NOTES

FINDING FLOW: THE NEED FOR A DYNAMIC APPROACH TO WATER ALLOCATION

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Recent crises stemming from diminishing groundwater resources highlight the failure of existing water allocation agreements to account for changing circumstances. This note focuses on two case studies—a dispute over the All-American Canal between the United States and Mexico and a decade-long litigation between Kansas and Colorado regarding the Arkansas River Compact. Domestic and international issues stem from the same challenges of highly technical decisions, changing circumstances, and historical sensitivity of water rights. This Note argues that domestic and international water agreements place too much emphasis on one-time allocations despite warnings that imposing hard and fast rules unnecessarily burdens the ability to adapt to future changes in water conditions. These two case studies further demonstrate that traditional ex post dispute and litigation mechanisms are no longer adequate. After considering challenges to reform, this Note argues that the increasing urgency of water crises around the world have made conditions ripe for institutional change. As a solution, this Note proposes creating joint management institutions that provide ongoing expert administration for the changing dynamic of water resource crises.

In 1943, the Supreme Court was called upon to resolve a water allocation dispute between Kansas and Colorado over the Arkansas River. The Court refused to make an equitable allocation by judicial decree, reasoning that it was better for Kansas and Colorado to create an ongoing commission to resolve their issues because "they involve the interests of quasi-sovereigns, present complicated and delicate questions, and, due to the possibility of future change of conditions, necessitate expert administration rather than judicial imposition of a hard and fast rule."[1] Over half a century later, international and domestic water agreements have failed to live up to this vision of "expert administration" over "complicated and delicate" issues of water allocation. Despite warnings that imposing hard and fast rules

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[1] Colorado v. Kansas (*Kansas II*), 320 U.S. 383, 392 (1943).

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unnecessarily impedes adaptability to future changes in water conditions, countries and states have consistently chosen to allocate their scarce water supplies using rigid formulas that are impossible to alter and difficult to administer. With water becoming an increasingly scarce commodity, these failures in policymaking will have a severe and widespread effect on water-poor areas. This Note argues that domestic and international water agreements place too much emphasis on one-time allocations while failing to create institutional structures for joint management. Traditionally, fixed allocations were regarded as the key to ensuring security in water interests and stability in growing economies that relied on these property rights.[2] However, dramatically increasing demands on scarce water supplies, particularly unexpected demands on groundwaters, have shown the limitations of water allocation agreements that try to create hard and fast rules.[3]

The goal of stability is no longer being met by the existing rigid models of water allocation as evidenced by the growing criticism of interstate water agreements and international water treaties.[4] Accordingly, future models, in order to succeed, will require a different conception of how these issues should be resolved. Just as bodies of water will often disregard and overflow political boundaries, so will water issues overflow from one jurisdictional or political arena to others. Although there are obvious political differences between international and domestic water agreements,[5] international and

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[2] Fixed water allocations are consistent with "nineteenth century[ ] water laws [that] viewed water as a type of property and defined water use rights with some precision. Upon allocation, the water owner's property rights in water were protected against infringement like rights in land and other types of property." Eric T. Freyfogle, *Water Justice*, 1986 U. ILL. L. REV. 481, 483.

[3] Bradley Karkkainen deals with the concept of "collaborative ecosystem governance," which involves the cooperation of diverse domestic agencies and organizations in ensuring a holistic management system. Bradley C. Karkkainen, *Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism*, 21 VA. ENVTL. L.J. 189, 190–93 (2002). In discussing the advantages of collaborative ecosystem management, Karkkainen notes that:

> [T]he conventional strategy—the strategy of acting only at the point where we think we know with reasonable certainty what the effects of a particular management choice will be, and then adopting fixed rules based on our best current understanding—is a prescription for inaction and ineffectiveness, or policy failure.

Id. at 201.

[4] *See infra* note 79.

[5] As noted by Scott Barrett:

> Rivalry between jurisdictions within a federal system is entirely different. The United States Constitution allows states to negotiate "compacts" concerning cross-border issues, subject to Congressional consent. Compacts are analogous to agreements between nation states, but disputes connected to compacts can be heard by the U.S. Supreme Court, and rulings by the Court can be enforced by the federal government. Indeed, the federal government may itself *impose*

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domestic issues stem from the same changing circumstances and historical sensitivity to the importance of water rights; there are enough similarities in the way water issues are handled that an examination of the two systems together can help to highlight the problems that need to be addressed. While international and domestic water agreements have been studied independently, there is little scholarship that draws from both fields.[6]

Although this Note focuses on diminishing groundwater resources to highlight the failure of existing water agreements to account for changing circumstances, this is but one example of recent developments that have challenged the permanency of water agreements. Scholars have also noted concerns regarding increasing urban and recreational water use[7] as well as the possibility of destructive ecological events.[8] While these dangers are known and can be accounted for in future fixed allocations, the possibility of other, unknowable risks pushes for a reformation of existing water allocation schemes.

This Note is organized as follows. Part I will provide a brief introduction to the problem of water resources generally. Part II will present two case studies: a dispute over the All-American Canal arising under the 1944 Treaty between the United States and Mexico, and the decade-long litigation between Kansas and Colorado regarding violations of the Arkansas River Compact. Part III will provide an analysis of the lessons learned from these two case studies and present the reasons why there should be more dynamic allocation of water resources. Part IV will propose joint management institutions as the solution, consider potential challenges to reform, and discuss how these institutions can ensure accountability.

> an allocation upon states if they fail to reach agreement themselves. . . . Such higher order intervention is not possible in international relations.

SCOTT BARRETT, ENVIRONMENT AND STATECRAFT: THE STRATEGY OF ENVIRONMENTAL TREATY-MAKING 64 (2003).

[6] While not studying water agreements specifically, Robert Keohane and Elinor Ostrom have also incorporated both domestic and international examples in considering the politics of collective action. Robert O. Keohane & Elinor Ostrom, *Introduction* to LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS 15 (Robert O. Keohane & Elinor Ostrom eds., 1995).

[7] Douglas L. Grant, *Interstate Water Allocation Compacts: When the Virtue of Permanence Becomes the Vice of Inflexibility*, 74 U. COLO. L. REV. 105, 107 (2003).

[8] *See* Alberto Szekely, *How to Accommodate an Uncertain Future into Institutional Responsiveness and Planning: The Case of Mexico and the United States*, 33 NAT. RESOURCES J. 397, 401 (1993) ("The 1944 Treaty provided the Commission with practically no tools, especially in the case of the Colorado River, to face 'extraordinary drought' situations . . . .").

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I
INTRODUCTION TO WATER RESOURCES

Increasing demands on limited fresh water supplies both domestically and internationally are spurring the need for reform. The diminishing fresh water supply is a well-documented phenomenon, with water resources reaching "the limit of ultimate utilizable potential in most countries."[9] Despite constraints on further water resource development, the demand for water continues to increase with "population expansion, economic development, and life-style changes."[10] Water scarcity has resulted primarily from the combination of water pollution, water waste, and increasing usage. Different communities face these problems to varying degrees. For example, water agreements in the western United States are more concerned about water allocation while water agreements in the eastern United States, which has abundant water resources, tend to focus on water quality.[11]

Both increasing demand and decreasing supply contribute to water scarcity. Water waste and water pollution are two of the main contributors to supply-side problems. Water waste stems from varying levels of technical capacity in developed and developing countries. Due to water wasted through inappropriate irrigation practices and deficient distribution systems, "[m]ost countries lose an astounding 30% of clean drinking water in their supply networks, a figure that in some cases can soar to 60% or more."[12] Water pollution has the potential to dramatically reduce supply, and results from factors such as residential sewerage and industrial pollution,[13] both of which are byproducts of a growing urban community.

Increasing usage is a problem only if the demand for water outstrips the supply. In other words, increasing water usage creates a water scarcity problem only when the rate of extraction is greater than the rate of recharge.[14] The rate of recharge is the rate at which the

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[9] R. MARIA SALETH & ARIEL DINAR, WATER CHALLENGE AND INSTITUTIONAL RESPONSE: A CROSS-COUNTRY PERSPECTIVE 3 (World Bank Pol'y Res., Working Paper No. 2045, 1999).

[10] *Id.*

[11] *But see* Felicity Barringer, *Growth Stirs a Battle to Draw More Water from the Great Lakes*, N.Y. TIMES, Aug. 12, 2005, at A12 ("[E]ven places not perennially in danger of running dry have become jealous of their water.").

[12] U.N. ECON. COMM'N FOR EUROPE, WHAT IS IT, WHY IT MATTERS? A BOOKLET FOR ALL WHO CARE ABOUT AND WORK FOR CLEAN WATER 3 (2004) (on file with the *New York University Law Review*).

[13] SALETH & DINAR, *supra* note 9, at 3 ("The unfavorable effects of water scarcity—both absolute and relative—are magnified further by rapid deterioration in water quality that discounts the utility of an already inadequate water supply.").

[14] Surface water and groundwater systems are also described as resource systems, meaning that they are "capable, under favorable conditions, of producing a maximum

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water cycle returns water to its usable form, and this rate varies for every water system. Groundwaters have varying rates of recharge depending on the depth of the water below ground and the solidity of the earth above the groundwater, since both factors impact the ability of rainfall to filter through.[15] When the rate of extraction exceeds the rate of recharge for groundwater, the result will be a lowering of the water table, which is the level of water underground. When the water table drops, more expensive technology becomes necessary to draw water from the greater depths.[16]

There are two main types of water systems: surface water and groundwater. Surface water includes rivers, lakes, and oceans. Groundwater refers to water that is below the ground, often contained in underground formations that have "sufficient water storage and transmitting capacity to provide a useful water supply via wells and springs."[17] Most bodies of water consist of both surface waters and groundwaters. Until recently, it was believed that surface waters and groundwaters were not connected.[18] Consequently, some water agreements were made on the faulty premise that the use of groundwaters would have no effect on surface waters and vice versa.

