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Weathering Climate Change: Provisions for Climate Change Resiliency in Transboundary River Treaties

Abstract

Climate change will be most apparent in alterations to the hydrologic system - shifts in movement, variations in extremes - thereby defining many resource disputes in the coming decades. Water is a boundaryless resource; as its hydrologic patterns shift within and without borders, so too will preexisting agreements on its use and allocation. The question for transboundary water agreements is: how can agreements both satisfy parties' needs and account for future uncertainties of climate-induced changes to their basins' hydrologic systems?

From examining literature and water agreements, this thesis develops a list of provisions identified as foundational to resiliency in transboundary water agreements. The context of Central Asia provides a case study for determining the effectiveness of provisions in fostering resiliency, ultimately concluding that, if the implementation of an agreement is weak, then the impact of provisions is negated. The value of an agreement's content is secondary to the resilient action resulting from it. Future research is needed to understand how provisions can be used to promote or strengthen agreement implementation.

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Weathering Climate Change:
Provisions for Climate Change Resiliency in Transboundary River Treaties

A Thesis

Presented to

the Faculty of the Josef Korbel School of International Studies

University of Denver

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Emily Joan Zmak

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Section One

“Nothing is more useful than water; but it will purchase scarce anything;

Scarce anything can be had in exchange for it.”

Adam Smith, The Wealth of Nations

Introduction

As climate change forces shifts from historic hydrologic patterns, the question of resiliency within preexisting water agreements echoes in the nexus of water and conflict. There is a strong argument for creating provisions that withstand the impacts and changes, foreseen and unforeseen, within transboundary river agreements. How can agreements both satisfy parties' current needs and account for future uncertainties? Can provisions within an agreement be a solution for mitigating international conflict caused by climate change? The hypothesis and theory of change of this thesis is that *if* riparians have mechanisms, or provisions, for adaptation within the overarching agreement framework, *then* transboundary river agreements will have the resiliency to withstand the impacts of climate change. The research presented below considers water and conflict, water and cooperation, and water and climate change in order to extract from the literature a list of provisions identified as important to resiliency in water agreements.

The list of provisions is then applied to two Central Asian water treaties for empirical evaluation of the effectiveness of the provisions. Finally, a discussion of the findings articulates the implied conditionality of implementation for provisions to have an impact on resiliency.

Background

Rivers are the scoliotic backbone of life. Watercourses carry the minerals and microorganisms critical to healthy ecological systems, while bending geography to the demands of force and gravity. Fertile river valleys accelerated the evolution and interdependence of flora and fauna. Humans then leveraged basin conditions for hunting and later agriculture, flourishing as a species to create cultures, societies, and technologies that have since defined the great civilizations—such as Mesopotamia in the Fertile Crescent, the Nile cities of Cairo and Alexandria, the canal-dependent metropolitan of London, and even the modern cities of the American West.

Though carrying less than 0.3% of the world's freshwater supply, rivers have influenced humankind more so than any other water source. Culturally, rivers define religion, festivals, and even language. Consider the Ganges, India's mystic river and home to the goddess Ganga, or the Jordan, the river of Christ's baptism and start of his evangelism. Economically, rivers have served as a link between peoples. Trade along rivers began as early as 3000 BC in Mesopotamia, building bridges between different civilizations and creating networks for the exchange of goods and knowledge (Whipps, 2008). Rivers provided the highways for exploration, opening the great continental expanses of North America for French traders in fur-laden canoes and the heart of Africa

for David Livingstone. As Henry Thoreau wrote, “[Rivers] are the constant lure, when they flow by our doors, to distant enterprise and adventure, and, by a natural impulse, the dwellers on their banks will at length accompany their currents to the lowlands of the globe, or explore at their invitation the interior of continents” (Thoreau, 2012, 92).

Considering the role of rivers in both the creation and connection of civilizations, it is of little surprise that watercourses have defined international relationships throughout the past seven thousand years. The first known international treaty of any kind was a water treaty in 2500 BC between two Sumerian city-states of Lagash and Umma to end a dispute along the Tigris River (UN, 2014). In the 4500 years since, thousands of water treaties have been implemented in cases of disputes—the Food and Agricultural Organization estimates over 3600 water treaties since 805 AD (FAO, qtd. In UN, 2014). More than 150 of these treaties have been signed in the last fifty years alone (UN, 2014). Of course, water treaties have developed out of a necessity for cooperation: the world has 263 transboundary basins falling within 145 nations, and 21 of those nations lay exclusively within shared basins (UN, 2014).

Yet, for how central watercourses have been to human development, our mastery over rivers remains as tumultuous as their characteristic waters. Water is legally defined as a fugitive resource, meaning that it lacks a fixed location and must be captured to be used. It heeds no boundaries without a stern and engineered hand. As such, we have diverted, dyked, dammed, and damned rivers to control water. Enduring civilizations, like Mesopotamia, China, and industrial Europe, responded to water challenges by redefining water management through innovative systems, whereas societies unable to create, maintain, and/or grow waterworks declined and collapsed. As one author summarized:

“...the economic productiveness and political equilibrium of today’s advanced societies depends critically upon the robustness, security, and continuous innovative development of an interlinked array of giant dams, electric power plants, aqueducts, reservoirs, pumps, distribution pipes, sanitary sewage systems, wastewater treatment facilities, irrigation canals, drainage systems, and levees...” (Solomon, 2010, 368)

In other words, it was through highly-refined and engineered infrastructure that societies established mastery of rivers. The technologies of control created short-term stability—but was it in exchange for long-term climate instability?

This micro-managerial control has a cost. Consider the Aral Sea, for example, the USSR’s “hydraulic Chernobyl” (Solomon, 2010, 377). The Soviet effort to transform the steppes into a cotton-producing belt was blasé reengineering of an arid ecosystem. By diverting the Syr Darya and the Amu Darya (known as the Jaxartes and Oxus of ancient history), the Soviets reduced the world’s fourth-largest freshwater lake into two small, saline lakes. Today, the steppes face a return to their aridity: the exposed lakebed creates a salty dust bowl effect on the cotton fields, while the stunted hydrological system makes for hotter summers and colder winters with less rainfall, less snowpack, and less runoff into the rivers. The result is a seemingly irreversible climate change.

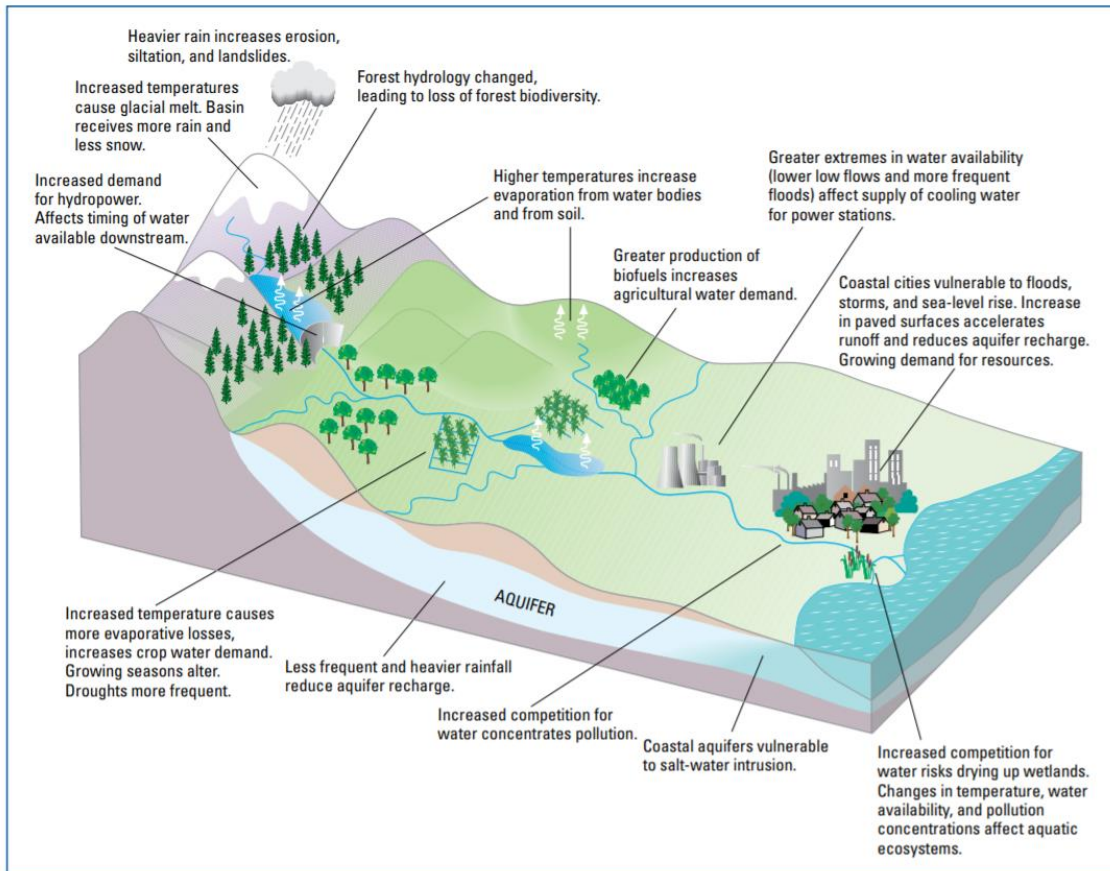
Climate change brings us to the sham of humanity’s so-called mastery of rivers, in that our advancements took for granted water’s renewability. An IUCN report phrased the concept as “an assumption of ecosystem stationarity,” meaning that water management was designed on the historical record of a basin’s hydrologic system (Barchiesi et al., 2014, 11). Civilizations aborted river outflow without questing the continuation of inflow. We established cities—giant cities, like Los Angeles and Mumbai—on the final drops of imported rivers. And we know now that our assurances

were unsustainable, as the means to mastery was also its undoing: it limited adaptability *and* exacerbated climate change. First, increasing the technical control over natural systems limited societies' adaptability—dams built to provide water in the dry season ballooned nearby populations accordingly; in-house taps created endless flows of freshwater; subsidized and expanding irrigation networks slowly unsynced demand to natural supply. Second, the very technologies that provided the power for control, like the coal that produced energy and the toxic byproducts of infrastructure development, were the technologies that enabled climate change.

The impacts of climate change will be evident in multiple arenas, such as the well-publicized threat to polar bears and the increased frequency of “100 Year” storms. However, few natural systems will be impacted as significantly as the hydrologic cycle. Climate change is defined by the Intergovernmental Panel on Climate Change as “a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer),” which “may be due in natural processes or external forces or to persistent anthropogenic changes in the composition of the atmosphere or in land use” (IPCC, 2001, qtd. in Barchiesi et al., 2014). For rivers, these persistent changes will be felt from source to termination. As pictured in Image 1.1, the amount of river water, or flow, will be impacted by increased glacier melt, as well as shifts to rainfall instead of snow, which will change the seasonality of high flows and low flows. Precipitation changes will also increase erosion, siltation, and landslides, while temperature changes increase evaporation from water bodies. For industries and cities built within the historical basin conditions, changes will

have direct impacts on their livelihoods, and will be further exacerbated by impacts felt in aquifers and wetlands.

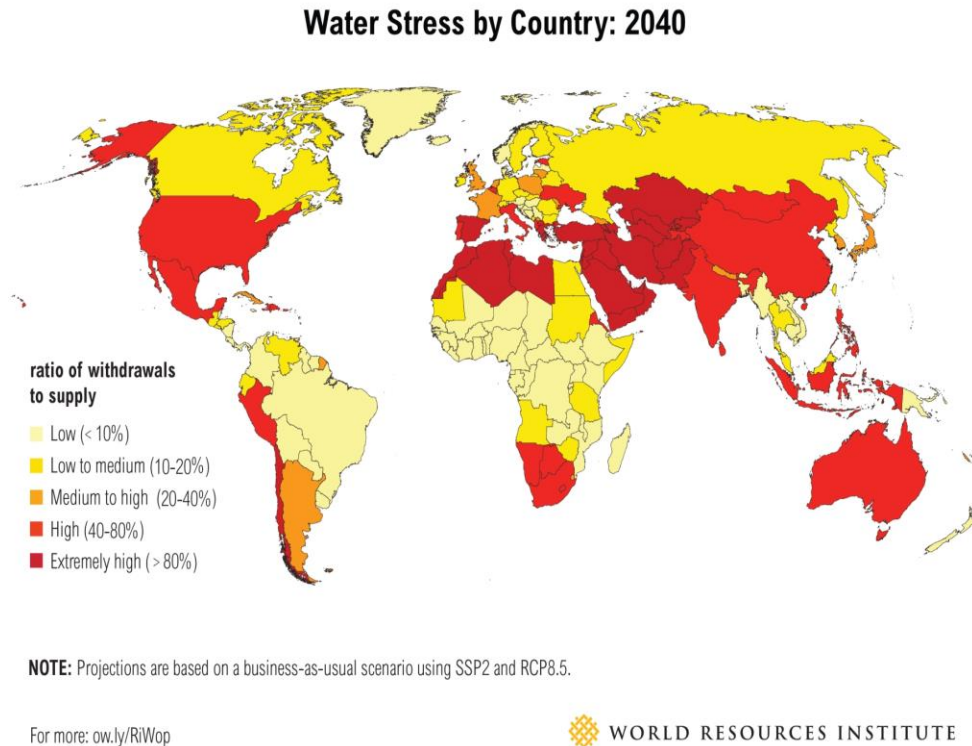
Image 1.1. Climate Change in a Typical River Basin (Barchiesi et al., 2014, 12)



Recent decades have brought awareness of the human impact on climate and ecosystems, and especially the vulnerability of freshwater systems. Millennium Ecosystem Assessment experts predict that 25% of freshwater supply may already be unsustainably consumed. This stress will worsen in coming years, as seen in Image 1.2 below. Chronic shortages cannot be fixed by moving heavy loads of water, but must be addressed watershed by watershed—yet must also satisfy the political nature of the world’s 261 transnational river basins (Solomon, 2010, 376). Borders, populations,

historical use, and preexisting agreements all contribute to the politicization of watersheds.

