The world’s most precious resource is water. Its availability, scarcity and importance to society may well result in it being the driver of international conflict in the coming decades. But is water a natural resource to be treated, allocated and used as any other natural resource, or does it assume a special significance in the transboundary context? This paper delves into how perceptions and treatment of water impact water disputes.

Water has been a central theme of settlement, transportation, commercial growth and cultural identification. Eighty-five percent of all people reside within three miles of the world’s oceans and natural waterways. Water is the only natural resource that is both fully sustainable and non-substitutable. Indeed, it assumes such importance that the world’s four great religions universally celebrate the resource as a means of growing closer to God, from Christianity’s practice of baptism of the newborn to Islam’s purification practice of the deceased. It should come as no surprise that this resource generates emotion and conflict in times of scarcity.

I. DRIVERS OF WATER SCARCITY

Population:

In 1960 the world’s population was three billion, having doubled in the preceding century. By the year 2000 it doubled again to six billion. By 2050, the world’s population will approach ten billion.¹ Population is the principal driver of water usage. Water usage driven by population growth is exponentially increased by the energy demands and food demands that an increased population demands. Global water consumption is increasing at the alarming rate of twice the population rate.² This demand is often exacerbated by the immigration and refugee displacement of peoples to water scarce regions. Thus, there is increased demand in areas already short on supply. For example, in the United States, the population has grown disproportionately in the water scarce regions of the American


Southwest as economic and employment patterns shifted. Similarly in China, industrial growth has shifted populations to water scarce regions.

**Economic Development:**

The shift from agrarian and rural economies of third world countries further compounds water usage: Societies transform to more energy dependent and less micro-sustainable economies resulting in increased energy demands, food production demands and centralized water and sanitation demands. Urbanization and economic development give rise to substantial increases in water usage and infrastructure needs for power generation, industrial, commercial and transportation.

**Climate Variability:**

Compounding increased demand for freshwater on already water stressed regions is the impact of climate change. The single factor that stresses water planners is uncertainty. Effective water development can only occur on the basis of wise water planning predicated on valid demand and supply assumptions. Historically, water planning was a look-back engineering or hydrologic practice where the driest years on record were assumed to be the worst-case planning event. Climate change challenges those practices by invalidating historical assumptions of water availability (the supply side).

Recent studies conducted in the Colorado River Basin of the Western United States and Mexico suggests that precipitation and the resulting runoff will be reduced by as much as 10%-30% in the southern area of the watershed (Mexico, California, Nevada and Arizona), while the northern basin (Utah, Colorado, New Mexico, Wyoming) may see a reduction both in overall precipitation of between 10%-25% with more precipitation falling in the form of rain rather than snow, altering runoff characteristics, timing and water quality. These significant changes will only serve to increase tensions and stress relations both between the states and tribal nations of the Southwest and neighboring Mexico.

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3 Between 1970 and 1995, the population of the West grew by about thirty-two percent, compared to a nineteen percent growth rate in the rest of the country. See Pamela Case & Gregory Alward, Patterns of Demographic, Economic and Value Change in the Western United States: Implications for Water Use and Management 7 (1997).


6 American Rivers, Colorado River, https://www.americanrivers.org/river/colorado-river/ (last visited July 13, 2016) (“The Lower Colorado River, which provides water to Las Vegas, Los Angeles, San Diego, Phoenix, and Tucson, already faces a one million acre-foot deficit and is in danger of running dry far before the Pacific. Climate change is expected to further reduce the river’s flow by 10 to 30 percent by 2050.”).

Across the planet in the disputed Kashmir region, climate change has begun to stress already fragile relations. There, conflicts of water sources have long existed between Pakistan and India. The Kashmir region is the source of six major rivers which flow into the Indus River. To resolve an earlier conflict, these tributaries were divided not by watershed and need but separately and geographically, the three eastern rivers to India and three western rivers to Pakistan symbolizing the inability of these two countries to cooperate. The agreement, known as the Indus Water Treaty, was mediated by the World Bank. Additionally, India is involved in other water related treaties and agreements. For example, the Ganges Treaty governs the sharing of the river water between India and Bangladesh, stipulating how much water each party should receive every ten days during the yearly wet season. The Ganges Treaty, however, expires in 2026 and time will tell if continued cooperation will be achieved in the coming years. Despite these agreements, in recent years a rush to install hydroelectric capacity has given rise to conflict and more distrust. As glaciers decline the lessening of flows has given rise to Pakistan blaming India for water decreases caused increasingly by the impacts of climate change. In contrast, many in India see their upstream location as a right or “natural advantage” justifying increased use of the shared resource.