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quantity of a flow variable without harming the stock or the resource system itself." ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 30 (1990). Other examples of resource systems are fishing grounds, grazing areas, bridges, parking garages, and mainframe computers. *Id.*

[15] Some groundwater basins are believed to be non-rechargeable, which raises special concerns. "[B]ecause of their lack of recharge and stagnant character, confined [groundwater basins] are uniquely susceptible to pollution. The absence of recharge and flow to and within the [groundwater basin] makes any contamination extremely difficult and expensive to clean." Gabriel Eckstein & Yoram Eckstein, *A Hydrogeological Approach to Transboundary Ground Water Resources and International Law*, 19 AM. U. INT'L L. REV. 201, 251 (2003).

[16] Another negative consequence of lowering the water table is the greater likelihood of water contamination. For example, in Waukesha, Wisconsin, over-extraction of groundwaters led to a 600 foot drop in the water table. Barringer, *supra* note 11. "[T]he deeper the water source, the more likely that it would be contaminated with too much radium, a naturally occurring radioactive element. [Waukesha's] radium content is now more than double the acceptable level set by the Environmental Protection Agency in 2000." *Id.*

[17] Eckstein & Eckstein, *supra* note 15, at 210.

[18] The primary focus of international law has been on the general principles that should govern the initial allocation of surface waters. The 1997 Convention on the Law of the Non-Navigational Uses of International Watercourses does address groundwater "related" to surface waters. *See* 1997 Convention on the Law of the Non-Navigational Uses of International Watercourses, G.A. Res. 51/229, U.N. Doc. A/51/869 (July 8, 1997) (defining "watercourse" as system of surface waters and groundwaters consisting of unitary whole). However, critics point out that "the scope of the document may raise more questions than provide answers about the status of ground water resources under international law. Some unclear areas include the justification for differentiating between various aquifer types and the applicability of international law to particular aquifer types." Eckstein & Eckstein, *supra* note 15, at 231.

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Groundwater is of particular relevance because it has emerged in recent decades as "a vital source of water for millions of people worldwide."[19] Groundwater comprises only 0.75% of the total volume of fresh and salt water found in nature, but it makes up nearly ninety-seven percent of readily-available fresh water.[20] "Among European nations, at least seventy-five percent of drinking water comes from ground water."[21] In the United States, "ground water provides approximately one half of all drinking water."[22] Increasing dependence on groundwater resources has raised unexpected problems that existing water agreements fall short of addressing.

II
TWO CASE STUDIES

This Part examines two case studies to highlight the need for reform. While domestic and international situations should be combined with caution,[23] key insights can be gleaned from examining them together.[24] For instance, in the international setting, it is often regarded as unfortunate that treaties could not be enforced as they are in domestic settings.[25] As we will see from the domestic case study, however, the opportunity for litigation is not a panacea for resolving water conflicts. Similarly, federal governments like the United States are unable to commit to international treaties unless their water-sharing states cooperate internally,[26] a process that can benefit from the valuable lessons to be learned from international water treaties.

These two case studies were selected because they have certain attributes which make them strong candidates for reform, as well as appropriate examples for comparison. First, there are only two par-

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19 Eckstein & Eckstein, *supra* note 15, at 201.

20 *Id.* at 210.

21 *Id.* at 202.

22 *Id.*

23 *See* Oran R. Young, *The Problem of Scale in Human/Environment Relationships*, *in* LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS, *supra* note 6, at 27, 33 ("[W]e should be wary about casual assertions regarding the existence of an international community and, as a result, about the transferability of arguments pertaining to the role of community in solving collective-action problems from the level of small-scale societies to the level of international society." (citation omitted)).

24 *See supra* note 6 and accompanying text.

25 *See infra* note 86 and accompanying text.

26 For example, a recent news article notes the potential future conflict over use of water from the Great Lakes. The eight states that border the Great Lakes are considering an agreement to prevent other states from using the water. *See* Barringer, *supra* note 11. As an added complication, the eight states bordering the Great Lakes must also negotiate with Ontario and Quebec, the two Canadian provinces that are part of the Great Lakes water system. *Id.*

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ties to each of these agreements, and this Note later argues that smaller numbers of parties to an agreement have a greater likelihood of cooperation.[27] Second, both water agreements were signed around the same time, when the relationship between groundwater and surface water was not well understood, and since then similar conflicts have arisen in both contexts. Finally, both examples have existing, albeit weak, water commissions in place, providing the framework for the creation of joint management institutions.

A. United States-Mexico Case Study

The first case study is one example of the numerous international water treaties signed to resolve transboundary water issues. Water issues are often transboundary; almost all countries share at least one water system with another country.[28] For example, in Africa alone, there are at least forty transboundary groundwater systems,[29] in addition to numerous shared surface waters. There are upwards of six countries that share one water system in Africa.[30] The international case study presented in this Note focuses on a water system shared by only two parties, but it still illustrates the problems that can arise when fixed water agreements are unable to adapt to changing circumstances.

Between 1900 and 1944, Mexico and the United States tried to reach agreement on the allocation of the waters of the Colorado, Tijuana, and Rio Grande rivers.[31] The 1944 Treaty that was ultimately signed entitled Mexico to 1.5 million acre-feet per year of water from the Colorado River.[32] At the same time, the All-American Canal was built to carry the United States' apportionment of water from the Colorado River to California.[33] The All-American Canal extends eighty-two miles, beginning at the "Imperial Dam on the Colorado River about 20 miles northeast of Yuma, Arizona . . . [and] extend[ing] south and then west, following the Mexican/American border much of

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[27] *See infra* note 125 and accompanying text.

[28] *See* Eckstein & Eckstein, *supra* note 15, at 205 ("[T]here is scarcely a country in the world (except for most island-nations) not linked hydrologically to another country.").

[29] U.N. Int'l Law Comm'n, *Further Case Studies on Groundwaters* 6 (Informal Working Paper No. 1, 2004) (on file with the *New York University Law Review*).

[30] *Id.* at 7.

[31] Douglas L. Hayes, *The All-American Canal Lining Project: A Catalyst for Rational and Comprehensive Groundwater Management on the United States-Mexico Border*, 31 NAT. RESOURCES J. 803, 814 (1991).

[32] Treaty Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., art. X, Feb. 3, 1944, 59 Stat. 1219, 1237 [hereinafter 1944 Treaty].

[33] *See* Imperial Irrigation District, How It Works: The All-American Canal, http://www.iid.com/water/works-allamerican.html (last visited Jan. 2, 2006).

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the way."[34] The 3.1 million acre-feet of Colorado River water delivered annually through the All-American Canal is distributed to nine cities and 500,000 acres of agricultural lands throughout the Imperial Valley in California.[35]

Since signing the treaty, Mexico has benefited from the water that has seeped through the unlined All-American Canal running along the United States-Mexico border. As water flows along the border, the unlined canal on the United States side seeps water across to the Mexico side. Some of this water is wasted, but the rest of the water joins existing bodies of groundwater in Mexico. These groundwater flows have enabled the Mexicali Valley to be one of Mexico's most productive agricultural zones, producing and exporting wheat, cotton, vegetables, and animal fodder.[36]

In an effort to find more water to meet growing demand, the United States plans to line a portion of the All-American Canal with concrete to conserve water that would otherwise seep into the ground.[37] Once the canal is lined, the negative impacts to Mexico will include a reduction of recharge to the aquifer by 70 million cubic meters per year.[38] Mexico has objected to the project, arguing that it would constitute a prohibited interference with its groundwater.[39]

The 1944 Treaty does not discuss groundwater, and there is little precedent for resolving disputes between the United States and Mexico concerning groundwater.[40] At the time, technology and

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[34] *Id.*

[35] *Id.*

[36] Larry Rohter, *Canal Project Sets Off U.S.-Mexico Clash over Water for Border Regions*, N.Y. TIMES, Oct. 1, 1989, § 1, at 1.

[37] As early as the 1970s, the United States government discussed the possibility of lining the All-American Canal. *See* Sandra Dibble, *Worries over Water; Mexicali Valley Farmers Fear Groundwater Loss When U.S. Lines Canal*, SAN DIEGO UNION-TRIB., July 6, 2004, at A1. The project was approved by Congress in 1988, setting off a wave of cross-border controversy. Rohter, *supra* note 36. After delays resulting from California's energy crisis and fiscal problems, the Department of Water Resources and the Imperial Irrigation District (IID) finally signed an agreement in 2002 to provide "$126 million in State funding to IID to design and construct a 23-mile lined canal parallel to the existing unlined portion . . . ." *See All-American Canal Lining Agreement Signed*, BUS. WIRE, Jan. 29, 2002. In June 2004, IID awarded the four-year contract to the private firm Parsons for management of the design and construction of the new canal. *Parsons Will Manage All American Canal Lining Project; New 23-Mile Canal Is Crucial for Southern California Water Supply*, BUS. WIRE, June 1, 2004.

[38] Bill Hume, *Canal Fight Shows Water Conservation Has Consequences*, ALBUQUERQUE J., Feb. 24, 1999, at A10.

[39] *See* Sandra Dibble, *U.S., Mexican Groups Sue Dept. of Interior over Water*, SAN DIEGO UNION-TRIB., July 20, 2005, at B1 (describing litigation by U.S. and Mexican groups to halt construction of canal on basis that water belongs to Mexico).

[40] In addition to the groundwater issues relating to the Colorado River, the United States and Mexico are estimated to share seventeen other groundwater basins. Robert E.