Image 1.2. Water Stress by Country (World Resources Institute)



Consider again the Aral Sea crisis. Despite multiple layers of international, interstate, and national agreements and commitments to reverse the desiccation of the basin, the Aral Sea continues to shrink. The water management and regional governance has failed the environment and the social interdependence of the basin, as well as the long term climatic implications. In other words, the current governing agreements have failed both short- and long-term. The question, then, is not merely how to govern a watershed, nor how to address the impacts of climate change. Rather, the question is how to create agreements that can satisfy the needs of parties today, while also considering the future

uncertainties of climate-induced changes to basins' hydrological systems. And, underscoring this orientation is the question of how to ensure resiliency in the agreement, so that it can withstand the pressures of climate change and promote cooperation between riparians.

Resiliency and Water Agreements

The future of water disputes has been heralded as an apocalyptic certainty in media, entertainment, and even academic outlets. Ismail Serageldin, former chairman of the World Commission for Water, said in 1995: “Many of the wars in this century were about oil, but those of the next century will be over water.” Examples of water tensions are seen in violent outbreaks around the world—Karachi, Pakistan; Cochabamba, Bolivia; and Kenya, in what one author calls “the oddest report of water violence” between monkeys and humans, in a conflict over water tankers that left eight primates dead (Solomon, 2010, 371-372).

Yet, when stepping away from the fervor of fear, water war is impractical. It has been, and continues to be, rare. Wolf (2003) found that 67.1% of riparian interactions are cooperative, 27.7% of riparian interactions are neutral, and a mere 5.2% of riparian interactions are conflictive. Similarly, though using different methodology, Kalbhenn and Bernauer (2012) found that a mere 18.3% of interactions are conflictive.¹ The nature of water agreements seemingly rebuffs militarized escalation.

¹ Both datasets include verbal hostilities as conflictive interactions.

Jeuland (2017) wrote that “[t]here is ample evidence that river basin treaties are *remarkable in their resilience*, even in some of the world’s most contentious locations, providing effective mechanisms to resolve disputes.” The Indus River Commission has survived two wars; the Mekong River Exchange continued technical meetings through the Vietnam War; and Central Asia’s Cooperation on Transboundary Water Management has lasted through several post-Soviet revolutions and coups. Water agreements have been, overall, resilient. So, what is resiliency?

The theory of resiliency comes from the field of psychology, stemming from the work of Emmy Werner in the 1970s and 80s. Werner worked with at-risk children, and found that one-third did not exhibit the destructive behaviors of their peers or parents, such as teenage pregnancies and substance abuse (Werner, 1982). Werner named this group “resilient.” Resiliency theory focuses on positive capabilities, the “contextual, social, and individual variables”, that disrupt negative trajectories towards risky behaviors (Zimmerman, 2013). It emphasizes coping mechanisms amidst difficulties.

The application of resiliency theory to water treaties acknowledges the strength-based foundation of resiliency. Werner’s “resilient” children exhibited *actions*, both internal and external, that disrupted the path towards unhealthy, conflictive, and risky behaviors. Transferring the theory to agreements, then, requires examination of the actions, both internal and external, that an agreement can promote to disrupt the trajectory towards failed implementation. Wolf (2007) and Brochmann (2012) found that resiliency is tied to cooperative behavior elicited by a water treaty. Therefore, there is a braided theme to extract regarding water agreements and resiliency: resiliency reduces the likelihood of negative behavior; resiliency stems from cooperation in a watershed;

and cooperation comes from a successful water agreement. In other words, resiliency is tied to positive riparian relations and agreement implementation.

But why pursue resiliency? Why not mere flexibility or sustainability? Although the latter concepts are important traits within a resilient agreement, resiliency is a worthwhile goal because of its broader encompassment of definitions. Resiliency theory articulates the ability to “respond and recover” (Table 1.1 below) and even “thrive” (Table 1.1) in times of crisis. Flexibility and sustainability are much narrower in scope, implying the capabilities necessary to adapt, but not necessarily the capabilities to flourish. In contrast, resiliency is an optimistic, positive, and forward-moving goal for nations and communities to adopt. In the words of writer James Cascio, “Sustainability is about survival. The goal of resilience is to thrive” (Cascio, n.d.).

Table 1.1: Selected Definitions of Community resiliency (Source: Crow, 2018)

Author, year	Definition
Tobin (1999)	Resilient communities are defined as societies, which are structurally organized to minimize the effects of disasters and at the same time have the ability to recover quickly by restoring the socioeconomic vitality of the community
Norris et al. (2008)	A process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance
Cutter et al. (2008)	The ability of a social system to respond and recover from disasters and the inherent conditions that allow the system to absorb impacts and cope with an event, as well as post-event adaptive processes that facilitate the ability of the social system to re-organize, change, and learn in response to a threat
Magis (2010)	The existence, development, and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability, and surprise
Cohen, Leykin, Lahad, Goldberg, and Aharonson-Daniel (2013)	A community's ability to function amidst crises or disruptions
Kuir-Ayius (2016)	The ability of communities to respond and adapt after disturbance through learning and collaboration with all relevant stakeholders, and strategic planning at local and national levels to maintain, measure, and strengthen community capitals, and hence achieve sustainability

The question stemming from resiliency theory, then, and the discussion of resiliency within a community, an agreement, or climate change, is: what are the aspects of an agreement that promote resiliency? And how can those be capitalized upon to strengthen conflict prevention in a future of heightened water shortages, stemming from climate change?

Climate Change and Responses in Water Agreements

To understand how to promote resiliency in treaties, it is necessary to understand what threatens to inhibit current water agreements. Climate change is a real and sizeable threat. A growing body of scientific models and evidence provide blurry outlines of clouded uncertainty, yet reinforce the changes that will, and have begun, to take place. We do not know how it will reshape civilization's relationship with rivers, though we know it will. And as it modifies the hydrologic system, preexisting water agreements must modify accordingly.

Solomon (2010) argues that society has not modified water use to climate change pressures. He writes that modern societies tend to take one of four options to respond to the looming impacts of climate change. The first option is to do nothing and wait until a solution is found, such as genetically modified crops or gradual population reduction. The second option is to be more efficient with water use through regulation or market-oriented methods. Already, this option has begun to be implemented in many places out of necessity, such as in Israel where water scarcity has been monetized by an innovative water industry. The third option is to divert huge amounts of water from wetlands to drying lands. The final option is to drill deep into the Earth's reserves and pump them

dry. The Ogallala Aquifer in the heartland of the U.S. is an example of draining underground water reserves for contemporary prioritization of consumption.

In coincidental response to Solomon, Drieschova and Eckstein (2014) identify four strategies for addressing climate change within agreements. The first strategy is dubbed “ignoring uncertainty,” meaning the deliberate or unconscious denial of uncertainty. The authors use the example of omitting a conflict resolution process from a water treaty as a way of ignoring the risk of conflict (2014, 53). It is of little surprise that this strategy, which echoes the warnings of Solomon above, is best avoided. The second strategy, called the “complete contracts approach,” tries to create certainty in all situations. This tongue-in-cheek “watertight agreement” removes any ambiguity (2014, 54). However, the rigidity of such a strategy inhibits flexibility when unforeseen scenarios happen. The third strategy reduces the impacts of climate change by limiting uncertainty. Actions such as transparent data, climate modelling, and engineering projects are methods of mitigating future effects. On the continuum of successful strategies, Drieschova and Eckstein rank this above the former option, yet caution against the assumption that reducing uncertainty eliminates uncertainty (2014, 54). The fourth and favorite strategy of Drieschova and Eckstein is called the “open-ended approach” (2014, 55). This strategy responds to climate change uncertainty by designing flexibility into water management. Examples here include mutual assistance funds, indirect water allocation, and feedback loops for design and operation (ibid). One of the strongest advantages of the flexible approach is that riparians can adapt obligations to their shifting natural restraints or advantages.

It is plain that Solomon's four options, and at least two of Drieschova and Eckstein's options, lack sustainability and even short-term feasibility. Solomon argued that the answer to addressing the pressure of water scarcity is a paradigm shift, in which water is seen as the new oil – "a precious resource that has to be consciously conserved, efficiently used, and properly accounted for on the balance sheets across the breadth of human activity, great and mundane" (Solomon, 2010, 383).

Both Solomon and Drieschova and Eckstein recognize that there is a need for greater resiliency in and strengthening of water agreements. Agreements *must* modify to the pressures of climate change. It is through this lens of modification that the concept of provisions, or mechanisms within an agreement for particular eventualities, comes to the forefront of relevant literature.

Introduction to Agreements

The concept of provisions hinges upon the foundations of agreements. The basic principles of agreements create the foundation for discussing what additional scaffolding, such as provisions, can be added to a water agreement. Though critically important in the nexus of water and conflict, water agreements are—at their core—founded on the same principles of any other agreement: interests and needs. Agreements are ratified when the positions, interests, and/or needs of parties are satisfied to the degree where peace is preferable to conflict. Often veiled behind positionality and its temerarious rhetoric are parties' motivations, their needs and interests, which make for the substance of meaningful negotiations. The classic example of sisters arguing over an orange illustrates the purpose of understanding interests: two siblings fighting over an orange results in

their mother cutting it in half; one sister goes outside to eat the flesh, while the other sister goes to the kitchen to zest the skin for a cake (Follett, 1995). Of course, had they discussed their motivations for wanting the orange, each sister could have been fully satisfied. Similarly, finding resolutions for complex disputes, such as a water conflict, is still a matter of satisfying interests. Two riparians fighting over water may appear unresolvable until examining interests reveals maneuverability. Exploring interests allows parties to craft win-win solutions.

There are three overarching categories of interests: substantive, procedural, and psychological (Moore, 2003, p. 75). Substantive interests are comprised of goods, such as money, time, or natural resources like water and oil. Procedural interests are the mechanisms through which the dispute is discussed and outcomes are implemented. Agreeing to use the World Bank as a neutral mediator, or creating a path for resolving future disputes, are procedural interests. Finally, psychological interests are emotional and relational needs. In a transboundary context, the need for political face-saving, or for trust in an upstream riparian, are psychological interests.

The combination of substantive, procedural, and psychological interests comprise the reasons a party agrees to a treaty. When interests are satisfied, parties are satisfied. Interests can also be considered in long-term ways. By modifying traditional agreements to address future interests—whether procedural, substantive, or psychological—the agreement is better equipped for climate change. It will also be more resilient, as the agreement will be able to withstand, and even thrive in, crises.

Mechanisms for adaptation, eventualities, and flexibility within agreements are not uncommon; in fact, provisions are present in as many as three-quarters of

transboundary water treaties (Tir and Stinnett, 2012). The following section will examine the context of and arguments for provisions and mechanisms, before returning to the foundation of interests and needs, established above, in the creation of a provision list.

Literature on Provisions in Water Agreements

There is a broad body of literature on the existence and promotion of provisions within transboundary water treaties. The underlying theory is that provisions can, if done correctly, impact the treaty's capacity for withstanding conflict. As Tir and Stinnett write: "The central hypothesis is that the more institutional features [provisions] a treaty contains, the more effective it will be in preventing the occurrence of militarized conflicts between signatory states" (2012, 218). The theory is further expanded in this thesis, to propose that provisions can impact the treaty's resiliency in withstanding negative trajectories.

A provision is defined as "the action of providing or supplying something for use," specifically "for future eventualities or requirements" (Google Dictionary). Its Latin origin, *providere*, means to foresee or to attend to. Both are action-oriented verbs with positive connotations. The optimism connoted from the idea of provisions syncs with the cooperation and collaboration necessary in transboundary agreements, both in conception and in implementation. In other words, the very roots of provisions imply the hope of resiliency. For this reason, the term provision is used over semi-synonymous terms, like "rules" (Drieschova and Eckstein) or "criteria" (d'Estrée and Colby), employed in other contexts.

