joint institutions can contribute to integrated management. The authors also discuss the inclusion of non-Danube riparians, primarily the countries that share the Black Sea, in any institutional establishment. The institutional structures for integrating the commercial uses of the river with ecological interests will also have to be put into place. In an edited book by Tunc Aybak,²⁴¹ the political and environmental intricacies of conflict and cooperation over the Black Sea are considered in great detail.

238. C.H.V. De Villeneuve, *Western Europe's Artery: The Rhine*, 36 NAT. RESOURCES J. 441 (1996).

239. I. Frijters & J. Leentvar, *Rhine Case Study*, PCCP, UNESCO (2001-2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/ara1_sea_basin_2.pdf.

240. J. Linnerooth-Bayer & S. Murcott, *The Danube River Basin: International Cooperation or Sustainable Development*, 36 NAT. RESOURCES J. 521 (1996).

241. POLITICS OF THE BLACK SEA: DYNAMICS OF COOPERATION AND CONFLICT (T. Aybak ed., 2001).

A special issue on international waters in *Water Policy* includes several case studies from Europe and Southern Africa. We note here the European rivers. In a chapter by Pieter Huishman, Joost de Jong, and Koos Wierikis,²⁴² the cases of the Rhine and Meuse are discussed. Another chapter by Hans-Peter Nachtnebel²⁴³ discusses the case of the Danube. The former article takes a detailed historical approach in assessing the river basins mentioned and the hydropolitics among the riparians while the latter article considers in detail the environmental issues concerning the Danube and assesses the environmental program currently in place.

In an edited book by Nills Peter Gleditsch, two regional investigations particular to Europe are of interest. Two chapters on the water resources of the Iberian Peninsula are investigated, one by Francisco Correia and Joaquim da Silva²⁴⁴ and the second by Ramon Llamas.²⁴⁵ While the former chapter also reviews the Rhine and the Danube, both chapters consider the major rivers shared between Spain and Portugal, review the rich history of cooperation and agreements between the countries, and review some of the water conflicts between them. In another chapter by Alexander Spirin, Olga Turevskaya, and Sergey Turevskiy,²⁴⁶ the Seversky Donets River, shared between Russia and Ukraine, is investigated. The authors discuss both pollution problems and water availability problems, which stem mostly from non-coordination and a lack of legal basis for preventing transboundary pollution on the interstate level.

We close again with the article by Vinogradov,²⁴⁷ which also reviews the Seversky Donets shared by Ukraine and Russia. Most interesting, however, is reference to other rivers that are shared by former-Soviet Eastern European states such as the Neman, Dneestr, and Dnepr. During the Soviet years, these rivers were under one jurisdiction, but, since the demise of the USSR, they have become international. Vinogradov outlines the flow of the rivers, the respective riparians, and the main issues regarding each river that will require the most attention.

242. P. Huisman, J. de Jong & K. Wierkis, *Transboundary Cooperation in Shared River Basins: Experiences from the Rhine, Meuse, and North Sea*, 2 *WATER POLICY* (June 2000).

243. H.P. Nachtnebel, *The Danube River Basin Environmental Programme: Plans and Actions for a Basin Wide Approach*, 2 *WATER POLICY* (June 2000).

244. F. Correia & J. da Silva, *Transboundary Issues in Water Resources*, in *CONFLICT AND THE ENVIRONMENT* (N.P. Gleditsch ed., 1997).

245. R. Llamas, *Transboundary Water Resources in the Iberian Peninsula*, in Gleditsch ed., *supra* note 244.

246. A. Spirin, O. Turevskaya & S. Turevsky, *Water Management in the Seversky Donets River: A Challenge for the Near Future*, in Gleditsch ed., *supra* note 244.

247. S. Vinogradov, *Transboundary Water Resources in the Former Soviet Union: Between Conflict and Cooperation*, 36 *NAT. RESOURCES J.* 393 (1996).

The author also reviews some of the emerging legal frameworks for environmental cooperation in the region.