**Insufficient Infrastructure:**

Water scarcity may also be the result of a lack of proper water diversion, storage and delivery infrastructure. Deterioration of infrastructure leads to water stress and can be attributed to eroding conditions, however, recently purposeful action has been directed to transform this precious resource and its corresponding infrastructure into a weapon. Conflicts in Yemen, Somalia, and Syria are examples of recent water scarcity driven by disruption of infrastructure. Religious and political instability and the lack of committed financial resources have resulted in existing water infrastructure being rendered inoperable or ineffective. Rival groups have turned Aleppo, Syria into a tragedy compounded by the tactical withholding of water.

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12 Salman, *supra* note 9, at 3.
13 IANS, *Siachen: The glacial battleground of water –deficient India and Pakistan*, THE ECONOMIC TIMES (Apr. 9, 2016 1:59 PM), http://economictimes.indiatimes.com/news/defence/siachen-the-glacial-battleground-of-water-deficient-india-and-pakistan/articleshow/51754218.cms (stating that “India and Pakistan, the two sparring nuclear-armed nations, have deployed their troops in large number in an area which is facing clear signs of an impact from climate change, adding to the looming threat of a water crisis.”).
In other watersheds, nations have acted unilaterally for economic gain with consequences to their neighbors. Regional and national competition for shared watersheds has resulted in tensions and, in some cases, armed conflict. An intelligence community assessment identified water as a driver which contributes to social disruption and potentially nation instability.\(^{14}\)

**Economic and Political Discord -The Use of Water as a Weapon:**

Conflicts over this precious resource have existed for centuries.\(^{15}\) Some conflicts have nearly turned to war. When Turkey’s Southeastern Anatolia Project (Güneydoğu Anadolu Projesi or “GAP”) began filling reservoirs in the Euphrates-Tigris basin, Iraq threatened war if inflows were not released.\(^{16}\) The 2008 restart of discussions between Turkey, Syria and Iraq over the flows of these rivers has once again taken a backseat to war but the issue will undoubtedly resurface once a resolution of the Syrian/Iraq conflict can be brought to a close.\(^{17}\)

In other parts of the Middle East, war has never been far from the subject of water. The Israel/Lebanon/Jordan/Syria disputes over the Jordan River and its three tributaries, the Dan, Hasbani and Banias, have seen open conflict over water diversion and infrastructure with control over the Banias being one of the drivers of the Six Day War.\(^{18}\) Similarly, the battle between upstream diversions and storage and downstream neighbors for economic gain (predominately hydropower production) has played out on the Nile between Ethiopia and Egypt,\(^{19}\) on the Danube River between Hungary and Slovakia,\(^{20}\) and in Southern Africa.\(^{21}\) The Danube dispute is of special importance as it was the first the first be referred to and decided by the International Court of Justice (“ICJ”). The controversy revolves around a large project of dams on the Danube that was initiated by the Budapest

\(^{14}\) Global Water Security: Intelligence Community Assessment, https://fas.org/irp/nic/water.pdf 3 (“water problems will contribute to instability in states important to US national security interests. Water shortages, poor water quality, and floods by themselves are unlikely to result in state failure. However, water problems—when combined with poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions—contribute to social disruptions that can result in state failure.”).

\(^{15}\) See Pacific Institute, Water Conflict Chronology Map, available at http://www2.worldwater.org/conflict/map/.


Treaty of 1977 between the Czechoslovak Socialist Republic and the Hungarian People’s Republic. However, due to economic issues, Hungary attempting to slow down the project and expressed concerns about the environmental impact of the project. In an attempt to resolve differences regarding the project, the parties agreed to submit the dispute to the ICJ for resolution. The Court ruled that Hungary was not entitled to terminate the project on environmental grounds, Hungary and Slovakia must negotiate in good faith on the proper amount of water to be released into the river, and that the 1977 treaty signed by the two countries was still in effect. Despite this ruling, the conflict is ongoing and the project has not been fully completed.