Several authors have written extensively in the literature on treaty provisions. Their works, discussed in brief below and expanded upon in topical discussions later in this section, have been defining pieces in compiling a master list of treaty provisions. Tir and Stinnett (2012) found that water scarcity increases the chance of militarized conflict, but that “highly institutionalized river agreements” create cooperative riparian interactions and reduce militarized interstate disputes by 71% (2012, 212, 221). The authors defined institutionalization by four provisions—monitoring, conflict management, enforcement provisions, and intergovernmental organizations—and purport all four provisions to be important in an agreement’s ability to withstand climate change. Ultimately, the authors found that 72% of the treaties examined in their empirical research had at least one institutional provision — 47% included monitoring provisions, 7% had enforcement provisions, 35% had conflict management provisions, and 35% delegated authority to an international institution (Tir and Stinnett, 2012, 216). Though far from comprehensive provision coverage, the findings are encouraging, and provide a basis for determining whether provisions are effective or merely prevalent.

A World Bank report by Dinar et al. (2016) identified similar findings in their literature review of water treaty resiliency. They cited the findings of Dinar et al. (2015), which underscored the importance of Tir and Stinnett’s four provisions, and further found that flexibility and directness in water allocation are important to agreement stability. Dinar et al. (2016) also identified the findings of Mitchell and Zawahri (2015), which suggested that the exchange of data and an enforcement provision both reduced the likelihood of military encounters and increased the likelihood that negotiations would be successful in resolving the conflict.

In a similar vein, Drieschova and Eckstein (2014) identified a list of cooperative transboundary mechanisms. Their motivation is to use provisions “to establish an internationally more benign environment that is conducive to cooperation and mutual burden sharing” (2014, 52). Drieschova and Eckstein distinguish between substantive and procedural “rules” [provisions]. Two of their identified rules overlap with Tir and Stinnett, monitoring and dispute resolution, and with Mitchell and Zawahri (2015), transparent data sharing, but the majority of Dreischova and Eckstein’s provisions are distinct. These include technical and financial cooperation, prior notice and consultation, flexibility mechanisms, amendment mechanisms, allocation methods, and prioritization of use.

Green et al. (2013) similarly promote seven elements necessary for “institutional and ecological resilience” in their research on the Okavango River Basin. They argue that natural resource management accompanies “a cycle of experimenting, monitoring, learning, and adapting” (2013, 1), and that a successful water agreement includes a variety of mechanisms for enabling resiliency through cooperation and adaptation. Green et al. (2013) highlight the importance of water allocation methods, provisions for extreme events, and joint management commissions, while also joining the academic chorus promoting enforcement, dispute resolution, and joint monitoring and information exchanges. Green et al. also underscore the significance of horizontal and vertical flows of information and coordination, adaptive management, public participation, and the authority to respond to changing circumstances.

d'Estrée and Colby (2004) use a framework for evaluating success in water conflict resolution, of which some aspects reiterate—or at least enlighten—provisions for

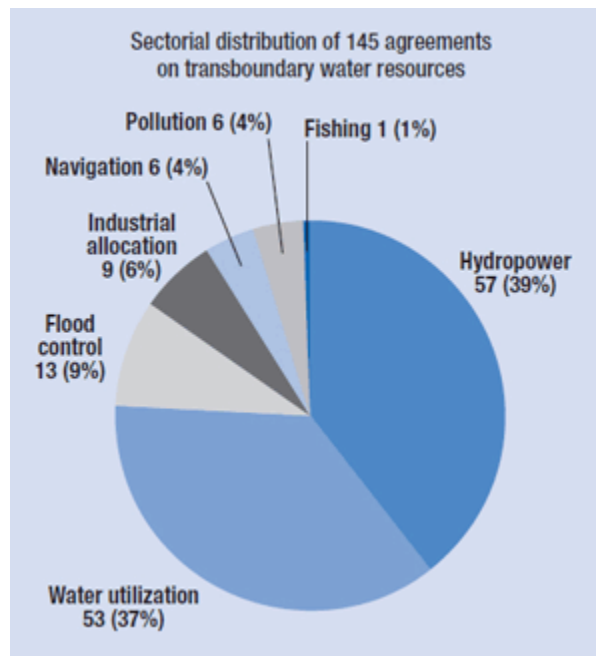
a water agreement. Criteria for evaluating success include cost effective implementation and financial feasibility of an agreement, environmental sustainability, compliance and incentives for compliance, flexibility, and the ability to resolve future disputes (2004). Though the criteria extracted are for measuring the success of an agreement, instead of for conjecturing the success of an agreement, there is illumination for creating provisions from the posthumous identification of success in an agreement.

Troell and Swanson (2014, 26) identified provisions that address the multi-sectoral challenges of water stresses. Changes to the hydrologic cycle will indirectly shape other potential areas of conflict, both related and unrelated to water—ranging from agriculture and biodiversity to urbanization and world markets. The implication here is that climate changes to the water cycle will have drastic felt impacts across the social and environmental spectrum, exacerbating existing and latent conflicts. Troell and Swanson propose four methods for adaptive water management (2014, 31). The first is the creation or emphasis of policies, practices, and institutional mechanisms [provisions] for flexibility and facilitating knowledge sharing. The second is multilevel governance, and the third is the inclusion of stakeholders in the full process of management. The fourth is using an ecosystem-based approach to ensure environmental flows and resiliency. These provisions identify flexibility, vertical and horizontal integration, and the environment as essential considerations to include in treaties.

Finally, a UNDP report overviewing transboundary water agreements found seven topical themes across 145 agreements [see Image 1.3 below] (Human Development Report, 2006). Though not specific to the creation of provisions, the report provides a sense of the priorities of most riparians, which illumines the provisions most relevant to

most agreements. More than three quarters of agreements focused on hydropower (39%) and water utilization (37%). Far less frequent were sections on flood control (9%), industry allocation (6%), navigation (4%), and pollution (4%). Only one of the 145 surveyed agreements addressed fishing. As provisions are examined and extracted, it is important to frame them in light of their relevance to the majority of water agreements.

Image 1.3. Sectorial Distribution of 145 Agreements on Transboundary Water Resources (Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis. UNDP, 2006)



In examining the literature on provisions, three major themes were repeated throughout. First, there is significant overlap of identified provisions between authors. This not only suggests that the provision is worthwhile and important to include, but that its inclusion is broadly supported in the academic community. Second, though few authors specifically identified the theory of resiliency as an important foundation, most authors used words like adaptation, flexibility, sustainability, and stability in justifying the purpose of provisions. This suggests that the purpose of provisions is largely the

same; provisions are designed from the motivation to prevent conflict and encourage cooperation. Finally, the literature on provisions emphasized, whether implicitly or explicitly, the importance of content in an agreement. There is very little discussion on issues of implementation. As will be discussed in the conclusion of this thesis, the overemphasis on content may be exaggerating the weight that provisions actually hold in a treaty's resiliency to climate change, and even conflict in general.

The literature detailed above was foundational in articulating what provisions look like. The following subsections better describe the nature of the provisions identified, and further detail their application to water agreements.

Intergovernmental Institutions

One of the most common provisions in established water agreements are intergovernmental institutions, also called commissions or interstate organizations. Tir and Stinnett (2012) found that where there are transboundary institutions, the likelihood of militarized conflict between riparians is reduced. Institutions established within treaties can address how rivers will be used and allocated, and how water quality, water levels, and navigation will be respected, because the institution facilitates diplomacy, communication, and cooperation (Tir and Stinnett, 2012, 217). The distinct nature of delegated authorities also keeps issues from becoming political, as it frames problems as technical and methodological issues to be resolved through logic and science.

Green et al. (2013) promote joint management for similar reasons. Commissions function outside the "diplomatic restraints" of the political community, as technocrats from each state can collaboratively problem solve issues related to management,

conservation, and allocation, without the burden of politics. Green et al. recommend a provision for joint management that integrates all related issues to a basin into the authority of one overarching body, with the proper authority to respond to crises. They argue that this is required for efficient governance over a basin, writing: “Otherwise, the system is well informed but impotent” (2013, 5).

Considering Tir and Stinnett and Green et. al’s promotion of an intergovernmental body, *Intergovernmental Institution* is the first identified provision to be included in the provision list. This provision recommends designating an intergovernmental institution with self-governance and minimal political oversight, thereby reducing political volatility and ensuring long-term consistency in the management of a shared basin.

Reframing the Value of Water

Tir and Stinnett (2012) argue that the value of water will increase, especially psychologically, as climate change impacts are felt at a basin level. Perceived value of water is directly tied to conflict over water. Water’s value increases the risk of conflict in four ways. First, the increased value of water will heighten actual tensions and the likelihood of tensions, especially in regions where secondary water sources—such as groundwater or rain catchment—are scarcer than the rivers (Tir and Stinnett, 2012). Consider Jordan and Israel as an example where an ineffectual water treaty would have significant conflict implications. Second, increased demand for river water will increase objections to other riparians’ uses, such as agriculture or industrial use (Tir and Stinnett, 2012). In Central Asia, the amount of water employed by downstream riparians for cotton irrigation is vocally objected to by its upstream neighbors. Third, Tir and Stinnett

anticipate an increase in coercive diplomacy, as nation-states will be less patient with the process of diplomacy. This could include saber rattling, threats, or economic pressures from the stronger riparians. Returning again to Central Asia, Uzbekistan former president threatened weaker Tajikistan with war over their shared water resources. And fourth, poorly managed transboundary basins have a spillover effect into other conflict areas, risking the overall exacerbation of dyadic conflicts (Tir and Stinnett, 2012, 214). In other words, water is a good excuse to fight, irrespective of the grounds. Tir and Stinnett's argument is that water scarcity, water value, and water conflict are a ladder of escalation.

Therefore, considering the arguments raised by Tir and Stinnett, *Reframing the Value of Water* is a provision to be included in the provision list. This provision recommends that riparians employ reframing techniques, such as those used in prospect theory (Kahneman and Tversky), the behavioral economic theory that proposes people engage with risk in different ways. In the case of water, recognizing that people have an aversion to loss, this provision recommends that riparians reframe the value of water through a lens of mutual gain, instead of a lens of "giving", or worse: "losing", water to another riparians. Collaboration and cooperation benefit citizens throughout the basin, whereas isolation and noncompliance result in higher losses overall.

Vertical and Horizontal Integration

Troell and Swanson (2014) highlight the importance of multilevel governance and the inclusion of all stakeholders, as climate change impacts will be felt across the social and environmental spectrum. Troell and Swanson propose mitigating the intersectoral and multisectoral impacts through horizontal integration, which they describe as "inter-

institutional and intersectoral coordination and cooperation” (2014, 26) to address the sectoral and policy fragmentation. A possible example would be integrating reforestation plans into official water management, a concept promoted broadly by organizations like The Nature Conservancy (www.plantabillion.org). Accompanying horizontal integration is vertical integration, meaning governance coordination in basin planning that ranges from local to regional to international levels (Troell and Swanson, 2014, 27). Troell and Swanson extend this approach to even the household level, where adaptability should relate to and inform basin wide policies (2014, 27). Two examples of attempts at vertical and horizontal integration are the 1992 Convention of the Protection and Use of Transboundary Watercourses and the 1998 Aarhus Convention on Public Participation in Environmental Decision-Making. The 1992 Convention established norms for stakeholder engagement in international governance; the 1998 Aarhus Convention is international law that, in turn, reinforces the 1992 Convention (Troell and Swanson, 2014, 27).

Green et al. (2013) echo a similar sentiment regarding vertical integration:

“In addition to including multiple levels of governance and nongovernmental local action, resilience thinking assures that the coordination must at least occur at the scale of the socio-ecological system involved but must include linkage to multiple scales of governance to allow adaptive response” (2013, 5).

Resiliency in a basin is closely tied to governance at multiple levels. This also parallels the discussion on factors for resiliency in the resiliency section above.

Therefore, the *Vertical and Horizontal Integration* provision is a provision to be included in the provision list. The provision aims to break down the siloed and fragmented approaches to water management through horizontal integration—the inter-

institutional and -sectoral inclusion in coordination and management, and vertical integration—the multi-level governance inclusion in coordination and management.

Addressing Hydrologic Variability

Water sharing agreements typically include institutional aspects for water allocation. The four most common methods are proportional allocation, fixed flow allocation, a combination of proportional and fixed flow, and non-water transfers (Ansink and Ruijs, 2008). Proportional allocation gives a percentage of river flow to riparians (such as 28% to A and 72% to B), whereas fixed flow allocation uses specific metrics of river flow (such as 39,200 MCM to A and 140,000 MCM to B). A combination method grants riparians certain minimums, and then allocates the remainder by percentage. For example, Ansink and Ruijs highlight the Nile Waters Agreement of 1959 between Egypt and Sudan, which grants specific million cubic meters per country, and then grants percentages of the remaining flow (Ansink and Ruijs, 2008, 251).² Finally, non-water transfers include the transfer of lump sums, annual payments, exchanged resources, and even the absence of militarized conflict (Ansink and Ruijs, 2008).

Green et al. (2013) report that riparians rarely define water allocations, and those that do, do so in a way that ignores hydrologic variation. Of the 145 transboundary river treaties signed in the 20th century, nearly half address water allocation, but few address hydrologic variability (Ansink and Ruijs, 2008; Drieschova and Eckstein, 2014). Green et al. (2013) found that, statistically, only percentage-based allocation promotes resiliency.