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demand for water did not rise to the level where groundwater was a competitive commodity, so there was no consideration of whether groundwater should be included in the allocation. The main support for the argument that the United States and Mexico agreed to maintain the underground flow that existed at the time of the treaty comes from Minute 242, which was passed by the International Boundary and Water Commission in 1973 to resolve a water pollution issue involving the Colorado River.[41]

Any resolution of the United States-Mexico dispute over the All-American Canal would ideally balance the interests of both parties with vital environmental concerns.[42] For Mexico, the decrease in the amount of recharge to the groundwaters in the Mexicali Valley will drastically reduce the amount of water available for irrigation.[43] Mexican farmers have a reliance interest in maintaining the groundwater flow as more than 700 wells have been installed in the Mexicali Valley to recover the groundwater.[44] For the United States, the water is needed for the burgeoning Southern California region,[45] and municipal uses are generally considered to be a higher priority than agricultural needs.

Due to the stalemate over the terms of the 1944 Treaty, both parties stand to lose valuable water resources and harm fragile wetlands.[46] The United States claims that neither party is bound by Minute 242 to maintain the flow of groundwater that existed at the time the 1944 Treaty was signed.[47] This position has the potential to harm the United States in the long run, because Mexican farmers may

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Hall, Note, *Transboundary Groundwater Management: Opportunities Under International Law for Groundwater Management in the United States-Mexico Border Region*, 21 ARIZ. J. INT'L & COMP. L. 873, 875 (2004).

41 Minute 242 states that:

> With the objective of avoiding future problems, the United States and Mexico shall consult with each other prior to undertaking any new development of either the surface or the groundwater resources, or undertaking substantial modifications of present developments, in its own territory in the border area that might adversely affect the other country.

Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River, U.S.-Mex., Aug. 30, 1973, 12 I.L.M. 1105, 1106–07 (1973), *available at* http://www.ibwc.state.gov/Files/Minutes/Min242.pdf.U.S.-Mex.

42 *See infra* note 49 and accompanying text.

43 *See* Hume, *supra* note 38 (noting that reduction in groundwater will also increase salinity of water).

44 *See* Rohter, *supra* note 36.

45 *See* Dibble, *supra* note 39 ("The water saved through the lining project could supply 134,000 households in San Diego County, according to the San Diego County Water Authority.").

46 *See infra* note 49 and accompanying text.

47 Dibble, *supra* note 39 ("U.S. officials have steadfastly maintained that the water carried by the All-American Canal belongs to California.").

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exhaust available groundwater supplies along the border.[48] Moreover, environmentalists have recently discovered that Mexico's Andrade Mesa wetlands, covering some 8000 acres and home to more than 100 bird species, may be nourished by seepage from the All-American Canal and, therefore, may be at risk of disappearing if the canal is lined.[49] Despite the fact that the United States and Mexico both have an incentive to prevent the other nation from exploiting these limited resources, there is no established joint institution to forward their common interests.[50]

B. Kansas-Colorado Case Study

In the United States, domestic policymakers also struggle to adapt to the challenges of interstate water conflicts, and states that share bodies of water have settled on signing binding compacts that create fixed water allocations. The Compact Clause of the U.S. Constitution permits states to negotiate compacts with the consent of Congress.[51] Interstate compacts have three main functions: to resolve boundary disputes, to facilitate "one-shot" interstate projects, and to create ongoing administrative agencies.[52]

Compacts are commonly used to resolve water allocation and quality issues that transcend state boundaries. States are forced to enter into compacts to resolve disputes over water when, as is often the case, the courts and Congress are unwilling to step in and perform the initial allocation. There are currently twenty-six water allocation compacts in operation in the United States.[53] A close examination of

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[48] This type of pumping race has been described as a strategic externality. "What an operator does not withdraw today will be withdrawn, at least in part, by rival[s]. The fear that [pumpers] cannot capture tomorrow what they do not pump today undermines their incentive to forgo current pumping for future pumping." OSTROM, *supra* note 14, at 109 (alteration in original) (quoting Donald H. Negri, *The Common Property Aquifer as a Differential Game*, 25 WATER RESOURCES RES. 9, 9 (1989)).

[49] Sandra Dibble, *Wetlands Become a Focus in Debate over Canal Lining*, SAN DIEGO UNION-TRIB., June 6, 2005, at A1.

[50] *Id.* ("Both countries have planned badly the use of water, and are using water inefficiently, . . . and both countries need each other to resolve these issues.") (quoting Exequiel Ezcurra, Director of Scientific Research at the San Diego Museum of Natural History and former Director of Mexico's National Institute of Ecology).

[51] U.S. CONST. art. I, § 10, cl. 3 ("No State shall, without the Consent of Congress, . . . enter into any Agreement or Compact with another State.").

[52] Jill Elaine Hasday, *Interstate Compacts in a Democratic Society: The Problem of Permanency*, 49 FLA. L. REV. 1, 3–4 (1997).

[53] Douglas L. Grant, *Limiting Liability for Long-Continued Breach of Interstate Water Allocation Compacts*, 43 NAT. RESOURCES J. 373, 373 (2003). Of these compacts, twenty-two are essentially state-based and four involve close cooperation with the federal government. *Id.* at 373 n.1. For a list of all interstate water compacts, see the Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service, http://laws.fws.gov/lawsdigest/compact.html (last visited Jan. 8, 2006).

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one interstate water allocation compact that has been litigated in the Supreme Court will highlight the challenges of interstate compacts when initial allocations fail to take into account important future developments such as increased groundwater use.

Colorado and Kansas signed the Arkansas River Compact in 1948 to apportion the waters of the Arkansas River.[54] In the past decade, litigation between Kansas and Colorado over the terms of this compact has appeared before the Supreme Court three times.[55] The legal dispute between Colorado and Kansas dates as far back as 1906, when Kansas filed a motion for an injunction against diversions of water by Colorado, a motion which the Supreme Court dismissed.[56] In 1943, Kansas again brought suit to enjoin Colorado's use of the Arkansas River, but the Supreme Court urged the states to resolve the dispute through "mutual accommodation and agreement."[57] With no other alternative, Kansas and Colorado began negotiating an interstate water allocation compact in earnest, and after three years they signed the Arkansas River Compact.[58]

Unlike other compacts, the Arkansas River Compact did not apportion the waters based on a specific quantitative amount to either the upstream or downstream state,[59] but provided a "flexible apportionment based on the right of both states to make demands for releases from John Martin Reservoir at the times and the rates speci-

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54 Arkansas River Compact, art. I.B, 63 Stat. 145, 145 (1949).

55 *See generally* Kansas v. Colorado (*Kansas III*), 514 U.S. 673 (1995); Kansas v. Colorado (*Kansas IV*), 533 U.S. 1 (2001); Kansas v. Colorado (*Kansas V*), 543 U.S. 86 (2004).

56 *See* Kansas v. Colorado (*Kansas I*), 206 U.S. 46, 117–18 (1907).

57 *See Kansas II*, 320 U.S. 383, 392 (1943) (noting that judicial restraint should be exercised when dealing with rights of states and that "mutual accommodation and agreement should, if possible, be the medium of settlement").

58 *Kansas III*, 514 U.S. at 678; *see also* Arkansas River Compact, 63 Stat. 145.

59 As a framework for thinking about interstate compacts, scholars in the field have noted that to apportion water, "a compact must either (1) limit how much water the upper state can use or (2) guarantee the lower state a certain amount of water." 4 WATERS AND WATER RIGHTS § 46.03, at 46-10 (Robert E. Beck ed., 1991 ed., repl. vol. 2004); *see also* Jeffrey P. Featherstone, *Existing Interstate Compacts: The Law and the Lessons*, 4 TOL. J. GREAT LAKES' L. SCI. & POL'Y 271, 273–74 (2001) ("[M]ost interstate water allocation compacts . . . seek to allocate water by either limiting storage or flow. In the storage allocation approach, limitations are placed on the amount of water that can be stored by an upstream state. . . . The other approach involves dividing the actual flow of a river system."). This type of allocation is a result of the dynamics of surface waters, where the upstream water user has an advantage over downstream users. In comparison, groundwater users have equal access to the water underlying their land; the primary limiting factor is the water-pumping technology that allows them to draw the water from certain depths. Few interstate water allocation compacts even mention groundwater, because at the time these compacts were drafted, states did not rely on groundwater as heavily as they do now.

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fied in the Compact."[60] Under the terms of Article V, the drafters of the Compact assumed that the allocation would leave approximately sixty percent for Colorado and forty percent for Kansas, but they intended that this allocation be capable of adjustment by administrative discretion in order to provide the "best possible use of . . . water at all times."[61] In practice, the states rejected this flexible format of adjusting water allocations to the seasonal rate of flow. They instead chose to convert it to a fixed allocation by withdrawing the maximum amount allowed under the agreement.[62]

With these existing agreements in place, the dispute that has languished in the Supreme Court for the past ten years highlights the need for compacts to place more emphasis on administrative process. The focus on getting the "right" allocation is misguided because even the most well-intentioned allocation formulas are likely to go awry. The current dispute between Kansas and Colorado began in 1983 when Kansas came to suspect that Colorado's post-Compact pumping of groundwater violated the provisions of the Compact.[63] The provision at issue is not in Article V, which discusses the basis of apportionment, but rather in Article IV, which the Court interpreted to mean that Colorado could not "materially" reduce the level of "usable" shared water.[64] Colorado did not increase the amount of surface water that it extracted from the reservoir, but it did fail to account for

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[60] David W. Robbins & Dennis M. Montgomery, *The Arkansas River Compact*, 5 U. DENV. WATER L. REV. 58, 66 (2001); *see also* Arkansas River Compact, art. V, 63 Stat. at 147.