In recent years water has been used openly as a weapon of war. When ISIS targeted the geologically fragile and trouble plagued Mosul Dam it did so as a weapon to be used potentially against over a million inhabitants of Iraq and to deny water to towns not under its control. Additionally, ISIS has employed similar tactics with the Ramadi Dam by closing its gates and cutting off water to nearby cities. Similarly, Al-Shabaab has used water in the five year Somali civil war by cutting off water to areas liberated and destroying water infrastructure as a means of demonstrating power and continued presence. Also, very recently in Syria, a dissident group (denominated as a terrorist group by several nations) bombed a pipeline carrying water from the Euphrates River to Aleppo, the country’s largest northern city. Thus, certain groups have used this resource, which is essential to life, as an effective weapon to further their respective goals.

Nations have also had their internal battles over water scarcity, the United States perhaps being the most active, which can be traced to the importance of states within its federalism form of government. With states enjoying sovereignty, the battles have largely been economic driven, with states seeking water development for economic advantage

23 Id. at 2.
24 Id. at 6.
28 PRI, Al-Shabaab’s ‘water terrorism’ is yielding results and tragedy in Somalia’s civil war (Aug. 12, 2014 3:00 PM), http://www.pri.org/stories/2014-08-08/how-al-shabaab-using-water-tool-terrorism (“The Juba River is the other closest water source, but the locals can’t access it because al Shabaab controls the city of Bardheere. About 70 miles to the south, Bardheere is the only place to access the river, and al Shabaab doesn’t allow people from government-controlled areas to come to fetch water.”).
29 Alisa Reznick, Weaponizing Syria’s Water (Jan. 4, 2016) BOSTON REVIEW, http://www.bostonreview.net/world/syria-water-alisa-reznick (rebels also claimed to have laced TNT to springs in Ain al-Fijah).
over the other. Dating back to the Industrial Revolution, states have argued over water. These conflicts revolve around the numerous interstate river basins within the continental United States. For example, the Colorado River basin encompasses a quarter of a million acres within America’s driest region. The Colorado River is often viewed as the most used, managed and litigated river in the world, serving seven US states and the nation of Mexico. Most conflicts and issues regarding this basin have been resolved through the means of treaty, Supreme Court apportionment, and two interstate compacts. But the Colorado River is not the only source of water conflict in the United States. Various other river basins conflicts are currently either within the US Supreme Court or are marching toward it. Therefore, the United States itself has seen its fair share of water disputes, many of which are still ongoing, with others sure to follow.

One recent case before the Supreme Court, Tarrant Regional Water District v. Herrmann, highlights the misunderstandings, emotions, and territorial sentiments often found toward water. The Red River traverses the American states of Texas, Oklahoma, Arkansas and Louisiana before merging with the Mississippi River before it discharges to the Gulf of Mexico downstream of New Orleans. The climate and topography of these four states could not be more different. The Eastern half of Oklahoma and the States of Arkansas and Louisiana are prolific with water, receiving over sixty inches of rainfall annually; in contrast, Texas, one of the fastest growing states, is arid, receiving less than twenty-inches of precipitation in the basin.

In 1819, after extensive negotiations by then Secretary of State John Quincy Adams, the United States entered into the Treaty of Amity, Settlement, and Limits Between the United States of America and His Catholic Majesty on behalf of the Republic of Mexico. A central piece of the negotiations was to establish the boundaries between the newly formed United States and Mexico. President James Monroe was adamant that Mexico would have no access to, ownership of, or rights to access and use the Red River, which the United States wanted for its exclusive trade. Mexico relented and the contentious boundary of the Red River was firmly placed within the United States. Later, after the Texicans fought and won Texas' independence from Mexico, the Republic of Texas succeeded to the boundary, which had placed the entire channel of the Red River within the United States. In 1978, after twenty years of rather loose and periodic negotiations, the States of Arkansas, Louisiana, Oklahoma and Texas agreed to divide the waters of the Red River and its tributaries by the Red River Compact (RRC), which Congress later passed into federal law.

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32 133 S.Ct. 2120 (2013).

33 The author and his law partner, Scott Miller, represented the Tarrant Regional Water District in all phases of the litigation. Co-counsel before the Supreme Court was Charles Rothfeld, Timothy Bishop and Michael Kimberley of Mayer Brown, Washington, DC. Additional assistance in the lower Court and the 10th Circuit was provided by Clyde Muchmore and Harvey Ellis of Crowe Dunlevy as local Oklahoma City counsel.