² Egypt receives 48,000 MCM per year and Sudan receives 4,000 MCM per year. Of the remaining flow, Sudan receives 66% and Egypt receives 34%.

This compliments findings by Dinar et al. (2010), which found that no allocation method, fixed allocation, or allocation of the entire river increased basin tensions. This was similar to findings by Ansink and Ruijs (2008), who found that an agreement where the downstream riparian is allocated a fixed amount of water has the lowest stability. However, Ansink and Ruijs found that the highest stability is when the upstream riparian is allocated a fixed amount—even higher than if riparians have proportional allocations (Ansink and Ruijs, 2008).³

Significant to climate change, however, is Ansink and Ruijs' (2008) finding that decreased river flow decreases agreement stability, yet increased variance can either increase or decrease stability. In other words, variability offers opportunity to ensure cooperation and stability are the norm. Without mechanisms to adapt to variations in river flow, it is less likely that riparians will comply with the terms of the water agreement. Therefore, *Addressing Hydrologic Variability* is a provision to be included in the provision list. Though quantity and quality will vary by context, this provision proposes that the mechanisms of allocation should either grant the upstream riparians a fixed amount of water or grant all riparians a percentage of the water.

Monitoring

Monitoring provisions have wide support in the literature. Tir and Stinnett (2012) described monitoring provisions as the mandated collection of data. They argue that this

³ The authors recognize that a different study found proportional allocation to be more efficient than fixed flow allocation. However, efficiency is distinct from stability. The authors believe stability is more critical in light of climate change.

provision is especially important for climate change, where water shortages could be caused by climatic issues like drought, instead of political issues like upstream overuse. Monitoring provisions prevent some conflicts through information. Similarly, the transparency that accompanies monitoring can alleviate fears that riparians are using more than their fair share.

Green et al. write that monitoring is an important cooperative process for riparians, citing the findings of Dinar et al. (2010), which found a correlation between monitoring and fewer grievances between riparians. Drieschova and Eckstein (2014) write that monitoring allows parties to become aware of unexpected basin conditions, and also allow riparians to consider adjusting or amending the current agreement.

As such, *Monitoring* is a provision added to the provision list. Monitoring is a process-oriented focus on mutual collection of data through continued collaboration and shared resources. The mandated collection of data further assists in climate change resiliency by clarifying water supply changes (Tir and Stinnett, 2012). Therefore, this provision recommends that water agreements require regular, publicly available, and ongoing joint monitoring of shared water supplies. Particular emphasis should be placed on climate changes and future modelling of hydrologic changes.

Dispute Resolution

Considering that a major motivation to study agreements is to mitigate and prevent conflict, it is of little surprise that conflict resolution is identified as an important provision within water agreements by most authors. D'Estrée and Colby (2004) identify the ability to resolve future disputes as a measure of success; Tir and Stinnett (2012)

identify dispute resolution as a significant provision within water agreements; and Green et al. (2013) write that dispute resolution mechanisms are a “failsafe” for noncompliance and defection. Drieschova and Eckstein (2014) highlight the Pact of Bogota, or the 1948 American Treaty on Pacific Settlements, as an example of dispute resolution process. It begins with negotiation, escalates to mediation, and then, if parties were unable to resolve the dispute, moves to arbitration under the International Court of Justice (2014, 64).

As such, *Dispute Resolution* is a provision added to the provision list. Possibly the most important of all provisions, this one promotes direct and collaborative resolution through a provision that is culturally relevant, clearly defined, and complete with escalation plans and a pre-identified, mutually-acceptable third party. Such a provision is foundational to a resilient transboundary river agreement.

Enforcement

Provisions for enforcement are also broadly supported in the literature. Tir and Stinnett (2012) purport that enforcement provisions give bite to agreements, dissuading riparians who would cheat from doing so. The authors argue that if sanctioning and similar punishments are detailed in an agreement, then enforcements are seen as more legitimate and less retaliatory or reactionary. Green et al. (2013) also argue that an enforcement provision is important to a water agreement. They write that enforcement can also be structured through positive means, such as benefit-sharing or through a mechanism that ties water to another interdependent issue, such as trade. By targeting areas critical to riparians, compliance becomes self-enforcing (Green et al., 2013).

D'Estrée and Colby (2004) similarly discuss compliance as the most common indicator of

success in an agreement; it is logical, then, that a mechanism that encourages compliance would be a mechanism that increases the likelihood of its success.

Therefore, considering its importance in the literature, *Enforcement* is a provision on the provision list. The provision should be strong enough to dissuade riparians from cheating, while also predetermining what punishments are legitimate responses. This provision recommends dictating enforcement-oriented discipline that is contextually feasible and well publicized as the response to noncompliance.

Technical and Financial Cooperation

A less common, but important provision pertains to the ability to execute elements of an agreement, particularly the technical and financial elements. A major barrier to overcome within an agreement is infrastructure. For example, *how* infrastructure is to be implemented has impacts on the feasibility of its implementation. Jeuland discusses how international conditionalities on water infrastructure “may be altering riparians’ willingness and ability to develop their water resources” (2017, 344). He argues that international funders and development organizations impose the economic burden of conditionalities on developing countries—a way of projecting “conditionalities that the developed countries had not faced during their own development process” (Jeuland, 2017, 345). These conditionalities include integrated water resource management, power production, stakeholder engagement, and scrutiny during the design and implementation of projects like dams. Though conditionalities may be important in the safe and sustainable operationalizing of infrastructure, the technical and financial

elements require significant cooperation. This cooperation should be determined within the water agreement.

Drieschova and Eckstein (2014) further underscore the critical role that technical and financial cooperation play in harnessing resources for research, development, emergency funds, and offsetting impacts of climate change. They use the Convention on Cooperation for the Protection and Sustainable Use of the Danube as an example of this cooperation. The treaty assures riparians that “mutual assistance upon the request of other Contracting Parties” will be given in times of crisis (Drieschova and Eckstein, 2014, 61).

As such, the *Technical and Financial Cooperation* provision is part of the provision list. Coordination of financial and technical efforts is important to the environmental and infrastructural health of a basin. This provision proposes an insurance mechanism specifically geared for funding emergencies and critical infrastructure, as well as for the gradual development of technology needed to maintain basin health. By establishing clear guidelines for its use, by contributing equitably, and by pooling resources, the provision establishes resilient responsiveness for climate change.

Institutional Learning

An intriguing proposition for continuous improvement, provisions related to the idea of institutional learning were hinted or suggested in the literature. Green et al. (2013) frame a provision for adaptive management as a means to address the continuation of learning and adaptation in an agreement. The authors recommend establishing “iterative processes,” or cyclical systems for improvement, into the management of a shared basin (2013). In d'Estrée and Colby's (2004) framework, the purpose behind the evaluation of

conflict resolution in water agreements is to further institutional learning, to address what worked and what did not, and then to reform aspects that need improvement.

Considering the importance of adaptation and flexibility within resiliency, *Institutional Learning* is a provision added to the provision list to enable the intergovernmental bodies governing a watershed to modify or enhance practices through self-improvement. Institutional learning includes monitoring and evaluation, feedback loops (Drieschova and Eckstein, 2014), and training within the institution. This provision broadly captures a need for ever-improving performance and accountability.

Transparency

Transparency is a theme among provision literature that, though not necessarily captured in a singular provision, resonates within other provisions. Tir and Stinnett (2012) refer to transparency as a reason for monitoring. Green et al. (2013) refer to transparency as a reason for enforcement, as transparency encourages compliance. Drieschova and Eckstine (2014) propose a provision for data sharing as a transparent mechanism. They write that data sharing promotes “harmonization,” because when all parties have the same information, misunderstandings are less likely.

As such, *Transparency and Trust Building* is a provision added to the provision list. This provision specifically aims to reduce distrust between riparians resulting from water scarcity (Tir and Stinnett, 2012) through data sharing. This prevents other riparians from employing enforcement mechanisms unjustifiably, allows riparians to engage flexibility mechanisms on the momentum of cooperation, and grants veracity to tracking

the impacts of climate change. This provision specifically differs from *Monitoring* because of its psychological and relational emphasis.

Prior Notice

Drieschova and Eckstein (2014) identify prior notice and consultation as a provision to be included in water agreements. They outline the two halves of prior notice: first, that riparians will consult the other; second, that riparians agree not to begin potentially impactful activities without consent of the other. The authors write that though prior notice and consultation are obligatory under international law, including the 1997 U.N. Convention on the Non-Navigational Uses of International Watercourses, including a provision within an agreement enhances trust and certainty.

Therefore, *Prior Notice* is a provision to be included on the provision list. Stipulating the provision in a water agreement provides a structured mechanism for reducing basin stress and enhancing riparian trust. Ultimately, this provision aims to be “conducive to the search for cooperative solutions that meet changing water priorities” (Drieschova and Eckstein, 2014, 63).

Amendment

An amendment provision is, essentially, a flexibility mechanism that institutionalizes a lesson learned or eventuality come to pass. Drieschova and Eckstein (2014) argue that it makes an agreement “inherently more adaptable.” An amendment mechanism allows governance to shift with new scientific or technological advances, or when water flows have changed. This mechanism would be well suited for many climate-change-impacted contexts. Consider, for example, the Aral Sea Basin in Central Asia:

agriculture and cotton account for a large percentage of the economy, demanding significant and seasonal irrigation supply. As economic development and urbanization reshape regional growth, water usage will change accordingly. An amendment mechanism would allow the Central Asian riparians to adapt their agreements to the new context, through a consensus-based process that becomes a permanent treaty amendment.

The *Amendment* provision is added to the provision list as an extreme flexibility measure. It builds upon preexisting cooperation to adapt to unexpected circumstances without forfeiting the collaborative progress made up to that point. Amendments can be proposed on an as-needed basis, or following certain scenarios like scientific breakthroughs or extended droughts. Regardless, the provision enhances the resiliency of an agreement.

Prioritization of Use

A provision detailing the prioritization of water use allows riparians to plan for allocation in times of scarcity (Drieschova and Eckstein, 2014). The idea, as articulated by Drieschova and Eckstein, is that the provision provides substantive flexibility while recognizing the essential human element of water allocation. For example, riparians could prioritize household use first, and scaling up into agriculture, environment, hydropower, and other economic or industrial needs. This method not only allows adaptability to water quantity, but to water demands (Drieschova and Eckstein, 2014). The provision dovetails with a point raised by Tir and Stinnett (2012), when they highlighted that, in times of river scarcity, riparian water use becomes a source of conflict. They highlighted agricultural and industrial use as being particularly

controversial. A provision like Drieschova and Eckstein's would enable riparians to determine priorities prior to the time of scarcity, thereby reducing conflict.

As such, the provision of *Prioritization of Water Use* is added to the provision list to address the need within agreements for substantive flexibility. The goal of this provision is to provide a scale of priorities for times of water scarcity, emergencies, and unexpected changes to the hydrologic system.

Communication Channels

Foundational to enhancing any relationship, and especially for encouraging quality cooperation and coordination, are functional communication channels. Like transparency, communication is a theme prevalent in the literature on provisions, but not as a stand-alone mechanism. Green et al. (2013) discuss the importance of communication within governance and information sharing. Drieschova and Eckstein (2014) underscore communication in their provision for data sharing, arguing that data sharing "can inaugurate the first communication channels" (60). D'Estrée and Colby (2004) measure the success of the relationship between parties through indicators related to communication: general relationship quality, reduction in hostility, and cognitive shifts in perception of the other party.

However, considering communication's role in any bi- or multilateral agreement, the provision for *Communication Channels* is included on the provision list. The provision should include preferred channels, the minimum frequency of communication, and who is to be included in what types of communications. This latter stipulation could include forums for regional countries or basin-specific stakeholder engagement. The

provision's ultimate purpose is to increase the quality of communication, to promote the attributes needed to withstand negative climate change pressures.

Provisions from Conflict and Water Literature

There are a number of active water conflicts in the world, and a host of research on the factors and circumstances that prevent or inflame them. Researchers have examined the impacts of geography, methods of allocation, power relations, population size, and even financial options of riparians, in order to identify factors related to conflict. In this section, root causes of water conflicts are examined as impetus for the creation of corresponding provisions. Though the research does not directly propose provisions, provisions are extracted from the instigators of conflict to reduce the likelihood of conflict. By doing so, the goal is to increase an agreement's ability to withstand negative trajectories.

Reciprocal Resource Trade

Lee and Mitchell (2010) found that the geographic location of a riparian in a river basin can increase or decrease the likelihood of conflict or cooperation. The authors examined four scenarios of up- and downstream riparians, with emphasis on the impact of energy production (such as coal, gas, or electricity) in the relationship. The empirical research showed that militarized conflict was most common between riparians that produced no energy (56%), yet risk was highest for militarized conflict when the downstream riparian has no energy resources of its own and therefore must use force to

protect its water rights (Lee and Mitchell, 2010). By comparison, the lowest risk of conflict is when the downstream riparian has its own energy resources, while the upstream riparian does not. The authors essentially found that when riparians could reciprocate resources—energy for water, and vice versa—the basin was less prone to militarized conflict. Resource interdependence is good for basin stability.