[61] Robbins & Montgomery, *supra* note 60, at 91 (quoting *Arkansas River Compact: Hearing on S. 1448 Before the S. Comm. on Interior and Insular Affairs*, 81st Cong. 15 (1949) (statement of Gail L. Ireland, Member, Colorado Commission on the Arkansas River Compact)).

[62] *See* Robert Benjamin Naeser & Lynne Lewis Bennett, *The Cost of Noncompliance: The Economic Value of Water in the Middle Arkansas River Valley*, 38 NAT. RESOURCES J. 445, 461 (1998) ("The agreement between the two states seems to imply that both sides have settled on a quantity to which Kansas is entitled, otherwise they could not have agreed to the 328,000 [acre-foot] depletion [in the 1986 case]."). The Arkansas River Compact was not originally intended to guarantee either Colorado or Kansas a specific amount of water. The Compact specified that both Colorado and Kansas could use the water in John Martin Reservoir, but Colorado's water use was measured by the amount of water released at the dam while Kansas's water use was measured by a maintenance of stateline flow. Arkansas River Compact, art. V.E.3, 63 Stat. at 148.

[63] *Kansas III*, 514 U.S. at 679.

[64] *Id.* at 694. Article IV of the Compact states that:

> This Compact is not intended to impede or prevent future beneficial development of the Arkansas River basin in Colorado and Kansas . . . Provided, that the waters of the Arkansas River, as defined in Article III, shall not be materially depleted in usable quantity or availability for use to the water users in Colorado and Kansas under this Compact by such future development or construction.

Arkansas River Compact, art. IV.D, 63 Stat. at 147.

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the amount of groundwater appropriated by Colorado water users.[65] Even before the signing of the Compact, Colorado farmers had used groundwater wells as a backup water supply during unpredictable periods when surface water was not available. However, the number of groundwater wells had increased from 121 in the pre-Compact days to around 2000 by the time of the litigation.[66] This reliance on groundwater to make up for limited surface water supplies is a growing trend in water-scarce areas.

Throughout the litigation, both Colorado and Kansas claimed that they did not know the relationship between groundwater and surface water. The Special Master's[67] report noted that "[b]y the 1970s the extent of pumping in Colorado was a matter of common knowledge, but that is not to say that the impact of such pumping on usable Stateline flows was generally known or understood. Indeed, it appears not to have been, even in Colorado."[68] Colorado lost its case before the Supreme Court because it could not deny the connection between groundwater and surface water, and therefore could not deny that Colorado water users' pumping of groundwater had significantly decreased the flow of surface water to Kansas water users.[69] The true misfortune of the dispute between Kansas and Colorado is that since 1995, the case has returned twice more to the Supreme Court.[70] Since the most recent Supreme Court review of the case, Kansas and Colorado have been negotiating the lingering issues of their dispute, advised by the Court to rely on the "expert discussion" required by the technical nature of the subject matter.[71] Despite years of litigation, the two parties are as institutionally undeveloped as when they began, lacking the joint management tools necessary to address their problems.

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65 *See infra* note 68 and accompanying text.

66 Naeser & Bennett, *supra* note 62, at 451.

67 Defined most broadly, a Special Master is someone specially appointed to help a court with a particular matter or case. In the case of water disputes, the Special Master assists the Supreme Court with the more technical aspects of the dispute and submits his findings to the court in a written report.

68 Kansas's Reply Brief Opposing Colorado's Exceptions at 2, *Kansas III*, 514 U.S. 673 (1995) (No. 105) (quoting Special Master's Report).

69 Kansas was quick to point out in its own brief to the Supreme Court that "nowhere in its exceptions or supporting brief does Colorado deny that it has violated the Arkansas River Compact by virtue of increased postcompact pumping in Colorado over the period 1950–1985." *Id.* at 7.

70 *See infra* notes 87–91 and accompanying text; *see generally Kansas IV*, 533 U.S. 1 (2001); *Kansas V*, 543 U.S. 86 (2004).

71 *Kansas V*, 543 U.S. at 106 ("The Special Master . . . expressed the hope that expert discussion, negotiation, and if necessary binding arbitration, would lead to resolution of any remaining disputes.").

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III
LESSONS LEARNED

The preceding two case studies have shown that existing water allocation models, in both the domestic and international arenas, have failed in critical ways. Specifically, existing water allocation solutions fail to account for changed circumstances, rely on inadequate ex post dispute resolution mechanisms, and create institutions with minimal flexibility and authority. These problems will become increasingly pertinent as demands for scarce water resources increase.

This discussion is relevant because international and domestic organizations continue to focus on creating the most appropriate standard for initial water allocations. International organizations research existing general practices followed by most states and present them in a written form called a codification.[72] These codifications can be used either as general guidance for states when negotiating their own treaties, or may be directly ratified by several states to form a multilateral treaty, also known as an international convention.[73] A number of these organizations are currently focusing on groundwater, as it is "becoming increasingly important for all populations, but particularly for the populations of the developing world."[74] A central focus of this discussion is on which of two standards should govern fixed allocations of water, "equitable allocation"[75] or "optimal utilization."[76] One

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[72] *See* PETER MALANCZUK, AKEHURST'S MODERN INTRODUCTION TO INTERNATIONAL LAW 60–62 (7th ed. 1997) (describing "attempts to codify customary international law").

[73] *Id.* at 61.

[74] Int'l Law Comm'n, *Shared Natural Resources: First Report on Outlines* ¶ 25(a), U.N. Doc. A/CN.4/533 (Apr. 30, 2003) (*prepared by* Chusei Yamada).

[75] The concept of equitable allocation is the most commonly used principle in interstate water compacts for resolving water disputes among states. *See* JAMES RASBAND ET AL., NATURAL RESOURCES LAW AND POLICY 849 (2004) ("The rule of equitable apportionment adopted by the Court in *Kansas v. Colorado* has been the lodestar for all subsequent interstate allocation disputes."). Allocation is "often defined by some selected historic pattern of use" and is "also occasionally based upon population, the amount of arable land, or some other objective measure. Allocation may also be based on a vague notion that each state is entitled to a 'reasonable share' of the water." Joseph W. Dellapenna, *Treaties as Instruments for Managing Internationally-Shared Water Resources: Restricted Sovereignty vs. Community of Property*, 26 CASE W. RES. J. INT'L L. 27, 36 (1994); *see also* 5 WATERS AND WATER RIGHTS § 49.05, at 28–29 (Robert E. Beck ed., 1991 ed., repl. vol. 1998) (finding that states choose to limit their sovereignty in deference to interests of downstream riparians due to concern for future reciprocity).

[76] The language of optimal utilization is commonly used in international discourse regarding transboundary waters, but it has not been accepted as the guiding principle. More recent scholarship has placed greater emphasis on cooperation, including references to "conjunctive management" and "integrated management." *See* INT'L LAW ASS'N, WATER RESOURCES COMM., WATER RESOURCES LAW: FOURTH REPORT 16 (2004) [hereinafter Berlin Conference], *available at* http://www.ila-hq.org/pdf/Water%20Resources/Final%20Report%202004.pdf. The Berlin Conference, *supra*, suggests that the concept of

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thing that has become clear in the drafting debates is that these terms are not easily defined, and that they are sometimes used without a substantive understanding of their practical implications for water allocation. Assuming that these international codifications are intended to provide guidance to the international community concerning how to draft transboundary water agreements, the emphasis on determining the correct standard of allocation diverts attention from the more pressing concern of creating an ongoing administrative process to address the rapidly changing water needs of different areas.

As international organizations debate the drafting of international water laws and U.S. states continue to negotiate binding water agreements,[77] lessons should be drawn from the past. The rest of this Part is organized to demonstrate how the failure to account for the increasing importance of groundwaters has caused even the most well-intentioned allocation formulas to go awry and has led to time-consuming and costly disputes and litigation. Part IV will make the case for joint management institutions. While water commissions currently exist in both case studies, they are not joint management institutions because they are only authorized to monitor transboundary water conditions. Effective reform requires that joint management institutions are created with the decisionmaking authority to adjust water allocations to changing circumstances.

A. Fixed Allocation Formulas Cannot Account for Everything

Water agreements with fixed allocations are likely to result in conflict because of two interrelated problems: They are both difficult to negotiate (and renegotiate) and difficult to draft comprehensively to predict future conditions. Water agreements are difficult to conclude because their negotiation requires large expenditures of time

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"optimal use" should be linked to the joint management of international watercourses in a manner that allows management to extend beyond artificial boundaries in order to consider the relevant physical and economic characteristics of the entire body of water.

[77] For example, the U.S. Fish and Wildlife Service recently reported that:

> The Upper Colorado River Endangered Fish Recovery Program . . . announced today the signing of a cooperative agreement that launched implementation of a management plan to help ensure that current and future water needs are met for people in the Yampa River Basin while promoting recovery of four species of endangered Colorado River fish—the humpback chub, bonytail, Colorado pikeminnow and razorback sucker. The agreement was signed by the States of Colorado and Wyoming, the Colorado River Water Conservation District and the U.S. Fish and Wildlife Service . . . .

Press Release, U.S. Fish and Wildlife Service, Agreement Addresses Water Needs of Yampa River Basin Residents and Promotes Recovery of Endangered Fishes (Jan. 20, 2005), *available at* http://www.r6.fws.gov/pressrel/CRRP-1.htm.

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and money.[78] This is a self-perpetuating problem since the unlikelihood of future renegotiation, given the same concerns over time and money, will only place more pressure on getting the initial allocation right, leading to extensive negotiations over every detail.[79] Most water agreements do not permit a method of adjustment by a joint management institution, making the only alternative time-consuming renegotiation by the parties.