34 http://avalon.law.yale.edu/19th_century/sp1819.asp

confirming the boundary and rights of access to the river that had been defined by treaty centuries before.36

The RRC is somewhat unique in that it divides a river which does not flow into one of the three states (Texas), something no other compact does. The RRC is also arguably one of the worst drafted compacts, with the United States Supreme Court noting its ambiguous language.37 Oklahoma, which is water prolific, discharges after all uses within the state (estimated to be 2.6 million acre feet), nearly 34 million acre-feet out of state. Of importance to this discussion is that Oklahoma had no foreseeable need for such an abundance a small portion of which the Dallas-Fort Worth metroplex (America’s fourth largest city) sought to acquire by lease, purchase or appropriation.38 In response, Oklahoma passed an extensive embargo of all water preventing any appropriation, transfers or sale of water out of state. Instead water was discharged from pristine freshwater tributaries unused into the Red River which was also entirely within Oklahoma where it was polluted by naturally occurring chlorides making it unfit for municipal use.39 North Texas sought to enter into Oklahoma immediately before the water was discharged into the polluted Red River and transport 310,000 acre feet of water which it assumed for over twenty years had been allocated to Texas under the RRC.

The legal arguments presented were secondary to the emotional arguments, as these two states have a long history of distrust and rivalry40. The principal public arguments that appeared in the media within Oklahoma against cooperative use and sale were:

- The need to keep the water in Oklahoma for future generations (even though there was no physical way to do so as water flowed by gravity out of full reservoirs out of state);
- If people and industry in Texas need water, they need to relocate to Oklahoma (economic warfare);
- Texas can wait till the water leaves Oklahoma (even though the entire channel of the Red River is in Oklahoma and hence, the water never flows into Texas); and
- Oklahoma’s upstream and water abundant climate was a natural advantage that gave Oklahoma the right to control (similar to the arguments made by Ethiopia and India in their conflicts).

The Supreme Court found the RCC to be ambiguous and interpreted the disputed language in favor of Oklahoma.41 The result is that millions of acre-feet of water will never

36 Id.
38 Tarrant Regional Water District sought 310,000 acre feet under Texas’ apportionment in a shared basin to divert from a location just inside Oklahoma before the water could come in contact with the naturally polluted mainstem of the Red River, which itself was wholly within Oklahoma.
40 One of which being the so-called Red River football rivalry between the University of Texas and University of Oklahoma.
41 Tarrant Reg’l Water Dist.133 S. Ct. at 212 (‘Many compacts feature unambiguous language permitting signatory States to cross each other's borders to fulfill obligations under the compacts, and many provide
be beneficially used and will flow unused to the Gulf, Texas will not be able to use water it thought it bargained for, and Oklahoma will not enjoy the nearly billion dollars it was offered for the water to settle out of court. While there was a good constitutional basis for the Court’s decision, the driver for the inability to resolve the dispute was largely emotion underscoring the difficulties in resolving water disputes.

II. CONFLICT RESOLUTION PATHS AND IMPEDIMENTS:

a. Impediments to Conflict Resolution:
The principal impediments resolution of water conflicts are:

i. Emotions. A phrase often heard in disputes is that it is “my water” or “our water.” This phrase is seldom heard in the context of other natural resource use.

ii. Water as Leverage. In the international context, water is often used to exert pressure, gain advantage or exert control. In the state context, one state views water security as enabling it to have an economic advantage for growth that another state lacks. On a local level, an argument is often made to use water to control or influence development or growth).

iii. Territorial and Nationalistic Dogma. For better or worse the world has largely endorsed globalization of business, trade and employment. Yet water is a resource that is often seen and treated as a local, state or national resource which is not to be freely exchanged or transferred.

iv. Historical Distrust. States and nations often have a history of conflict and distrust based on events, religion, or beliefs. A water conflict between countries (or states) with this background is traditionally hard to resolve.

v. Lack of Understanding of Water. Water has its own terminology and is allocated and managed in sometimes archaic and complex legal systems. In addition, the existence, storage, transport, transmissivity and consumption of water is often misunderstood. For example, many nations and jurisdictions do not recognize or fully understand the interrelationship between surface and groundwater or the interplay between water quality and water quantity. Misperceptions impede a proper discussion.