North America and Latin America

In an edited book by Asit Biswas, Newton Cordeiro, Bendito Braga, and Cecilia Tortajada,²⁴⁸ the issue of Latin American river basins is taken up. Different authors review different aspects of three river basins: Amazon, Plata and Sao Francisco. Among the three river basins, one chapter on the Amazon and three chapters on the Plata River Basin make the most reference to international hydropolitics. Manuel Picasso Botto²⁴⁹ considers the Amazon Cooperation Treaty as a mechanism for sustainable development among the basin riparians. While the treaty applies to issues other than water, Botto looks at the specifics of the treaty and explains how the treaty principles are applied to shared waters. Victor Pochat²⁵⁰ discusses the water resources management regime of the Plata Basin. His account deals with the role played by the experts related to water resources within the institutional system of the basin and shows how the activities of these experts evolved by considering 30 years of the system's performance. Within the larger Plata basin he also considers the Paraguay, Parana, and Uruguay Rivers. Newton Cordeiro²⁵¹ considers the upper Paraguay basin, Bermejo River basin, and the Lagoon Mirim basin. All these water bodies are shared and Cordeiro assesses some of the environmental issues involved in the water projects being planned and perceived by the respective riparians. He argues that population growth, large-scale economic projects, the economic crisis of the 1980s, and changes in the development priorities and approaches have contributed to the degradation of the Plata basin's natural resource base. Cordeiro points to the unilateral actions that continue to prevail and argues that there is great coordinated development potential that is untapped among the riparians. Lilian del Castillo Laborde²⁵² considers the institutional framework that evolved in the Plata basin. She outlines the events that culminated in the Plata Basin Treaty. The author also provides an analysis of other important treaties

248. MANAGEMENT OF LATIN AMERICAN RIVER BASINS: AMAZON, PLATA, AND SAO FRANCISCO (A. Biswas, N. Cordeiro, B. Braga & C. Tortajada eds., 1999).

249. P.M. Botto, *The Amazon Cooperation Treaty: A Mechanism for Cooperation and Sustainable Development*, in Biswas, Cordeiro, Braga & Tortajada eds., *supra* note 248.

250. V. Pochat, *Water-resources management of the Plata basin*, in Biswas, Cordeiro, Braga & Tortajada eds., *supra* note 248.

251. N. Cordeiro, *Environmental Management Issues in the Plata Basin*, in Biswas, Cordeiro, Braga & Tortajada eds., *supra* note 248.

252. L. del Castillo Laborde, *The Plata Basin Institutional Framework*, in Biswas, Cordeiro, Braga & Tortajada eds., *supra* note 248.

that have governed the waters of the basin. Laborde,²⁵³ in a special issue of *Natural Resources Journal*, again considers the Rio de la Plata shared between Argentina and Uruguay. While she reviews the significance of navigation in the larger Plata basin and provides an overview of the physical and hydrological aspects of the river, she focuses on the past legal regimes of the Rio de la Plata and analyzes the negotiations over the 1973 Rio de la Plata Treaty signed between Uruguay and Argentina. She provides an extensive review of the treaty.

Raul Artiga²⁵⁴ considers the Trifinio Plan, a joint utilization project between El Salvador, Guatemala, and Honduras. The author describes how the political will on the part of the three countries combined with talks on high levels pertaining to the project culminated in an agreement that focused mostly on territorial planning and reforestation of land. This seemingly non-water related project, however, needed to harness the waters of the Lempa, Ulua, and Motagua river basins. The author suggests that the project could also generate the mechanisms for the protection and sustainable management of the watershed as well as managing the region's hydrological resources, which to date remain unmet. Artiga also discusses the success and institutional capacities of the Trifinio Plan as an example that may be used elsewhere in Central America.