This initial problem is exacerbated by the likelihood that, no matter how detailed, no water agreement can account for all possible circumstances. As the two case studies have shown, neither the 1944 Treaty nor the Arkansas River Compact was able to predict and account for the impact of diminishing groundwater resources.[80] In the late 1940s when both of these agreements were drafted, water users had limited technological capabilities to draw groundwater from wells, so those total withdrawals did not have a material impact on surface water levels. Recent changes in technology have accounted for dramatic increases in the ability to utilize groundwater.[81]

The most persuasive argument in favor of fixed allocations is that they encourage water users to feel secure in making investments and thereby ensure greater stability in the economy. However, these allocations give water users a false sense of security because they fail to account for changed circumstances and the disastrous effects that such omissions can have. For example, water users in Mexico and Colorado, unaware that the groundwater they were using did not belong to them, invested in groundwater-pumping infrastructure and expanded

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[78] BARRETT, *supra* note 5, at 126 ("[N]egotiation is costly . . . . Ambiguity imposes transaction costs.").

[79] As one scholar notes, "[t]he chief weakness of [interstate] compacts has been that they have negotiated agreements too precisely and in too much detail, without sufficient information and study of the problems involved. Moreover, compacts have not provided the proper kind of administrative machinery to deal with the evolving problems of a basin." Ernest A. Engelbert, *Federalism and Water Resources Development*, 22 LAW & CONTEMP. PROBS. 325, 341 (1957); *see also* Eyal Benvenisti, *Collective Action in the Utilization of Shared Freshwater: The Challenges of International Water Resources Law*, 90 AM. J. INT'L L. 384, 399 (1996) ("True to the conception of water treaties as discrete transactions, much emphasis has been placed on the initial stage of allocating shares. This emphasis, highlighted by the ILC's previous concern to propose a clear rule of allocation, has overshadowed the other issue, cooperation."); Naeser & Bennett, *supra* note 62, at 463 (noting that it is necessary to "emphasize the need for allocation rules to incorporate flexibility—allowing water to move to higher valued uses—and strong enforcement and monitoring mechanisms").

[80] *Cf.* Grant, *supra* note 53, at 375 ("Another reason to expect more litigation is that compacts typically allocate water for the long term, and limits of human foresight can result in unintended drafting omissions and ambiguities.").

[81] *Kansas III*, 514 U.S. 673, 691 (1995) ("We agree with the Special Master that 'new wells, the replacement of centrifugal with turbine pumps, and increased pumping from [pre-Compact] wells all come within [Article IV-D].'" (alterations in original)).

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their farms based on their presumed water supply.[82] The sudden revelation that the water was not for their use was certain to have a destabilizing effect on their individual livelihoods as well as the welfare of their communities.

Increasing reliance on groundwater is only one example of the kinds of changing conditions for which fixed allocation formulas are unable to account. For example, a recent article noted that an increase in the "demands for urban, Indian, recreational, and ecological uses"[83] have forced states into costly disputes because their allocation formulas failed to account for these changes. Moreover, at the international level, neighboring countries such as the United States and Mexico, as well as similarly-situated countries, are not institutionally prepared for the potential of increased global warming to cause "extraordinary drought," which would be devastating to both countries, but for which the 1944 Treaty makes no provision.[84] Even more troubling than these known threats are those dangers that scholars have not yet studied, which will remain unknowable in any future agreements that attempt to make fixed allocations.

B. Dispute Resolution Mechanisms Are Inadequate

In the international arena, there are few dispute resolution mechanisms available for countries that want to alter existing agreements. The lack of an enforcement body is considered one of the most challenging aspects of international negotiation,[85] and the possibility of litigation is often regarded as a domestic solution that would be useful at the international level. President Harry Truman, in a speech in 1945, said:

> When Kansas and Colorado have a quarrel over the water in the Arkansas River they don't call out the National Guard in each state and go to war over it. They bring a suit in the Supreme Court of the United States and abide by the decision. There isn't a reason in the world why we cannot do that internationally.[86]

Despite the fact that litigation in the Supreme Court is an option for domestic disputes, the Arkansas River Compact litigation between

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[82] *See supra* note 44 and accompanying text.

[83] Grant, *supra* note 7, at 107.

[84] *See* Szekely, *supra* note 8, at 401 ("The 1944 Treaty provided the Commission with practically no tools, especially in the case of the Colorado River, to face 'extraordinary drought' situations . . . .").

[85] *See* BARRETT, *supra* note 5, at 15–16 (comparing domestic and international enforcement to find that international agreements have little power to affect behavior materially).

[86] *Id.* at 106 (quoting BARBARA K. RODES & RICE ODELL, A DICTIONARY OF ENVIRONMENTAL QUOTATIONS 163 (1992)).

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Kansas and Colorado demonstrates that adjudicatory bodies can have limited efficacy in resolving water issues.

There are at least two reasons why dispute resolution and litigation mechanisms have thus far been inadequate: Adjudicatory bodies lack expertise to effectively address technical water issues, and parties are constrained by agreements they made without knowledge of how conditions would change. The Kansas-Colorado dispute underscores the fallacy of relying on a court lacking scientific expertise to address technical water issues. Adjudicatory bodies are frequently pressed to make technical decisions in other areas of law as well. The argument of this section is not that this kind of ex post adjudication should be abandoned, but rather that its inadequacies may be mitigated by ex ante joint management institutions.

To address the concern of technical expertise, the Supreme Court in *Kansas v. Colorado* designated a Special Master with expertise in water law to study and report on the issues involved in the litigation. However, this was not a complete solution because both Kansas and Colorado filed exceptions to the various reports of the Special Master. It was then up to the Supreme Court to make technical decisions about the extent to which the Special Master's recommendations should be modified. The litigation proceedings were divided into two phases: the liability phase[87] and the damages phase.[88] After finding Colorado in violation of its obligations, the Supreme Court asked the Special Master to calculate the quantity of usable water that was wrongfully depleted from the Arkansas River and to determine the appropriate monetary damages for the harm caused to Kansas by the depletions, including prejudgment interest if necessary.[89]

Ironically, in 1943, when Kansas claimed injury from crop losses due to water diversions by Colorado, the Supreme Court declined to "speculate as to how much of this land would have been put under irrigation under more favorable circumstances."[90] Half a century later, this was exactly what the Supreme Court asked the Special Master to do. Despite the more advanced water assessment technologies that had developed since 1943, the calculations were still filled with uncertainty and controversy, which brought Colorado back to the

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[87] *See generally Kansas III*, 514 U.S. 673 (1995).

[88] *See generally Kansas V*, 543 U.S. 86 (2004); *Kansas IV*, 533 U.S. 1 (2001).

[89] *See* H. David Gold, *Supreme Court Struggles with Damage Assessment in Water Dispute as Interstate Compact Breaks Down*, 29 ECOLOGY L.Q. 427, 427 (2002) ("In 1995, the Court acknowledged the hydrologic connection between groundwater and surface water and held that Colorado had breached the Compact. The Court then assigned the task of assessing damages to Special Master Arthur Littleworth.").

[90] *Kansas II*, 320 U.S. 383, 399 (1943).

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Supreme Court in 2001 and 2005 to challenge the Special Master's determination of the value of the crop losses.[91] In each of these instances, the Supreme Court was once again forced to adjudicate on a matter outside its expertise.

The second reason that dispute and litigation mechanisms are flawed stems from the fact that interstate compacts and international treaties are essentially contracts, and the role of any adjudicator is to enforce the promises made by the parties to the contract. In situations where the parties could not predict the consequences of their agreement, unaware of future developments in water resources, enforcement of these agreements is an imperfect solution.[92] For instance, in *Kansas v. Colorado*, the Supreme Court enforced the terms of the original agreement, regardless of the fact that both parties acknowledged their lack of knowledge about the relationship between groundwater and surface waters. The Supreme Court had to do more than just enforce the original allocation, because there was an open question about whether, in calculating damages, monetary interest should be issued to Kansas for the years it was deprived of water.[93] This required the Court to interpret the intent of the framers of the Compact as to whether they intended to include monetary interest, even though it was highly likely that neither state had even considered the possibility.[94] Regardless of the outcome, the Court's decision was an undeserved windfall to one state at the expense of the other, revealing the inadequacy of current dispute mechanisms.

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[91] *Kansas IV*, 533 U.S. at 16 (noting that crop losses constituted "the largest component of Kansas's damages claim").

[92] There are two main theories of contract: actual intent theory and objective theory. *See* E. ALLAN FARNSWORTH ET AL., CONTRACTS: CASES AND MATERIALS 119 (6th ed. 2001). Actual intent theory argues that "[o]nce a contract has been validly made, the courts attach legal consequences to the relation created by the contract, consequences of which the parties usually never dreamed—as, for instance, where situations arise which the parties had not contemplated." *Id.* at 120. Objective theory, on the other hand, tries:

> (1) to treat virtually all the varieties of contractual arrangements in the same way, and (2), as to all contracts in all their phases, to exclude, as legally irrelevant, consideration of the actual intention of the parties or either of them, as distinguished from the outward manifestation of that intention.

Id.

[93] *See Kansas IV*, 533 U.S. at 21 (discussing "whether, at the time the Compact was negotiated and approved, Colorado and Kansas could fairly be said to have intended, or at least to have expected or assumed, that Colorado might be exposing itself to liability for prejudgment interest in the event of the Compact's breach").

[94] *See* Gold, *supra* note 89, at 428–29 ("The dissenting justices contended that, when the Compact was created, Colorado would not have contemplated that violations of the Compact would result in damages including interest. The relevant law at that time did not clearly allow interest on unliquidated claims.").