vi. Cultural Approach to Water: As briefly mentioned, water assumes spiritual, religious and cultural significance that other natural

for the terms and mechanics of how such relationships will operate. The absence of comparable provisions in the Red River Compact strongly suggests that cross-border rights were never intended to be part of the agreement.” In interpreting the language found ambiguous by the Court, the Court strayed from normative rules of compact and contract interpretation and employed a presumption in favor of sovereignty, which another author has aptly identifies as the Court viewing contract law through a lense of federalism).
resources do not. To the American Indian, ownership of water is as alien as ownership of the sun or air. It is therefore difficult for some cultures whose relationship to water has been embodied in religion and culture to think of water as a resource or commodity. This leads to the discussion of whether water is an economic good or social right. Clearly, the diversion, treatment and distribution of clean water is a benefit which carries expense. The question then is who and how this benefit is paid for. Does the government accord a human right to water making it available to all (and charging people and industry an unrelated cost or tax to provide this public service), or is it a good which can only be properly managed and conserved if it has an economic cost and is a commodity. And who controls the commodity? Is it only for a public entity to manage, or does privatization and private markets have a role?

b. Paths to Resolution of Water Conflicts:

i. **Education.** Developing baseline facts as to the watershed, its hydrology, geology, water availability and demands that each party accepts is the first step. Only with shared-transparent information which is respected by each side can a meaningful discussion occur.

ii. **Acceptance of Study Parameters.** Once baseline data is available and agreed between the parties, a common set of values, preferences, priorities and goals is needed. Resolving conflicts with two sets of varying goals and assumptions will be unproductive.

iii. **Integration of Water Quality and Water Quantity.** Traditionally perceived to be separate fields, water quality and water quantity can no longer be studied without the other. Diversion of water impacts the ability of a stream to accept nutrient and pollutant loading. Similarly, discharges impact the location and effectiveness of diversions.

iv. **Integration of Surface and Groundwater Regimes.** Effective basin planning and water allocation cannot be undertaken without acceptance of the interrelationship of surface and groundwater. Many of the recent disputes over allocated water have been predicated on the relationship of groundwater pumping to surface water.

v. **Cultural Acceptance.** An understanding (if not acceptance) of the manner and importance in which stakeholders value and perceive water is necessary for reasoned discussion.

vi. **Watershed or Basin-wide Approach to Planning.** The optimal approach to planning and allocating water, and hence resolving conflicts, is to plan the watershed as a unit. Allocating water or resolving conflicts on a boundary basis only leads to additional and future disputes. Watershed planning necessitates willing players. It
optimizes beneficial water use by holistically taking into consideration water availability, use, reuse and water quality.

vii. Approaches to Water Planning (Planning minimizes and Reduces Conflict).

1. Acceptance that Planning is Required. The first and obvious step is often one that is the hardest. Until recently, most major watersheds had no comprehensive and long-range planning.
2. Selecting a Planning Scale (local, province, national, regional, watershed). Will the planning be local, national or watershed? What is its scope?
3. Planning time horizon (short term long term assumptions and solutions). Many disputes over water result from a plan or set of assumptions found no longer to be true. For example, the Colorado River was largely allocated in the first half of the twentieth century far before anyone could have predicted the growth of Los Angeles, Phoenix and Las Vegas.
4. Flexible or Adaptive Management. A hallmark and goal of interstate water compacts in the United States has been the full and final allocation of waters in an interstate stream. Yet the goal of finality is what has led to so many conflicts as demands, water use and science have forced a review of agreements made. Having some degree of flexibility in the allocation of some portion of water or assumptions (i.e., climate change’s impact on water availability) allows a mechanism to resolve conflicts.

III. CONCLUSION:

Water is essential to life throughout the world. As such, this resource crosses all boundaries of life—whether those lines are geographical, religious, or cultural. Because of this fluidity, its importance, and the specter of climate change, water is often, and will likely continue to be, a driver of conflict for years to come. Despite disputes, however, history has shown that there is potential for compromise and problem solving without the need for actual, physical “water wars.” Through the use of treaties, compacts, or agreements, many nations and parts of nations have reached resolutions that allow for the shared use of this precious resource. Although there continue to be issues and groups have saw fit to use water as a weapon continued diligence and work towards amenable solutions is a worthwhile goal. By following the lessons of history and the approaches highlighted in this paper such solutions are possible and are perhaps within reach of competing parties despite a wide range of differences.