This interdependence is exemplified by the Syr Darya and Amu Darya basins in Central Asia (Lee and Mitchell, 2010). Kyrgyzstan and Tajikistan are the upstream riparians with significant energy deficiencies; Kazakhstan and Uzbekistan are the downstream users with sufficient energy resources. Previously, regional conflict has been caused by the seasonality of water demands. On one hand, the downstream users need water for irrigation during the growing season. On the other, the upstream riparians need hydroelectricity during the cold winter months. Because water shortages are chronic, winter releases contribute to the water allocation quotas of Kazakhstan and Uzbekistan, which aggravate their political and economic concerns. Reciprocal energy trade offers a solution to the seasonality problem. By employing reciprocal energy trade, Kyrgyzstan and Tajikistan can import energy from the downstream riparians during the winter months—when ordinarily hydroelectricity would be required to meet the heightened wintertime energy demands—allowing for greater releases during the summer months, when the thirsty cotton crops require substantial irrigation.

Therefore, since trading resources can both be included in water agreements and is shown to reduce the likelihood of conflict, *Reciprocal Resource Trade* is a provision included on the provision list. Trading resources-for-resources enhances interdependence and balances power. Thus, the purpose of this provision is to promote basin stability.

Recognition of Rights

A source of regular conflict is the recognition of rights. Rights are tied closely to identity and respect, and are a prevalent issue in many ongoing disputes. Consider, for example, the recognition of Israel in its negotiations in the Middle East. Though not as volatile nor publicized, recognition of rights to water is likewise important. In the Indus Waters Treaty, following nine years of negotiations and a bloody post-colonial rupture, the recognition of rights to water constitutes much of the treaty's preamble. In the case study later in this thesis, recognition of rights to water dominates much of the early Central Asian water treaty.

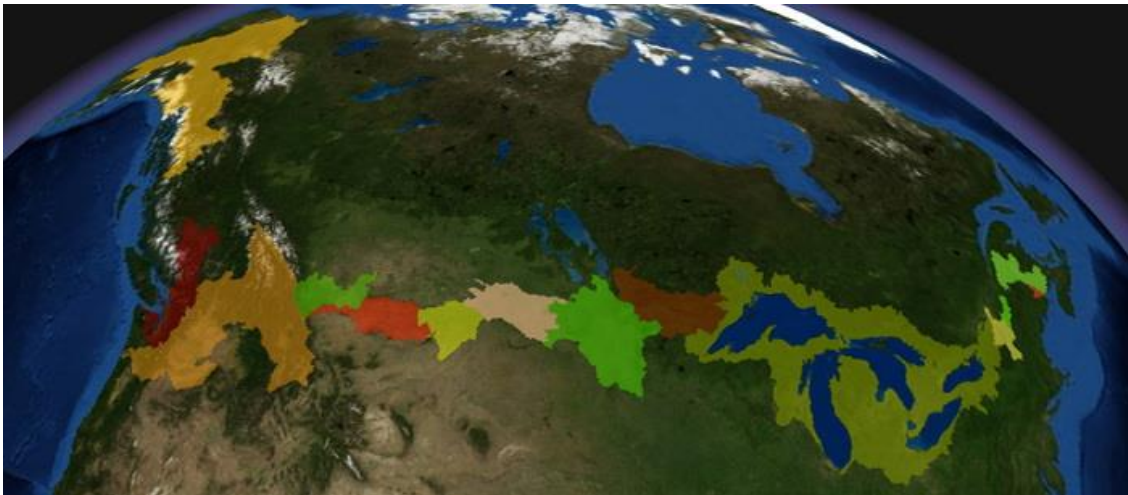
The proposed provision for *Recognition of Rights* is added to the provision list to recognize the entrenched psychological need of rights. The recognition of someone's rights soothes their fears, builds trust, and establishes a playing field as equals. This provision requires the articulation of rights of all riparians within the agreement. The underlying belief is that satisfying a psychological concern will promote stability, and therefore resiliency, in a basin.

Power Balancing

Lee and Mitchell (2010) found that the greater the power imbalance between riparians, the less likely militarized conflict is (Lee and Mitchell, 2010). Their finding syncs with multiple examples, but may be best exemplified in the transboundary relationship of the U.S. and Canada, which shares twelve distinct transboundary basins (See Image 1.4). The U.S., which has a population of 325.7 million and a GDP of \$18.57 trillion, dwarfs its geographically-larger but politically-smaller neighbor Canada, which

has a population of 36.29 million and a GDP of \$1.53 trillion (World Bank via Google Data). The power imbalance could be a factor in the overwhelming success of the International Joint Commission of the United States and Canada in managing the shared water resources. The sentiment was well summarized by Canada's former Prime Minister Pierre Trudeau, who said of Canada's relationship with the United States: "Living next to you is, in some ways, like sleeping with an elephant. No matter how friendly and even-tempered is the beast...one is affected by every twitch and grunt" (CBC Archives, 1969).

Image 1.4 The Twelve Shared River Basins of the US and Canada (IJC)



Therefore, considering that many transboundary basins do not have a significant power imbalance between riparians, the provision for *Power Balancing* is on the provision list. This provision aims to address the multitude of basins that are more prone to militarized conflict because they lack a clear hegemon. The provision articulates designating power-balancing through third party consultants and arbitrators, in order to place contestation between riparians in a neutral context.

Population Pressures

Lee and Mitchell (2010) found that the larger the population, the greater the risk of militarized conflict. The inference is that larger populations place greater pressure on governments to provide water, while also inflating the amount of water needed even in emergencies. This finding correlates with several of the most prominent water disputes of today, including Ethiopia and Egypt, with 102.4 million people and 95.69 million people respectively, and India and Pakistan, with 1.3 billion people and 193 million people respectively (World Bank via Google Data). MIT professor Elfatih A B Eltahir writes to the former example, purporting that population pressures in the Nile Basin are largely at fault for rising tensions. Eltahir writes that the current population growth is unsustainable for both land and water use in the region, thereby escalating tensions (2017, Nature Asia).

The lesson to be extracted from this finding is that a provision for *Alleviating Population Pressures* should be added to the provision list. This provision recommends addressing the greater strains of a population through contextually appropriate technical solutions that increase water storage capacity. These solutions may include aquifer recharge, dams, irrigation canals, or other engineering solutions that facilitate supply to larger populations in times of need.

Provisions from Adaptability in Water Management

Inspiration for provisions are sourced from more than just academic literature. Adaptability-in-practice, or the application of adaptability mechanisms in water management, gives insight to provisions that guide water management towards resiliency.

These specifically include provisions for the environment and for flexibility. The following discussion will better detail the relationship between flexibility and environmental management, and how intentional inclusion of both can increase the resiliency within a water agreement.

One IUCN report states: “Adaptation to climate change refers to *adjustment in natural or human systems* in response to actual or expected climatic stimuli or their effects, which *moderates harm or exploits beneficial opportunities*” (emphasis added, Barchiesi et al., 2014, 16). In other words, adaptation in the era of climate change will require adjustment, but not necessarily in negative ways. There is opportunity for adaptive and flexible provisions to shape the management of natural resources like water.

Jeuland (2017) writes:

“Climate change offers perhaps the starkest example of the complexity induced by human-nature system interconnections...The sheer complexity of the suite of potential changes, and the particular exposure of the water sector to them, have led researchers to propose a range of new methods that...emphasize the need to invest in ways that maintain adaptive flexibility.” (p. 347)

Flexibility is not a new concept in the realm of water treaty research. Drieschova and Eckstein (2014) argue that formalized flexibility has three benefits for riparians. First, flexibility can increase the pace of amendments to an agreement necessary for responding to climate change. Second, flexibility can ease the process of negotiating an agreement, because flexibility reduces the rigidity of an agreement. Third, flexibility allows for maintaining the spirit of an agreement without the original wording (2014, 52).

Adaptive capacity, however, is a newer concept in the realm of water treaty research. Smit and Pilifosova (2001) define adaptive capacity as “the potential or ability

of a system, region, or community to adapt to the effects or impacts of climate change,” and that its enhancement “represents a practical means of coping with changes and uncertainties in climate, including variability and extremes...reduc[ing] vulnerabilities and promot[ing] sustainable development” (quoted in Stucker and Lopez-Gunn, 2014, 3). In other words, adaptive capacity is resiliency-building; it is strengthening the mechanisms necessary for mitigating impacts of climate change and enhancing cooperation. The concept of adaptive capacity can be, and should be, a means for determining resilient provisions. The approach emphasizes capacity for coping and withstanding climate change—a foundational aspiration in the application of resiliency theory to water agreements.

Flexibility Mechanism

As discussed above, flexibility within an agreement offers multiple advantages to riparians, and is critical to resiliency in an agreement. Flexibility is a term promoted in practice by the IUCN, by the UN, and in the literature. Green et al. (2013) articulate the need within agreements to respond to changed circumstances on short notice, as well as for iterative processes promoting resiliency. Likewise, Dinar et al. (2015) found that flexibility mechanisms had a positive correlation with a treaty’s long-term effectiveness.

In response to support for the concept, a provision for *Flexibility* is added to the provision list. Though a flexibility provision overlaps with many pre-identified provisions, such as the *Amendment* and *Monitoring* provisions, flexibility allow for impromptu or short-notice adjustments to governance without, necessarily, long-term implementation of the flexible action. Flexibility also allows riparians to incorporate

lessons-learned from the field of water management, such as Integrated Water Resources Management (IWRM, discussed below) or other management frameworks.

Environmental Considerations

Adaptive capacity illuminates the importance of including the environment in agreements. Impacts to the environment are inherent to water agreements, especially in agreements that include water allocation, infrastructure, and industry. Troell and Swanson write that environmental flows, meaning “the quality, quantity, and time of freshwater flows,” are “critical to maintaining *ecosystem health and resilience*, especially in basins that are already subject to significant levels of abstractive use and pollution” (2014, 28, emphasis added). The eventualities of the environment deserve to be incorporated in governance.

The concept has been explored through adaptability practices, such as Integrated Water Resource Management (IWRM). IWRM is defined by the Global Water Partnership as “a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner *without compromising the sustainability of vital ecosystems*” (UN, “IWRM”, 2014, emphasis added). The backbone of IWRM is the inclusive, participatory planning process; it involves stakeholders in the management of nature, in order to address concepts such as sustainability, interconnectivity, accountability, and adaptability (Troell and Swanson, 2014, 29).

Considering how the environment has been included in other frameworks, a provision for *Environmental Considerations* is added to the provision list. This provision

articulates the rights of and obligations to the environment within an agreement. It increases the stability of the agreement in the long term, by mitigating the negative environmental impacts of a treaty and ensuring that necessary water flows for the environment exist, thereby ensuring the future of the water agreement itself.

Creation of Provisions List

Over the course of reviewing relevant literature, many provisions were extracted to establish a comprehensive list of provisions for climate change resiliency in transboundary river agreements. Each provision may not apply in every context, but the argument is that the majority combined will enhance any transboundary river agreement regardless of culture, geographical location, or basin challenges. That being said, the base assumptions behind the provisions are the same assumptions underlying interest-based negotiations: that parties negotiate in good faith, look for win-win solutions, prioritize long-term relationships over short-term victories, and set aside positions for mutually-satisfying solutions. These provisions are foundationless without good-faith riparians.

Structurally, the list is divided between enhancement and mitigation provisions. Enhancement provisions facilitate cooperation in areas more likely to be collaborative; mitigation provisions reduce escalation in situations identified to be more prone to conflict. The purpose in creating two lists is to underscore the significance of both in addressing impacts of climate change.

Furthermore, the organization below extends beyond that of Drieschova and Eckstein, who organized a like-minded list of “rules” into substantive and procedural categories (2014), by adding a category for psychological needs. The organization below

thereby represents the three types of interests discussed in earlier chapters (Moore, 2003, 75). The triangle of interests, or needs, can be defined thusly: substantive interests refer to goods, such as quantity of water; procedural interests refer to the process of addressing needs, such as using the World Bank as mediator or attaining assurance of an annual forum to address irrigation; and finally, psychological interests are the emotional and relationship needs, such as ensuring cordial riparian cooperation. The list below considers psychological needs as a critical consideration because of the complex nature of a riparian and between riparians.

The list is comprised of 20 provisions, divided into enhancement and mitigation columns, and organized according to the three categories of interests (see Table 1.2). It is noteworthy that the majority of provisions generated from the literature are procedural. The reason is three-part. First, substantive and psychological interests are highly contextual. The substantive needs of Israel and the West Bank will differ in specifics from those of Egypt and Ethiopia, as infrastructure, climate, supply, population size, and economy are just a few of many factors that shape specific substantive needs. Similarly, the psychological needs are influenced by time, place, and politics: the chemistry between negotiators, the stability of a political regime, power imbalances between riparians, and a host of other relationship and emotional demands define psychological interests. In contrast, procedural needs are generic.

Second, there is no sure way of predicting substantive and psychological interests in a future shaped by climate change. Procedural mechanisms, on the other hand, offer a route to future modifications, when psychological or substantive interests have changed.