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Rather than advocating for complete reform, some scholars have argued that the focus should be on improving dispute and litigation mechanisms. One remedy is for courts and Congress to become more actively involved and to allow states to unilaterally withdraw from compacts, something which courts and Congress have historically been hesitant to do.[95] If there were greater congressional and judicial intervention, the possible unpredictability of outcomes would force states to voluntarily renegotiate compacts.[96] Internationally, commentators have suggested that the United Nations Security Council may play this role, by threatening to use its Chapter VII powers to intervene in cases of serious environmental threats as a way to force countries to voluntarily renegotiate existing agreements.[97]

Another way to improve existing dispute resolution mechanisms would be to require that domestic and international water agreements include mandatory arbitration clauses. Unlike a court, an arbitration panel "need not tailor its decision to fit legal precedent" and "[a]n arbitration clause could quite conceivably instruct the arbitrators to 'split the difference' between each state's position to achieve the most equitable result."[98] Internationally, a designated arbitrator could even "draw on the silence of the lawmakers and the divergence of opinions of state parties to develop strong administrative judge-made law."[99]

Both of these responses are ex post solutions that apply when circumstances have degenerated to a point where intervention is necessary. A comprehensive approach to water allocation and management should also consider the ex ante mechanisms necessary to ensure that fewer conflicts arise that would require resort to third party intervention. One alternative that is noticeably missing from the literature is to broaden the authority of water commissions to address changing water allocation concerns, thereby creating joint management institutions that have real decisionmaking power.

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[95] Grant, *supra* note 7, at 173 ("The Court will not issue an apportionment decree unless the state seeking it clearly and convincingly proves a threat to its rights of a serious magnitude.").

[96] *Id.* at 177.

[97] *See generally* Alexandra Knight, Note, *Global Environmental Threats: Can the Security Council Protect Our Earth?*, 80 N.Y.U. L. REV. 1549 (2005).

[98] Joseph W. Girardot, *Toward a Rational Scheme of Interstate Water Compact Adjudication*, 23 U. MICH. J.L. REFORM 151, 174–75 (1989).

[99] Eyal Benvenisti, *Public Choice and Global Administrative Law: Who's Afraid of Executive Discretion?* 11 (Inst. of Int'l Law & Justice, Working Paper No. 2004/3, 2004).

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IV
JOINT MANAGEMENT INSTITUTIONS

Given that the traditional model of ex ante fixed allocations and ex post litigation is no longer adequate for the changing dynamic of water resource crises, the proposed solution in this Note is to create joint management institutions that provide "expert administration"[100] over these issues.[101] This Note does not attempt to describe in detail how these joint management institutions should be organized, in part because it will depend on the specific needs and constraints of each water system. However, there are two basic requirements of any joint management institution created to provide a dynamic and flexible approach to water allocation. First, a joint management institution must have the authority to make allocation decisions that are responsive to changing circumstances and emergent knowledge about water conditions, unlike existing water commissions that are not given any power to alter original allocations. Second, joint management institutions must be structured to manage any water projects that have the potential to harm the water system as a whole, rather than being limited to water issues that physically cross borders. The rest of this Part will consider existing water commissions, discuss why reform is necessary but may be hard to achieve, and present ways to improve the odds of success for joint management institutions.

A. Existing Water Commissions Need Reform

One advantage for the two case studies discussed, as well as many water agreements domestically and internationally, is that there are already institutions in place that are delegated the responsibility of monitoring compliance. These water commissions have no decision-making authority, so they cannot be considered joint management institutions, but they have the structure of formal institutions, with government funding for offices and administrators. Systems which are already institutionalized have an advantage over informal systems, because informal systems may not be easily institutionalized without

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[100] *See Kansas II*, 320 U.S. 383, 392 (1943).

[101] Joint management institutions are the solution proposed in this Note, but they are not the only alternative to current fixed allocation agreements. For example, the Montreal Protocol has been lauded as a "model of flexibility" in treaty-drafting, with obligations that can be "accelerated or decelerated, broadened or narrowed, strengthened or weakened as changes in science, technology, and treaty performance recommend[ ]." BARRETT, *supra* note 5, at 153. Other scholars have heralded water markets, the creation of individual water rights that can be bought and sold regardless of state or national borders, as a way to "promote both efficiency and environmental goals in the distribution of water." Barton H. Thompson, Jr., *Institutional Perspectives on Water Policy and Markets*, 81 CAL. L. REV. 673, 673 (1993).

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damaging existing relationships.[102] Despite this advantage, a closer analysis of existing water commissions in the two case studies will reveal why current water commissions are not adequate solutions.

In the United States-Mexico example, the International Boundary and Water Commission is granted responsibility under the 1944 Treaty for "[t]he application of the present Treaty, the regulation and exercise of the rights and obligations which the two Governments assume thereunder, and the settlement of all disputes to which its observance and execution may give rise . . . ."[103] The Commission is run on each side by one Commissioner, two principal engineers, a legal adviser, and a secretary.[104] The Commission's capabilities are limited to those designated by the original treaty, which include initiating joint construction projects and resolving border sanitation problems.[105]

A closer reading of the text of the 1944 Treaty will highlight the lost opportunities for enhanced cooperation among the two countries in their transboundary water relationship. With respect to provisions for joint action, the treaty requires that "the particular matter in question shall be handled by or through the Department of State of the United States and the Ministry of Foreign Relations of Mexico."[106] Aside from actions specifically mandated by the treaty, no other actions can be taken without prior approval from the governments of both countries. This provision prevents the Commission from doing anything more than carrying out specific technical tasks as dictated by the two governments.

In addition, the joint management of the transboundary waters between the United States and Mexico is prohibited when works constructed to regulate and maintain the waters are not jointly operated for the optimal use of the resource. Any works that are constructed entirely within the territory of one country remain "under the exclusive jurisdiction and control"[107] of that country regardless of the likely impacts of those operations on the body of water as a whole. The All-

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[102] Benedict Kingsbury suggests that the successful creation of a "partial international community" which exercises governance on a special topic within a specific limit will depend heavily on an institutional approach, because it is "difficult to apply administrative law approaches outside highly institutionalized settings." Benedict Kingsbury, *Omnilateralism and Partial International Communities: Contributions of the Emerging Global Administrative Law*, 104 J. INT'L L. & DIPL. 98, 117 (2005).

[103] 1944 Treaty, *supra* note 32, art. II, at 1223.

[104] For more information about the International Boundary and Water Commission, see International Boundary & Water Commission, http://www.ibwc.state.gov (last visited Jan. 8, 2006).

[105] 1944 Treaty, *supra* note 32, art. II, at 1223.

[106] *Id.*

[107] *Id.* at 1224.

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American Canal highlights the problematic nature of this provision, because while the canal is entirely within American boundaries and therefore under U.S. jurisdiction, it will have significant implications on the Mexican side of the border.

As for dispute resolution, the 1944 Treaty allows the Commission "[t]o settle all differences that may arise between the two Governments with respect to the interpretation or application of this Treaty, subject to the approval of the two Governments."[108] This grant of authority places two types of limitations: First, it limits the Commission such that it can do no more than enforce the terms of the agreement; and second, it requires that the enforcement be subject to the consensus of both governments. In the dispute over the All-American Canal, the discussion has been left to the two governments, which are, not surprisingly, unwilling to discuss the politically sensitive matter.[109]

In the dispute between Kansas and Colorado, the Arkansas River Compact created an administration with the power to regulate and enforce the provisions of the Compact.[110] However, the Compact does not give the Administration the power to alter the provisions of the Compact, or even to enforce the terms of the allocation with administrative discretion as intended by the drafters of the Compact.[111] The Administration is made up of three representatives from each state who are each appointed by the state governor for a term not to exceed four years. Each state is entitled to one vote, and administrative actions can only be taken with a unanimous vote.[112] Article VIII also allows the Administration to decide, by unanimous vote, to submit disputes to arbitration.[113] This clause is not compulsory, but gives Kansas and Colorado an option to resolve disputes without litigation, and was encouraged by the Supreme Court in its most recent decision.[114]

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108 *Id.* art. XXIV.d, at 1256.

109 *See infra* notes 133–35 and accompanying text.

110 The Arkansas River Compact at Article VIII.B states that:

> The Administration shall have power to:
>
> (1) Adopt, amend and revoke by-laws, rules and regulations consistent with the provisions of this Compact;
>
> (2) Prescribe procedures for the administration of this Compact: Provided, that where such procedures involve the operation of John Martin Reservoir Project they shall be subject to the approval of the District Engineer in charge of said Project;
>
> (3) Perform all functions required to implement this Compact and to do all things necessary, proper or convenient in the performance of its duties.

Arkansas River Compact art. VIII.B, 63 Stat. 145, 149–50 (1949).

111 *See supra* notes 60–62 and accompanying text.

112 Arkansas River Compact art. VIII.D, 63 Stat. at 150.

113 *Id.*

114 *See Kansas V*, 543 U.S. 86, 93–94 (2004). The Court stated that:

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The International Boundary and Water Commission and the Arkansas River Compact Administration are prime examples of how existing water commissions are given few decisionmaking responsibilities and instead are delegated technical tasks. When interstate compacts and water commissions were initially proposed, scholars viewed them as promising vehicles for flexible administration because they would not be "narrowly restricted from the outset to a specific kind of operation" but would rather have the ability to "grow and change in response to changing needs."[115] Without the ability to alter the allocation to address these changing needs, these water commissions are unsurprisingly "toothless."[116]

B. Potential Challenges to Reform

If joint management institutions are part of the solution to the crisis of shared water resources, the next question is why existing water commissions have not yet been reformed to create joint management institutions. The losses that result from non-cooperation are apparent to most parties and are well documented with publicly available information.[117] The lack of progress is more likely attributable to the contentious issues of how much water usage to restrict and how those restrictions should be distributed among the bargaining parties.[118] The rest of this part will address these coordination issues at two levels—a first-order inquiry will be directed at the reasons why parties might find it difficult to enter into a new agreement incorporating joint management elements, while a second-order question will

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> Moreover, the need for a River Master is diminished by the fact that the parties may find it possible to resolve future technical disputes through arbitration. The interstate compact itself creates an Arkansas River Compact Administration . . . empowered to resolve differences arising under the Compact. . . .
>
> . . . .
>
> The Special Master recommended both binding arbitration and these other less formal methods as alternatives, while opposing appointment of a River Master and observing that such an appointment would "simply" make it "easier to continue this litigation."