The Colorado River basin is discussed by Michael Cohen,²⁵⁵ who assesses the legal framework of the Colorado River and its development that has taken place between the United States and Mexico. He reviews some of the past agreements that have governed the river and outlines some of the restoration opportunities necessary to reverse the environmental impacts of the past century of water development. He also discusses the recent Declaration to Enhance Cooperation in the Colorado River Delta and the subsequent adoption of Minute 306 concerning the ecological, hydrological, and institutional issues of the delta. Another shared river between the United States and Mexico—the Rio Grande—is considered in a special issue of *Natural Resources Forum*. While the article by Stephen McCaffrey²⁵⁶ makes general conclusions

253. L. del Castillo Laborde, *Legal Regime of the Rio de la Plata*, 36 NAT. RESOURCES J. 251 (1996).

254. R. Artiga, *The Case of the Trifinio Plan in the Upper Lempa: Opportunities and Challenges for the Shared Management of Central American Transnational Basins*, PCCP, UNESCO (2001-2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/the_case_of_the_trifinio_plan_in_the_upper_lempa_2.pdf.

255. M. Cohen, *Managing Across Boundaries: The Case of the Colorado River Delta*, in *THE WORLD'S WATER: THE BIENNIAL REPORT ON FRESHWATER RESOURCES 2002-2003* (P. Gleick, with W. Burns et al. eds., 2002).

256. S. McCaffrey, *The Need for Flexibility in Freshwater Treaty Regimes*, 27 NAT. RESOURCES F. (No. 2, 2003).

applied to other river basins, it considers in detail the nature of the joint management institution—the International Boundary and Waters Commission (IBWC)—devised in the 1944 treaty between the two riparians. McCaffrey's goal is to demonstrate that treaties among states require flexible mechanisms that deal efficiently with the changing conditions of a given watercourse. Joint institutions are most appropriate and McCaffrey outlines the responses of the IBWC to water shortages.

Finally, we note the case of the Columbia River, which is considered by Keith Muckleston.²⁵⁷ Muckleston outlines the relationship between the United States and Canada over the Columbia River. His analysis includes the legal and political positions of both parties, the 1909 treaty creating the International Joint Commission (IJC), the subsequent activities of the IJC, and the negotiations that took place over the Columbia River.

CONCLUSIONS AND SUGGESTIONS FOR FURTHER WORK

The field of conflict and cooperation over shared waters has come a long way in the last decade. We were able to identify nearly 100 books, not to mention chapters in edited volumes, representing different disciplines, all addressing shared waters, conflict, negotiation, and cooperation.²⁵⁸ A few books we review do not speak directly to shared waters but make important and compelling connections to the field. Another complimentary work to our review is a book by Heather Beach, Jesse Hamner, Joseph Hewitt, Edy Kaufman, Anja Kurki, Joe Oppenheimer, and Aaron Wolf,²⁵⁹ which includes both earlier publications and an extended list of journal publications. In addition, the book takes a multi-disciplinary approach and considers international water issues in the context of several disciplines such as negotiation theory, institutional and legal studies, and economics.

Our review finds that case studies have been the mainstay of the water field but there is also a promising foundation of theoretical work related to conflict and cooperation over shared waters. Much of the theoretical work has emerged in the context of detailed and informative case studies and the various disciplines discussed here. Perhaps what is

257. K. Muckleston, *International Management in the Columbia River System*, PCCP, UNESCO (2001-2003), available at http://webworld.unesco.org/water/wwap/pccp/cd/pdf/case_studies/columbia2.pdf.

258. Although space considerations do not allow the inclusion of a table containing the list of publications and the basins they pertain to, the *Natural Resources Journal* will be happy to email or mail the table to any interested parties. Please contact the *Journal* at nrj@law.unm.edu.

259. H. Beach et al., *TRANSBOUNDARY FRESHWATER DISPUTE RESOLUTION: THEORY, PRACTICE AND ANNOTATED REFERENCES* (2000).

most lacking is empirical work. That is, while the theoretical underpinnings of the field are developed in the context of one or few river basins, efforts to test a theory across a larger set of observations are lacking in the book literature on shared international water. Empirical work is not only important in its own right but will also strengthen the theoretical foundations of the field. The nature of shared international water problems facilitates such a comparative strategy across a large data set. We will undoubtedly lose important detail by taking this general route, but we will also be able to make broad conclusions about conflict and cooperation over water and perhaps gain the ability to apply our findings to a number of water disputes and their subsequent resolution.