Procedural mechanisms are less time-restrained, less impacted by climatic shifts, and less likely to be wholly reshaped within the lifetime of an agreement.

Finally, the following list is procedural-heavy because the list’s purpose is to enhance resiliency, and resiliency is action-based. In other words, of the three categories, procedural provisions address the *actions* for ensuring an agreement can withstand climate-induced changes. Procedural provisions are the process to resiliency. Substantive and psychological interests, though important, will carry less weight in the withstanding future impacts—especially in a climate changed future—than procedural interests.

Table 1.2: The Provision List

	Mitigation	Enhancement
Procedural Interests	<ol style="list-style-type: none"> 1. Enforcement 2. Dispute resolution 3. Monitoring 4. Amendment 5. Flexibility mechanisms 	<ol style="list-style-type: none"> 1. Intergovernmental institutions 2. Vertical / horizontal integration 3. Financial / technical cooperation 4. Communication channels 5. Institutional learning 6. Prior notice and consultation
Psychological Interests	<ol style="list-style-type: none"> 1. Power balancing 2. Alleviating population pressures 3. Reframing value of water 	<ol style="list-style-type: none"> 1. Transparency and trust-building 2. Recognition of rights
Substantive Interests	<ol style="list-style-type: none"> 1. Addressing hydrologic variability 2. Prioritization of water use 	<ol style="list-style-type: none"> 1. Reciprocal resource trade 2. Environmental considerations

As detailed in the prior chapters, provisions for the provision list were specifically extracted because of ties to attributes that align with resiliency: cooperation, reduced conflict, the likelihood to endure or even thrive in crises. As such, these provisions are specifically tailored to water agreements, and even more specifically to climate change

impacts on water agreements. The relevance of the provision list to other types of environmental agreements has not been considered.⁴

In the following section, a treaty heralded as a resilient success is examined in the context of the provision list. The International Boundary and Water Commission of the U.S. and Mexico employs several provisions listed in Table 1.2 to enhance its capacity for managing environmental impacts related to both climate change and human mismanagement. Following a discussion of the U.S-Mexico treaty, the provision list will be applied in its entirety to the Central Asian case study to determine whether the provision list can illumine a region widely recognized for its latent water conflicts, which occasionally erupt into border violence and escalated political rhetoric.

Flexibility in U.S.-Mexico International Boundary and Water Commission

Troell and Swanson (2014) highlight the International Boundary and Water Commission (IBWC), established by a treaty between the U.S. and Mexico as a strong example of innovative basin management. It is an opportunity to consider the success of provisions in water agreements, and prompt discussion of provisions' role in resiliency. The duties of the IBWC have evolved since its establishment in 1899 to include the implementation of water agreements, resolution of disputes, and distribution and regulation of the Colorado River. The IBWC also makes managerial and operational

⁴ Throughout the remainder of the thesis, when discussion a specific provision related to the provision list, its shorthand reference will be used. First, each reference has either S, Pr, or Ps: S is for Substantive; Pr is for Procedural; and Ps is for Psychological. Next, the interest is followed by the type of provision: M is for Mitigation and E is for Enhancement. And finally, the reference ends in the number of each provision. For example, Power Balancing is the first psychological interest in the mitigation column. It's shorthand reference is PsM1.

recommendations to the governments of the United States and Mexico (Troell and Swanson, 2014, 37). Most importantly, the IBWC act as the treaty implementers.

The flexibility mechanism of the IBWC is particularly unique because of how effective it has been in allowing the IBWC to adapt on short notice to unforeseen environmental situations, or what Troell and Swanson call innovative basin management. This mechanism, the so-called “minute process,” allows the IBWC to create or amend rules to the basin treaties that guide their governance. Troell and Swanson explain that the minutes of a formal decision by the IBWC are forwarded to the Mexican and American governments; the minutes are considered approved if neither government rejects the amendment within 30 days (2014, 38). This allows the IBWC to act as needed with minimal oversight.

The minute process is particularly relevant to the discussion on provisions because of what it has contributed to: the impressive ability of the U.S. and Mexico to adapt to difficult basin conditions. The example used by Troell and Swanson is Minute 319, created in November 2012 as an amendment for interim measures that look remarkably similar to parts of the provision list. The interim measures included water storage for Mexico in case of shortages (PsM2), environmental considerations (SE2), a mechanism for water exchange (SE1), and evaluations for informing future measures (PrE5) (Troell and Swanson, 2014, 39). Furthermore, it involved stakeholders throughout the vertical and horizontal realms (PrE2), including Native tribes, environmental NGOs, national and state governments, and more throughout multiple sectors. The authors specifically highlight one agreement stemming from Minute 319 as a success of adaptive basin management. As a coordinated irrigation effort, the U.S. and Mexico exchanged

resources (SE1)—the U.S. contributed \$21 million and technical expertise (PrE3) to improving Mexico’s water infrastructure in exchange for 124,000 acre-feet of Mexico’s water (PsM3) (2014, 39). Ultimately, the collaboration will mimic a natural flood to create 2,000 acres of wetland habitat, also improving Mexico’s environment (SM2, SE2).

Of course, the definition of success is not a universal standard, and Drieschova and Eckstein use the same study of the U.S. and Mexico to underscore *instability* (2014, 54). A major drought in the late 1990s led to the U.S. and Mexico escalating their grievances on flow obligations to the International Centre for the Settlement of Investment Disputes. Mexico claimed it was unable to meet its obligations, and the U.S. claimed Mexico was unwilling. No resolution was reached until the drought ended in 2005. The argument of Drieschova and Eckstein is that the rigidity of the flow mandates within the 1944 U.S.-Mexico Rivers Treaty—one of the treaties under which the IBWC operates—restricted the riparians’ ability to resolve their conflict through alternative means; it failed to address hydrologic variability (SM1). The implicit question that arises from this argument, then, is: what is the balance between articulating the perfect agreement and implementing a resilient, productive relationship?

Conclusion of Section One

The conversations thus far have emphasized the relationship between provisions and the improvement of resiliency in water agreements. Yet all have assumed, implicitly or explicitly, the positive relationship between the content of an agreement and the governance conditions of a basin. This baseline assumption that resiliency inherently stems from provisions undergirded the initial research question: how can water

agreements satisfy parties' needs while also considering the future uncertainties of climate-induced changes to their basins' hydrological systems, in order to promote climate change resiliency?

The concept of provisions has been tested in case studies ranging from the US and Mexico (above) to the Okavango River Basin (Green et al., 2013). However, the case studies represented in the literature have used partial lists of provisions—such as the four provisions of enforcement, conflict resolution, intergovernmental institutions, and monitoring proposed by Tir and Stinnett (2012)—or through the lens of underscoring the benefits of provisions, which comes with potential bias.

The following case study examines two of the agreements used to govern the Amu Darya and the Syr Darya basins of Central Asia. The region is an area of personal significance to the author, plagued by failing water infrastructure, latent water conflicts, and a heightened vulnerability to climate change due to its glacier-fed river basins and contemporary Aral Sea disaster. Combined, these factors presented a case study ideal for applying the provision list.

Section Two

“Water, thou hast no taste, no color, no odor; canst not be defined, art relished while ever mysterious. Not necessary to life, but rather life itself, thou fillest us with a gratification that exceeds the delight of the senses...For thou, water, art a proud divinity, allowing no alteration, no foreignness in thy being.”

Antoine de Saint-Exupéry, Wind, Sand and Stars

Image 2.1. Map of Central Asia



Provisions: A Steppe in the Right Direction?

The concept of provisions has been tested in case studies ranging from the U.S. and Mexico to the Okavango River Basin of southwest Africa (Troell and Swanson, 2014; Green et al., 2013). However, the case studies represented in the literature need supplementation for three reasons. First, the case studies represented in the literature have used partial lists of provisions, such as the four provisions of enforcement, conflict resolution, intergovernmental institutions, and monitoring proposed by Tir and Stinnett (2012). Second, the case studies have been applied through the lens of proving the benefits of provisions in agreements, therefore creating the risk for bias in the selection of cases and provisions. And third, the case studies used in the literature have failed to answer the question of whether the content of agreement is directly responsible for the success of an agreement.

The following case study examines two agreements used to govern the Amu Darya and Syr Darya basins of Central Asia. It is a region tucked out-of-sight and out-of-mind from much of international affairs; it draws up images of nomads in yurts and Himalayan hikes without correlation to modernity. The region is an area of personal significance to the author, and is plagued by failing water infrastructure, latent water conflicts, and a heightened vulnerability to climate change due to its glacier-fed river basins and contemporary Aral Sea disaster.

The first section will paint a broader picture of the key actors of Central Asia, as well as its recent history of conflicts directly and indirectly tied to water. The second section will examine two of the major agreements governing water resources—the 1992 Agreement on Cooperation in the Field of Joint Water Resource Management and

Conservation of Interstate Sources, and the 2008 Statute of the Interstate Commission for Water Coordination of Central Asia—through an in-depth analysis of the present provisions, the discourse and text of the agreements, and the relative significance of the agreements. The final section will discuss the findings of the analysis. The case study will conclude with the implications for future research areas, and for the field of provision research.

Analysis of Central Asia’s Water Crisis

Introduction

“We must resolve water issues in the interests of all our countries including issues related to hydropower construction, water releases, and electricity sharing,” Kazakhstan’s President Nursultan Nazarbayev announced on March 15, 2018, ahead of the first Central Asian summit in nearly ten years (RFERL, March 15, 2018). The statement marked a dramatic change in tone from Uzbekistan’s late president Islam Karimov’s threat of “not just serious confrontations, but even wars” at the 2013 Forum to Balance Water and Energy Needs (Pacific Institute). In Central Asia’s rugged and remote corner of the world, defined climatically by its aridity and thirsty legacy of Soviet anti-environmentalism, water is the backbone of economies and infrastructure. Yet, water is also in greater demand than supply.

The issue of water rides along, betwixt, and above the regional conflicts of every sort—issues of terrorism, trade relations, war in Afghanistan, and the pockmarked landscape of enclaves and exclaves demarking ethnic lines. Water becomes a gambit for

political negotiations—hence, possibly, Nazarbayev's statement at the 2018 summit, “Our countries have 70 million people living here around two major rivers—the Amu Darya and Syr Darya—and we agreed today that no political bargaining is acceptable in the matter” (RFERL, March 15, 2018). It becomes a source of international attention, underscored by the United Nations Regional Centre for Preventive Diplomacy for Central Asia (UNRCCA) and the World Bank’s Central Asia Water-Energy Development Program, both of which aim to alleviate water tensions in the region. And most alarmingly, water becomes a cause of on-the-ground violence between communities fighting for access and control (for timeline of specific events, see Appendix A). Border towns formerly interconnected by Soviet infrastructure are now vulnerable to structural inequalities and disparities.

Ferghana Valley

Consider the Ferghana Valley as an example of this conflict interconnectivity. Resting in the spiral of three borders within the Syr Darya watershed, the Valley is the most densely populated and most agriculturally fertile region in Central Asia, home to multiple people groups. It is also the most conflicted region. Conflict has stemmed from horizontal inequalities between groups, such as the 2010 riots of Osh; from political unrest, as in the Andijan massacre of 2005; from religious extremism, like in the 1992 and 2004 Tashkent bombings; and from vague borders with strict policies that limit movement in the formerly cohesive Soviet space. One author summarized the volatility of the Ferghana Valley, writing:

“The ill-defined borders, the problems of enclaves and exclaves, the huge number of socio-economic and environmental problems faced by the inhabitants of the region, power struggles between the political elites...have made [the Ferghana Valley] one of the most dangerous and unstable regions of the world” (Borthakur, 2017, 334).

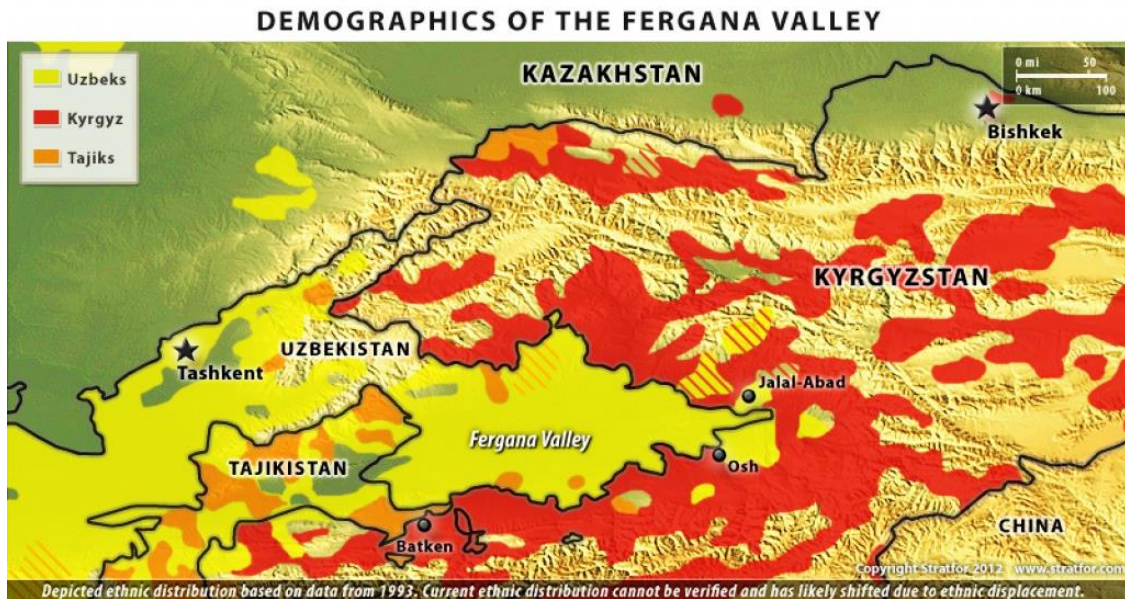
While these conflicts have been, and continue to be, distinct social issues, the collective turmoil is a melting pot that simmers into frequent, concentrated, and ongoing disputes around water. As early as 1990, the city of Osh had manifest violence over water issues, stemming from deeper grievances like government representation and the Soviet breakup. In one instance, up to 600 people were killed before Soviet troops could reestablish peace (Stratfor, 2013).