Id.

115 Richard H. Leach, *Interstate Authorities in the United States*, 26 LAW & CONTEMP. PROBS. 666, 678 (1961).

116 Hasday, *supra* note 52, at 22–23 (describing unresponsiveness of compact agencies as unsurprising in light of lack of accountability and state control).

117 Gary D. Libecap, *The Conditions for Successful Collective Action*, *in* LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS, *supra* note 6, at 161, 165 (describing types of losses that result from open-access systems).

118 *See id.*

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be what kinds of ongoing concerns must be addressed by any joint management institution.

The problem of shared water resources stems from the fact that transboundary waters are common pool resources. States and countries sharing bodies of water will only cooperate if they stand to benefit from such cooperation. Otherwise they have an incentive to act in their own interest even if the consequence of independent action is harm to the water system as a whole.[119] Given these incentive problems, the costs of collective action depend on the willingness of parties to negotiate.[120] To decide whether cooperation is feasible, parties engage in a process of negotiation[121] that is influenced by two important factors: the number of parties to the agreement[122] and the heterogeneity of the bargaining parties.[123]

There are two stages at which the number of parties has an impact on outcomes. In the process of negotiating an agreement, the greater the number of parties, the more difficult it becomes to obtain unanimous consent. More specifically, the negotiation of a new agreement incorporating joint management mechanisms would involve a new definition of property rights, and the greater the number of competing interests in this definition, the more difficult it would be for the group as a whole to reach consensus.[124] Even if consensus were possible, a secondary problem would be that the more parties there are to an agreement, the more difficult it becomes to monitor and enforce the terms of the agreement.[125]

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119 *See* Keohane & Ostrom, *supra* note 6, at 13. They find that:

> When CPRs [common pool resources] are open for anyone to use, individual beneficiaries may not take into account these adverse consequences. Participants acting independently have incentives to overuse the resource and thus reduce total returns. With respect to renewable resources, overappropriation can lead to the destruction of the resource itself.

Id.

120 Scholars have written widely about the problems of collective action. *See generally* BARRETT, *supra* note 5 (providing economic analysis of collective action problems with focus on Montreal Protocol).

121 *See id.* at 138–39 (noting that treaty outcomes emerge from and are shaped by process, and "process matters").

122 *See also id.* at 91 ("[W]hether a particular country participates often depends on the number of *other* countries that participate. Sometimes this decision depends on *which* other countries participate.").

123 *See* Libecap, *supra* note 117, at 165 (describing number and heterogeneity of bargaining parties as influences over likelihood of collective action); *see also* Keohane & Ostrom, *supra* note 6, at 6–10 (describing three types of heterogeneity, namely heterogeneity of capabilities, preferences, and information and beliefs).

124 Libecap, *supra* note 117, at 166.

125 BARRETT, *supra* note 5, at 126 ("[I]t becomes increasingly difficult to sustain full cooperation by means of a self-enforcing agreement when the number of countries that share a resource is larger.").

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Under this view, the two case studies discussed in this Note, both involving only two-party negotiations, should have a greater likelihood of success. The more complicated dilemma is how to deal with the heterogeneity of the parties. The problem of heterogeneity is premised on the notion that parties more equal in status quo allocations, political power, and economic capabilities are more likely to negotiate an agreement.[126] Asymmetry in any of these areas has the potential to make negotiation more difficult.

The status quo allocation of water resources is the distribution of rights under an existing water agreement. It is often the case in allocation disputes that, at least in the short run, one party is benefiting at the expense of another party and altering the compact through unanimous consent becomes an unlikely option.[127] One reason for this impasse is that existing water agreements will give some parties a vested interest in the status quo that they will be unwilling to give up.[128] Agreement is only likely if the new situation makes all parties better off as compared to the existing arrangement.

Basic principles of property and water law may support an argument that those who are first in utilizing water resources are entitled to maintain their status quo rights.[129] However, real-life conditions are rarely as straightforward as first principles. In the dispute between Kansas and Colorado, both parties have arguably valid claims that they have a status quo entitlement to the disputed groundwater. Kansas could claim that it is entitled to the groundwater since it was part of the original allocation.[130] However, Colorado could argue its claim of entitlement because Colorado farmers have made use of the groundwater for over half a century,[131] even before the signing of the original agreement.

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[126] *See* GARY D. LIBECAP, CONTRACTING FOR PROPERTY RIGHTS 6 (1989) ("Conflicts over distribution will be intensified, if there are important heterogeneities among the bargaining groups . . . .").

[127] *See id.* at 116. Libecap notes that "[a]mong bargaining parties, agreement on a proposed adjudgment in property rights depends upon a favorable calculation of expected net private benefits under the new arrangement relative to status quo returns." *Id.* This approach suggests that if the initial allocation of property rights is skewed toward one party, then there will be less likelihood of a renegotiation because any future agreement would have to improve upon the advantages granted to the privileged party.

[128] *Id.* at 6 ("Groups with vested interests may have advantages in political bargaining relative to other groups through lower costs of collective action.").

[129] *See, e.g.*, JESSE DUKEMINIER & JAMES E. KRIER, PROPERTY 40 (5th ed. 2002) (finding that in United States, "*surface waters* and some groundwater are allocated according to an explicit rule of first in time, called prior appropriation. The basic principle is that the person who first appropriates (captures) water and puts it to reasonable and beneficial use has a right superior to later appropriators.").

[130] *See supra* note 64 and accompanying text.

[131] *See supra* note 66 and accompanying text.

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Even more challenging than status quo allocations is the problem of heterogeneity based on political and economic disparity. In the United States-Mexico dispute, the heterogeneity of capability between the two parties is a clear impediment to future agreement on joint management institutions.[132] The lining of the All-American Canal, and the accompanying dispute over water rights, is one outward manifestation of an underlying problem of economic disparity. The lining of the All-American Canal is in advanced planning stages, and it is unlikely that the project can be stopped at this point. Both countries have been hesitant to discuss the matter publicly.[133] In the United States, the discussion is focused on the possibility of "good faith" projects to increase the quantity and quality of Colorado River water allocated to Mexico.[134] There are also proposals "to move some of Mexico's allotment of Colorado River water through the All-American Canal, a measure that would decrease the salinity" or "to keep the old canal filled with Mexico's share and ensure that the Mexicali aquifer is recharged once the paved segment is opened."[135]

The primary difficulty in these sensitive cross-border negotiations is deciding who should have the responsibility of paying for such proposals, since the United States continues to claim that it is only recovering water that it was allocated under the original agreement. The dispute between the United States and Mexico is typical of many water disputes, both domestic and international, because it is about money. As scholars have noted, "[g]iven sufficient fiscal resources, water users for any purpose could provide substitutes for the ground-

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[132] As an example for comparison, consider the U.S.-Canada transboundary water relationship, which is governed by the 1909 Boundary Waters Treaty. Arguably due to the homogeneity between the parties, the United States has demonstrated a greater willingness to negotiate with Canada. When Chicago pushed for additional diversion rights, the 1909 Treaty stated that the uses of the waters of Lake Michigan were an exclusively domestic concern and that Canada could only challenge proposed diversions if there was "material injury to navigation rights." Patricia K. Wouters, *Allocation of the Non-Navigational Uses of International Watercourses: Efforts at Codification and the Experience of Canada and the United States*, 30 CANADIAN Y.B. INT'L L. 60–61 (1992). Initially, the United States insisted on unilateral action, and tensions arose between the two countries. However, amended versions of the 1932 Treaty which gave the United States greater authority lost support from the President after opposition was expressed by Canada. Revealingly, the U.S. government remarked that its actions were guided in part by "considerations of comity: 'the mere result of the necessity of getting along with a neighbour nation, or neighbouring states . . . while theoretically, perhaps each nation had the right within its own boundaries to do as it saw fit, there were limits of companionship which required accommodation.'" *Id.* at 62–63.

[133] Dibble, *supra* note 37, at A1 ("United States and Mexico are quietly talking about ways to decrease the harm to Mexican farmers.").

[134] Chris Kraul & Tony Perry, *Rift Runs Deep in Water War*, L.A. TIMES, May 4, 2002, at A1.

[135] Dibble, *supra* note 37, at A1.

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water that they are seeking in a legal proceeding."[136] Mexico, while being financially unable to resolve this issue by securing alternative water sources, is in a politically sensitive position because access to groundwater is a crucial necessity for low-income farmers in the Mexicali Valley, who would otherwise be forced to migrate during droughts for the sake of subsistence.[137]

While parties with heterogeneous capabilities face barriers to negotiation, there is another aspect of heterogeneity that may work in favor of cooperation. If negotiating parties have different preferences, then it may be possible for everyone to benefit from cooperating.[138] Mexico may be less willing to trade off current growth for longer-term environmental benefits,[139] but if the United States values environmental protection, then it should be more willing to make economic sacrifices in order to achieve greater environmental protection. For instance, the lining of the All-American Canal will serve not only to divert water, but also to reduce water waste by saving some of the groundwater that would be lost on the way to Mexico.[140] In such a situation, heterogeneity, rather than being an impediment to cooperation, may be a necessary condition for cooperation.[141]

Finally, it is important to note that institutional change may be inevitable. If parties delay addressing water resource issues, their interests will eventually converge. Over time, as losses mount from exhaustion of scarce water resources, "the value of individual shares under the status quo declines so that more and more, all of the parties see themselves made better off by collective action."[142] A recent World Bank study made an empirical finding that the increasing

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136 3 WATERS AND WATER RIGHTS § 18.06, at 18-53 (Robert E. Beck ed., 1991 ed., repl. vol. 2003).