One empirical research path could utilize the extensive data available on international water treaties from different basins. We note an extensive compilation of international water treaties found in the *Atlas of International Freshwater Agreements*²⁶⁰ and the Transboundary Freshwater Dispute Database of Oregon State University.²⁶¹ One can also refer to the Food and Agriculture Organization for earlier treaties and other depositories, such as the UN Treaty Collection and the International Water Law Institute of the University of Dundee to locate treaty texts.²⁶² As we indicated in the introduction, a recent special section of *Water Resources Research* includes several works that fall under our definition of empirical work. The investigation of common phenomenon in the formation of bilateral and multilateral treaties is of great importance to the field. A final study we note is the work of Shira Yoffe, Gregory Fiske, Mark Giordano, Meredith Giordano, Kelli Larson, Kerstin Stahl, and Aaron Wolf.²⁶³ The authors explore why some river basins are more likely to be ripe for dispute than others.

The above discussion should not indicate that we are suggesting that the case study approach be dropped. In fact, another topic that has significant implications but has not been extensively pursued so far is

260. UN Environment Programme (UNEP) & Oregon State University (OSU), *ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS* (2002).

261. At www/transboundarywaters.orsu.edu.

262. Systematic index of international water resources treaties, declarations, acts and cases by basin, *Food and Agriculture Organization*, I LEGISLATIVE STUDIES (No. 15, 1978); systematic index of international water resources treaties, declarations, acts and cases by basin, *Food and Agriculture Organization*, II LEGISLATIVE STUDIES (No. 34, 1984); Food and Agriculture Organization, *WATERLEX*, at <http://faolex.fao.org/waterlex/>; United Nations Treaty Collection, available at <http://untreaty.un.org> (subscription required); International Materials, International Water Law Research Institute, University of Dundee, available at http://www.dundee.ac.uk/law/iwlr/Research_Documents_International.php

263. S. Yoffe, G. Fiske, M. Giordano, M. Giordano, K. Larson, K. Stahl & A. Wolf, *The Geography of International Water Conflict and Cooperation: Datasets and Applications*, *WATER RESOURCES RESEARCH* (forthcoming 2004).

analyses of negotiation processes. With hundreds of available treaties, there should be sufficient information on the process leading to these agreements. Naturally such investigations will be undertaken in the context of case studies, yet our hope is that more case studies be taken into consideration. River basins in the Middle East and North Africa, to name just a few, have been written about often. Yet other river basins have been less scrutinized. And it is perhaps the engineers, political scientists, economists, anthropologists, or geographers residing in the respective river basins that are most prepared to provide us with such an analysis. This will in turn strengthen the theoretical underpinnings of the field and provide us with more hypotheses to test, more observations to include, and more conclusions to draw on.

The field of economics is underrepresented in the book literature we reviewed here. This is not to say that either economics is not important or that economists are not interested in international water issues. It is probably a combination of several factors including difficulty in obtaining accurate data and information and the ability to communicate the results to the decision makers in the respective river basins. Therefore, economists should develop models that do not rely on sophisticated approaches, which necessitate accurate data that is probably as scarce as the water in the basin they are investigating. Regardless, economic analysis for identifying conditions for cooperation in various basins is greatly needed. Economic justification of cooperative arrangements and development options is the first step toward the initiation of a negotiation process that hopefully will lead to an agreement.

Too many research paths? It doesn't look like it to us. With the growing pace of recent publications on shared waters, it seems that soon they will be addressed.

REVIEWS

Silver Fox of the Rockies. By Daniel Tyler. Norman, OK: University of Oklahoma Press, 2003. Pp. 416, 27 illustrations. \$34.95 hardcover.

Dan Tyler has provided a well written book that does double duty: it is a biography of Delph Carpenter as well as a discussion of Carpenter's advocacy of state sovereignty over water. Carpenter's beliefs and actions serve to illuminate how westerners who distrusted federal control of water felt about water issues during the first four decades of the twentieth century. Today prior interstate compacts seem timeless and immutable but the outcome of the early 1900s water controversies was very much in doubt.

Carpenter grew up just as the prior appropriation doctrine was formally recognized in Colorado. In 1876, one year before Carpenter was