History of the Ferghana Valley

A variety of historical factors have concentrated conflict in the Ferghana Valley. Socially, Central Asia experienced dramatic shifts after the Kokand Khanate, an Uzbek dynasty immediately predating tsarist Russia’s rule, fell to colonization in 1876. Following a period of autonomy in the 1910s within the Russian Soviet Federative Socialist Republic (the successor of tsarism and the predecessor of the USSR), Stalin implemented ‘divide and rule’ strategies to delineate the borders of the new Soviet Socialist Republics (SSRs) throughout the 1920s and 1930s (Borthakur, 2017, 336). He complicated the process by creating ethnic-based socialist states. The Uzbek SSR was founded in 1924, followed by the Tajik SSR in 1929 and the Kyrgyz and Kazakh SSRs in 1936. This period marked the first time in Central Asia’s history that borders officially distinguished ethnic majorities. Ethnicity had not existed in Central Asia; people had previously been grouped “based on clan, region, or religion” (Strafor, 2013).

Ethnicity, however, was complicated. Different groups defined their origins differently depending on priorities of language, geographic location, or race. For example, the term “Uzbek” grew to include the Sart people, who were unrecognized by the Soviets, as well as Persian speakers—who would typically be considered Tajik—because they lived in Uzbek-dominated cities (Borthakur, 2017, 337). These factors all served to create a “geographic jigsaw puzzle” of enclaves, mixed populations, and interdependence that perpetuates conflict today (Borthakur, 2017, 337-338; see Image 2.2 for depiction of modern ethnic distribution).⁵

Image 2.2: Demographics of the Ferghana Valley (Stratfor, 2013)



⁵ Groups include, the three citizenships, as well as the ethnic groups of Uzbeks, Kyrgyzs, Tajiks, Russians, Tatars, Slavs, Armenians, and Meskhetian Turks (Borthakur, 2017, 336).

Modern Interdependence in the Ferghana Valley

The Ferghana Valley provides a concentrated illustration of the interdependence, interconnectivity, and similarities predating and postdating the Soviet occupation. Today, many of these elements continue to define and influence the relationships in Central Asia, especially the economic, infrastructural, and water regimes implemented by the USSR.

Economically, agricultural output in the Valley is around 79% higher than other Central Asian regions, with output of about \$1000 per hectare, compared to the regional average of \$613 per hectare (Abdullaev, 2010). This heightened output is in part because of its geographic advantages, but it is also because of extensive infrastructure for the historically agrarian region. An excerpt from 1882 describes the Valley with “huge water channels...whole forests of shade-giving trees...fields of wheat, barley, millet sorghum, corn, rice, beans, sesame, flax, hemp, cotton, and alfalfa...” (Middendorf, 1882, qtd. in Kreutzmann, 2016, 114). It is of little surprise then, that 12 million people in a tumultuous geographic depression of 8,500 square miles (Young, 2003, 6), all competing for the same crop outputs and all dependent on decaying irrigation infrastructure, would fracture along group lines.

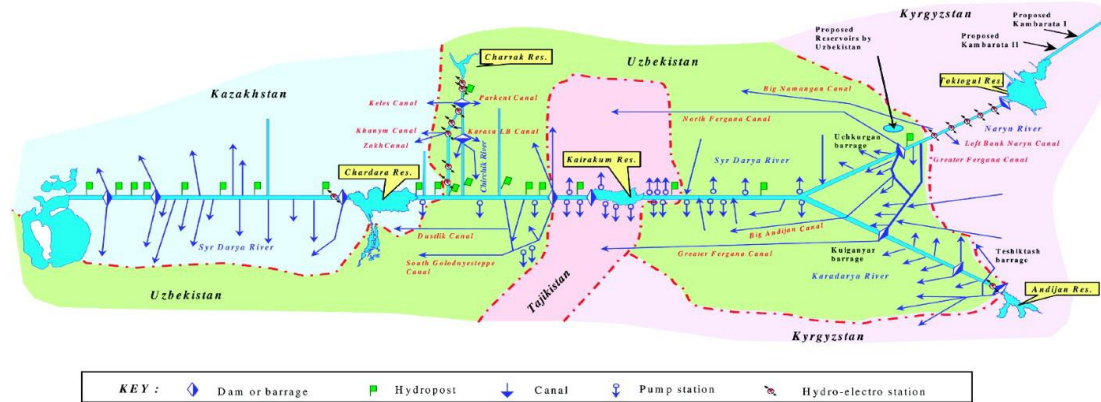
This jigsaw puzzle was structurally ruptured by the breakup of the Soviet Union in 1991. With independence came the solidification of formerly permeable borders and the nationalization of formerly shared infrastructure, throwing the ex-SSRs into economic competition and social turmoil. In addition to the nation-states themselves, enclaves and exclaves of ethnic populations were delineated—becoming islands of citizens whose freedom of movement is now a pawn in disputes over resources and infrastructure (Kreutzmann, 2016, 120). In August 2015, for example, Tajiks blocked a road and

Kyrgyz blocked a water canal in a disputed region along the border of an enclave in Kyrgyzstan. The situation escalated into immediate violence. The Tajik border service reported Kyrgyz villagers using shotguns and Molotov cocktails; the Kyrgyz service reported 120 Tajiks and 80 Kyrgyz engaged in rock throwing (Putz, 2015). Either way, at least four people were injured and several homes were damaged.

Finally, according to Hermann Kreutzmann, author of several works on irrigation in Central Asia, water disputes at the community level have two roots: forced modernization and constraints of interdependence (Kreutzmann, 2016). Both the Tsarist and Soviet modernization schemes included major interconnected irrigation systems to expand cropland into the arid steppes of Kazakhstan and Uzbekistan. This required mass diversions of water from the Amu Darya and Syr Darya rivers from their natural courses into the Aral Sea via dams, reservoirs, and canals, as illustrated in Image 2.3 below. As Kreutzmann states: “The control of regional resources and experiments with new technologies in the Central Asian “laboratory” enable the colonial power to envisage an interconnected system of producing raw materials in Central Asia and processing them in Russia” (2016, 116). Thus, the cotton and grains were transported north to Russia to support the booming textile industry and feed its burgeoning population, at the great expense of Central Asia’s water resources.

The Ferghana Valley is an example of how interconnected conflict in Central Asia is. Social, ethnic, economic, and historical factors feed into latent conflict that erupts on loosely related issues—namely water—at the primary, secondary, and tertiary levels. These factors are by no means concentrated in the Ferghana Valley; they spill out and define much of Central Asia and its regional relations today.

Image 2.3. Schematic Layout of the Syr Darya Basin (PA Consortium (2002, p. 55), via Wegerich, 2011)



The Aral Sea Basin

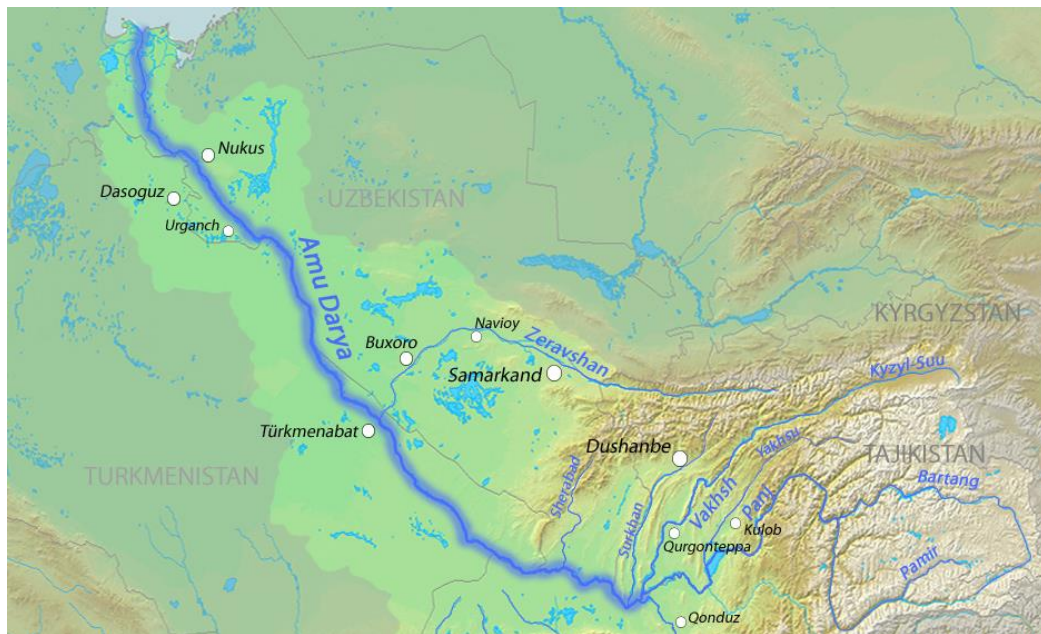
The Syr Darya and Amu Darya river basins flow without consideration of borders from the snow-capped peaks of Kyrgyzstan and Tajikistan, and onto the southerly steppes of Kazakhstan, before draining into the remnant of Uzbekistan’s Aral Sea. The basin spans 1.73 million square kilometers (668,000 square miles), with an average volume of 118.43 cubic kilometers (28.41 cubic miles), through territory with approximately 70 million people (FAO Water Report, 2013). Nearly every drop of the greater Aral Sea basin is allocated to a national interest. Unfortunately for the riparians—and even more so for the Aral Sea—there is little extra with which to negotiate, reallocate, or claim.

Like the Ferghana Valley, water in the basin flows in latent conflict, awaiting a loosely related dispute to thrust it back into the fore. Unlike the Ferghana Valley, however, the conflict is typically found at the primary level, that of governments and diplomats, instead of at the community level. The three riparians of the Syr Darya are Kyrgyzstan, the upstream user, and Kazakhstan and Uzbekistan, the downstream users (see Image 2.4). The riparians of the Amu Darya are Tajikistan, Kyrgyzstan, and Afghanistan, the upstream users, and Turkmenistan and Uzbekistan, the downstream users (see Image 2.5).

Image 2.4 Syr Darya River Basin (Wikicommons)



Image 2.5 Amu Darya River Basin (Wikicommons)



Aral Sea Basin Conflict Perpetrators

In addition to the conflict roots articulated in the discussion of the Ferghana Valley, two other themes play defining roles in the broader conflict context: actor instability and water use inefficiencies. First, The actors involved in Central Asia are volatile and unpredictable. Take, for example, the extreme pendulum swing of Uzbekistan within a two-year period. Uzbekistan's new president, Shavkat Mirziyoyev,

recently softened the late president Islam Karimov's policies on regional relations (Michel, 2017). The foreign minister, Abdulaziz Kamilov, expressed hope to start dialogue with its neighbors on water access and management, and that friendly relations are an "important foreign policy priority" for the new regime. Kamilov told the UNRCCA: "The preliminary acquaintance with these conventions shows quite reasonable approaches to resolution of this very complex issue. I hope that our neighbors will pay attention to this UN's proposal and we will be able to start a mutually interested dialogue" (Akipress, 2017). Kamilov would like the region to agree on water use, regulation, and compensation mechanisms.

This is a change from the late president's tone in 2016, when in a disagreement over Tajikistan's Rogun Dam he alarmed the international community with the threat of a resource war with his comment that "all of this could deteriorate to the point where not just serious confrontation, but even wars could be the result" (Michel, 2016). Dushanbe signed with an Italian company, Salini Impregilo, to begin construction, despite the World Bank's analysis that the Rogun could bring "large-scale threats to the entire region" (Michel, 2016).

Another root of the conflict is the inefficient use of the water. Today 90% of the total available water resources of Central Asia are dedicated to irrigation. Soviet planning sought to transform Central Asia into a natural resource producer for Moscow's industries, and cotton was the choice crop. Water was diverted without consideration to support the booming irrigation demands on the arid steppes. Consider Uzbekistan alone: in 1930, there was 530,000 hectares of irrigated land; in 1950, this increased to 650,000 hectares; and by 2005, this had boomed to 1.5 million hectares (Kreutzmann, 2016, 114).