137 WORLD BANK, GROUNDWATER IN RURAL DEVELOPMENT: FACING THE CHALLENGES OF SUPPLY AND RESOURCE SUSTAINABILITY 44 (2000).

138 *See* Keohane & Ostrom, *supra* note 6, at 8 ("Different preferences or endowments are a condition for gains from trade.").

139 Duncan Snidal, *The Politics of Scope: Endogenous Actors, Heterogeneity and Institutions*, *in* LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS, *supra* note 6, at 47, 64.

140 Melissa Crane, Note, *Diminishing Water Resources and International Law: U.S.-Mexico, A Case Study*, 24 CORNELL INT'L L.J. 299, 317 (1991) ("[A]ny allocation of groundwater between the two countries should take the U.S. conservation effort into consideration by allocating a greater share to the U.S. than it would have obtained without the relining project.").

141 Lisa L. Martin, *Heterogeneity, Linkage and Commons Problems*, *in* LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS, *supra* note 6, at 71, 81 ("Asymmetries of preference intensity are built into most models of international bargaining, since without them little scope for agreement would exist.").

142 Libecap, *supra* note 117, at 168.

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urgency of water crises around the world have made conditions ripe for institutional change.[143] While their data could not prove a causal relationship, they did find that recent water challenges have resulted in globally widespread institutional changes.[144] For this reason, states and countries that share water resources will be forced to grapple with the rapidly changing face of water resources, and when they do, they should not repeat the mistakes of the past but instead look toward implementing joint management institutions.

C. *Moving Toward Greater Accountability*

Given the necessity for more flexibility, reform of any existing water agreement should include consideration of how to implement effective joint management institutions. The next question is how to structure these new joint management institutions so that they are more effective than their predecessors. This Note does not attempt to describe in detail how these joint management institutions should be organized, in part because actual institutional design will depend on the specific needs and constraints of each water system.[145] However, this section will deal with a threshold accountability issue that must be addressed by any joint management institution.

The failure of most interstate water commissions is well-documented.[146] One explanation for their failure is the fact that domestic commissions were unresponsive to popular concerns and autonomous from democratic institutions.[147] Similarly, it has been noted that any international joint management institution would need "a high degree

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[143] SALETH & DINAR, *supra* note 9, at 5 ("[T]he occurrence of institutional changes in almost all countries does suggest the presence or the emergence of the necessary conditions for institutional change.").

[144] *Id.*

[145] There is a burgeoning scholarship on global administrative law which does touch on the basic procedural norms necessary for international joint management institutions. The concept of global administrative law is a relatively new one, and its parameters are still being defined. *See generally* Benedict Kingsbury et al., *The Emergence of Global Administrative Law* 8–10 (Inst. of Int'l Law & Justice, Working Paper No. 2004/1, 2004) (describing five main types of globalized administrative regulation: administration by formal international organizations; administration based on collective action by transnational networks of governmental officials; distributed administration conducted by national regulators under treaty regimes, mutual recognition arrangements, or cooperative standards; administration by hybrid intergovernmental-private arrangements; and administration by private institutions with regulatory functions).

[146] *See supra* notes 115–16 and accompanying text.

[147] Hasday, *supra* note 52, at 22 ("Once in operation, compact agencies are subject to two perennial, and conflicting, complaints. One part of the compact literature contends that compact agencies are particularly unresponsive to popular concerns and particularly autonomous from the democratic institutions of government, even for administrative agencies.").

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of sensitivity to a country's concerns that joint decisions about enforcement targets may be seen as compromising its national sovereignty."[148] Despite this history, joint management institutions have a stronger potential for success today because there is a greater acceptance of the need for drastic action to counter the growing danger of water crises domestically and internationally.[149]

One way to protect future joint management institutions from the criticisms of the past is to keep issues of accountability at the forefront when structuring these institutions. The traditional perspective is that governments are accountable to their citizens, and institutions, such as joint management institutions for water allocation, are accountable to governments. The problem of "external accountability" arises when the actions of institutions have a direct impact on the rights of individual citizens.[150] In such cases, accountability concerns are raised because the relationship between the institution and the citizens who are affected by its policies is more attenuated than in a domestic setting where legislators are directly elected by their constituents.[151]

There are two types of accountability, participation and delegation.[152] Delegation refers to the concerns of domestic legislators who appoint officials to positions in joint management institutions.[153] Participation addresses the form of accountability that the public at large can exercise to enforce its will on the joint management institution.[154]

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148 Scott C. Fulton & Lawrence I. Sperling, *The Network of Environmental Enforcement and Compliance Cooperation in North America and the Western Hemisphere*, 30 INT'L LAW. 111, 114 (1996).

149 *See supra* notes 142–44 and accompanying text.

150 Stefano Battini, *International Organizations and Private Subjects: A Move Toward a Global Administrative Law?* 21 (Inst. of Int'l Law & Justice, Working Paper No. 2005/3, 2005).

151 This is similar to the concerns raised in American domestic law that independent administrative agencies not directly elected by the public may act in countermajoritarian ways. Lisa Schultz Bressman, *Beyond Accountability: Arbitrariness and Legitimacy in the Administrative State*, 78 N.Y.U. L. REV. 461, 482 (2003) (noting that independent agencies raised concerns because authority to make policy did not directly derive from representative processes).

152 *See generally* Ruth W. Grant & Robert O. Keohane, *Accountability and Abuses of Power in World Politics* (Inst. of Int'l Law & Justice, Working Paper No. 2004/7, 2004) (describing participation and delegation theories of accountability and seven different accountability mechanisms).

153 *Id.* at 5.

154 *Id.* Issues of public participation are complex, and this Note does not attempt to address them in depth except to note that water is a natural resource with particularly potent cultural significance. For instance, in Mexico groundwater management is in the control of the Mexican government because there is a "deeply ingrained view of the Mexican people towards water as belonging to all, and the subsequent transfer of control of water to the federal government, makes water questions issues of national significance, readily vociferously addressed by a passionate public." M. Diane Barber, *The Legal*

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This discussion will focus on delegation since it is the form of accountability over which government parties have the most control.

With respect to delegation, the worry is that non-elected officials will have too much decisionmaking power if they are given the authority to reallocate waters in response to changing circumstances. In thinking about this problem, there are two views as to how the role of officials should be structured in joint management institutions. One view is that "officials . . . hold their office as representatives of the single state that nominated them, in its exclusive interest."[155] For example, in the Arkansas Water Compact Administration, governors from each member state appoint commissioners for four-year terms.[156] One result of such a model is that the commissioners are likely to be politically motivated, since they may not be part of the joint management institution long enough to feel either sufficiently invested in the goals of the institution or sufficiently insulated from the political pressures of the executive and legislative branches.

The alternative is the view that officials should pursue common interests that extend beyond national or state interests.[157] The International Boundary and Water Commission has been noted for maintaining a neutral, objective position in times of political crisis. While this view may be debated, it has been claimed that "its work was not dependent on political considerations, but rather was handled on the basis of a common understanding and awareness of the need to resolve the issues from a technical, economic, and even ecological perspective, for the mutual benefit of the two countries."[158]

There is a difficult tension between allowing administrative officials enough independence so that they can act in the common interests of the agreement and ensuring that these same officials are responsive to directly-elected legislators. As a threshold matter, this is an issue that must be at least considered, if not resolved, by any joint management institution that strives for accountability. Greater discourse in the domestic and international community is necessary to arrive at shared norms about how to define the appropriate role of

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Dilemma of Groundwater Under the Integrated Environmental Plan for the Mexican-United States Border Area, 24 ST. MARY'S L.J. 639, 664–65 (1993).

155 Battini, *supra* note 150, at 7.

156 Arkansas River Compact art. VIII.C, 63 Stat. 145, 150 (1949).

157 Anu Piilola, *Assessing Theories of Global Governance: A Case Study of International Antitrust Regulation*, 39 STAN. J. INT'L L. 207, 211 (2003).

158 Szekely, *supra* note 8, at 397–98 ("The marvel of the IBWC experience was that, even as late as 1989, it had existed and developed for 10 decades . . . practically oblivious to the political turmoil and other disputes which plagued the bilateral relationship between the two countries during the previous 100 years.").

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administrative officials and the joint management institutions they operate.

CONCLUSION

As water becomes an increasingly scarce commodity, international and domestic communities will need to find innovative ways to address demands for water. The lessons learned from the experiences of the United States and Mexico, as well as Kansas and Colorado, lead us to the conclusion that existing water agreements are inadequate. Given changing water conditions, reliance on fixed allocation formulas is misplaced, and depending on dispute resolution mechanisms to enforce or adjust these fixed allocations is an ineffective alternative.

This Note suggests first shifting the focus from allocation formulas that assume a static water supply to creating procedures that allow for ongoing development of changing water resources. Any future renegotiations of water agreements, which are likely to occur given the growing demand for institutional change in water resource management, should include joint management institutions as part of the solution. A final point, as well as an avenue for future research, is that the successful development of joint management institutions will depend on the extent to which they are structured to be accountable to their communities.

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