A large percentage of this output has been, and continues to be, cotton—the “white gold” of Central Asia. Between 1913 and 1990, Uzbekistan’s cotton output increased tenfold, and in 2011, Uzbekistan was the sixth largest cotton supplier in the world (Kreutzmann, 2016, 115).

Alisher Ilkhamov (2017) reiterates Kreutzmann’s argument: Central Asia exacerbates its own water strife through inefficient use. Up to 50% of Uzbekistan’s irrigation water is lost in its infrastructure networks (Ilkhamov, 2017). More concerning, however, is the overall water wastefulness. Ilkhamov writes that Turkmenistan consumes the highest rate of water per capita in the world, at a rate four times higher than the U.S and thirteen times higher than China. Uzbekistan is the fourth highest consumer of water per capita; Kyrgyzstan the fifth; Tajikistan the seventh; and Kazakhstan the eleventh (Ilkhamov, 2017). The exaggerated water use is primarily due to inefficient and leaky infrastructure.

The instability of the regional actors and the water wastefulness, combined with the negative impact of the Soviet Union and the legacy of interdependence, heightened by ethnic conflict and horizontal inequalities, and tied together with the economic dependency of thirsty cotton, creates a tumultuous hotbed desperately in need of effective water governance. Unfortunately for Central Asia, their contemporary issues face extreme escalation with the threat of climate change.

Climate Change in Central Asia

Climate change and its relationship to conflict have been heralded as certainty by many outlets and underscored as a serious threat to international relations in academia.

Solomon (2010) writes that the implications of water scarcity create competition of interests between ethnic groups, social classes, and geographical habitats, stating that conflicts are “palpable perils in a growing number of international watersheds in some of the world’s most combustible regions” (p. 372).

Bernauer and Siegfried (2012) in the *Journal of Peace Research* specifically name Central Asia as a region of concern, stating that the existing water management “has failed” and that disputes have persisted since the collapse of the USSR. Similarly, Rasool (2015) in the *Journal of Central Asian Studies* writes that climate change threatens the Central Asian region with environmental security problems in a complicated web of fragile state relations. Conflict caused by severe climate change, Bernauer and Siegfried hypothesize, will be amongst “poorer, less democratic, and politically less stable” riparians because of their weaker capacity for adaptation (2012). This concern ties to concerns of resiliency, and the necessary capacity for positive actions in thwarting a negative trajectory.

Stucker et al. (2014) examined the impacts of climate change and current water governance in the smaller tributaries of the Syr Darya basin, arguing that insufficient attention is paid to the less dominant but equally important water sources. They found that various factors have created an inflection point for management. Stucker et al. write:

“...climate change, population growth, deteriorating irrigation infrastructure and upstream expansion of irrigated agriculture contribute significantly to a decreasing and more variable supply of water, an increasing demand on large water losses, resulting in mounting pressures on the environment and basin inhabitants” (2014, 63).

Furthermore, the authors found that climate change in Central Asia, though difficult to model for a variety of reasons, is already happening. There are impacts to regional

climate in water volume, temperature, and precipitation. Models predict an overall decrease by 20% in river runoff by 2060 (Korkorin, 2010, and Westphal, 2010, qtd. in Stucker et al.). Ilkhamov (2017) believes overall decrease will be as high as 30%. Temperature increases of 0.3 to 1.2°C in the window between 1950 and 2005 have led to annual precipitation variations across Kyrgyzstan and Tajikistan (Stucker et al., 2014, p. 49). Most alarming is the Stucker et al.'s findings that, since the late 1950s, glacier volume in the region has shrunk by 15%⁶ and is only expected to accelerate in the future. One example is Tajikistan's Zeravshan Glacier, which, between 1927 and 2009, retreated 2.5km (ZEN qtd. in Stucker et al., 2014, 50). Stucker et al. similarly cite that snow cover area has decreased by up to 15% since the mid-90s. Of course, both snow cover and glacier volume contribute directly to long-term water storage capacity in an already water-stressed region. Ultimately, combined with permafrost melt and warmer precipitation, climate change threatens regional river volume, and therefore approximately 80% of the waters in the current Amu Darya and Syr Darya (Stucker et al., 2014, 50).

As climate change produces shifts in flow patterns, water disputes are likely to increase in intensity. Kreutzmann (2016) documented the changing characteristics of the Syr Darya over the past 50 years; snowmelt decreased by 20% while glacier runoff increased. The lower spring flows and higher autumn flows pose significant threat to the availability of irrigation water during the growing seasons. This heightens tensions between the downstream states' demands for water and the upstream states' willingness

⁶ The glacier shrinkage is caused by an annual melt ranging between 0.2 to 1%.

to provide that water, as well as internal pressures for dictatorships (all C.A. states excluding Kyrgyzstan) dependent on economic stability. Other ecological concerns include waterlogging and salinization, implying that quality of water may one day be as pressing of an issue as the quantity of water (Kreutzmann, 2016, p. 121).

The various literature on climate change in Central Asia is cohesive in many aspects, but especially in its warnings. Climate change is already happening, and it threatens the status quo of a volatile region. Additionally, it is closely linked to conflict. The current elements of Central Asian relations, both productive and unproductive, will be shaped by the impending hydrologic changes. The governance and agreements over water need to reflect this threat.

Water Agreements in Central Asia

Governance and agreements over water, however, do not reflect the threat of climate change. Water in Central Asia is managed hierarchically by transnational, national, regional, and local actors, who establish and enforce water codes, laws, and decrees pertaining to use. Many date back to the early and mid-1990s, and were established based on precedent set during the Soviet Union. That the system is flawed is no secret. In fact, recognition that the system of agreements is flawed includes statements from the countries themselves, such as Nazarbayev's blatant statement at the recent water forum in March 2018: "A major issue [in Central Asia] is problems around water sharing" (RFERL, March 18, 2018). Unsurprisingly, perhaps, one author describes the overall implementation on the ground as "legal nihilism" (Abdullaev et al., 2010, 1030).

“Legal nihilism” may be an overstatement, as there are a few interstate and national layers of governance.

The primary regional agreement is the Cooperation on Transboundary Water Management Treaty, signed by the five Central Asian states in 1992 following the breakup of the USSR to regulate and maintain water allocation throughout the entire Syr Darya and Amu Darya Basin. Janusz-Pawletta (2015) states that the treaty is regularly updated to reflect the changing needs of member states and the environmental crises resultant of Soviet planning, but others disagree. This treaty is critically examined in the following section.

A separate treaty was signed between the users of the Syr Darya river to create static allocation of the waters—1% to Kyrgyzstan; 9.2% to Tajikistan; 38.1% to Kazakhstan, and 51.7% to Uzbekistan—as a security mechanism for the downstream states (Kreutzmann, 2016, 121). Similarly, in 1998, the Syr Darya riparians signed the “Agreement Between the Government of the Republic of Kazakhstan, the Kyrgyz Republic, and the Republic of Uzbekistan on the Use of Water and Energy resource of the Syr Darya Basin.” This agreement specifically noted “the common interests of the participating countries and the urgent need for the development of an efficient and coordinated water regime in the Syr Darya basin, taking into account the problems of the Aral Sea” (“Agreement...”, 1998). It did not develop a coordinated regime, unfortunately. Kazakhstan blames Uzbekistan for noncompliance; Uzbekistan denies the claim; and Kyrgyzstan does not follow the agreement (Mitchell and Lee, 2010, 11).

Another relevant transnational treaty is the Interstate Coordination Water Commission (ICWC), also established in 1992, as a means of coordinating between

Kyrgyzstan, Tajikistan, and Uzbekistan in the Ferghana Valley. ICWC has been supplemented by Basin Water Organizations (BWOs), whose purposes are to implement the decisions of the ICWC, and also operate the major irrigation infrastructure—dams, gates, pumps, canals, etc.—necessary for executing the ICWC’s plans. In 2008, the riparians updated the treaty governing and envisioning the ICWC, in what became a modernized framework for governing the shared waters within the greater Aral Sea basin. This updated 2008 agreement is also critically examined in the following section.

Finally, at a national level, the Central Asian states introduced land reforms throughout the 1990s to both mitigate the Soviet legacy and revive the agricultural sector. In doing so, regulatory structures were abolished, transforming water allocation into “a place of contestation and competition” (Abdullaev et al., 2010, 1030). Water Users Associations (WUAs) were a result of both INGO and grassroots demands for better management, operation, and maintenance of waterworks. Unfortunately, they were bureaucratically established by the thousands and few successfully developed in practice (Abdullaev et al., 1030). Those that did mobilize continue to face difficulties in managing water, collecting fees, and operating the irrigation systems (Abdullaev et al., 2010, 1031). The weak national governance systems further complicate the overarching implementation of interstate agreements.

Introduction to Case Study Analysis

Central Asia’s water agreements provide an opportune case study for three reasons. First, the original agreement of 1992 was effectually replaced in 2008 by an expanded agreement. This allows for cross-examination to identify the additions that

riparians perceived to be of importance.⁷ Second, the updated water agreement satisfies many of the provisions identified in the literature as important for resiliency to climate change—yet, and thirdly, the agreement is hardly heralded as a successful transboundary river agreement, and is unlikely to withstand the heightened pressures of climate change. Though there are multiple agreements that could be analyzed through a governance lens in Central Asia, the 1992 and 2008 Agreements were selected due to their similar subject matter and matching signatory countries (see Appendix B for texts of the agreements).

The 1992 agreement was written following the breakup of the Soviet Union, and its language reflects the hurry to maintain a degree of interdependence. The 2008 agreement was written following regional and global concern over the Aral Sea crisis, as well as during the economic recession, and its language reflects the region’s environmental and financial concerns. In the following sections, we will analyze and compare the two agreements in light of the provision list; analyze the 2008 Agreement in light of the provision list; and compare the two agreements to identify the provisions that the Central Asian riparians added to improve their relations. We will then examine whether the provisions have had significant impact in improving the resiliency of the water agreements. Finally, we will discuss the implications of the findings.

1992 Agreement

Following the USSR’s break up, the preexisting interdependent economies and infrastructure of the Central Asian riparians were left suddenly derailed. The 1992 Agreement on Cooperation in the Field of Joint Water Resource Management and

⁷ It is important to note methodologically that the agreements analyzed are the English translations. One is taken directly from the ICWC website, and the other is sourced from the University of Texas. The Russian language versions of the agreements were not evaluated.

Conservation of Interstate Sources (hereafter “1992 Agreement”) reflected the need for re-established cooperation. The agreement was designed “based on the historical community of peoples living on the territory” and “recognizing the unbreakable interdependence and relationship of the interests of all the Republics,” in pursuit of an “organized solutions of the problems of joint management of water of interstate sources” (1992 Agreement). In other words, the riparians recognized that independence was not an end to interdependence.

The 1992 Agreement has a significant portion of the provision list incorporated within its text. The following section will examine the findings from Table 2.1 to discuss the implications of provisions present and absent from the agreement.

Table 2.1. The 1992 Agreement Compared to the Provision List

1992 Agreement Comparison to Provision List				
Present in Agreement			Absent from Agreement	
<i>ID</i>	<i>Name</i>	<i>1992 Article</i>	<i>ID</i>	<i>Name</i>
<i>SM2</i>	<i>Prioritization of Use</i>	Intro., Art. 10	<i>PrE4</i>	<i>Communication Channels</i>
<i>PsE2</i>	<i>Recognition of Rights</i>	Art. 1, 3, 9	<i>PrE5</i>	<i>Institutional Learning</i>
<i>Psm1</i>	<i>Power Balancing</i>	Art. 2, 6, 11	<i>PrE6</i>	<i>Prior Notice & Consultation</i>
<i>PrE3</i>	<i>Financial, Technical Cooperation</i>	Art. 4, 9	<i>Psm3</i>	<i>Reframing Value of Water</i>
<i>Psm2</i>	<i>Population Pressures</i>	Art. 4	<i>SE1</i>	<i>Reciprocal Resource Trade</i>
<i>PsE1</i>	<i>Transparency, Trust-building</i>	Art. 5		

<i>PrM3</i>	<i>Monitoring</i>	Art. 5, 8
<i>PrE1</i>	<i>Intergovernmental Institutions</i>	Art. 7, 9
<i>PrE2</i>	<i>Vertical, Horizontal Integration</i>	Art. 7
<i>PrM5</i>	<i>Flexibility Mechanisms</i>	Art. 8
<i>SE2</i>	<i>Environmental Considerations</i>	Art. 10
<i>SM1</i>	<i>Addressing Hydrologic Variability</i>	Art. 11
<i>PrM1</i>	<i>Enforcement</i>	Art. 12
<i>PrM2</i>	<i>Dispute Resolution</i>	Art. 13
<i>PrM4</i>	<i>Amendment</i>	Art. 14

1992 Agreement Analysis

There are several aspects of the 1992 Agreement worth highlighting. First, and quite noteworthy, is that the first five articles address psychological interests. Articles 1 and 3 recognize riparians water rights; article 2 balances power; article 4 recognizes population pressure; and article 5 attempts to establish transparency for trust. As Moore explains, psychological interests are tied to relationships, fears, and aspirations (2003). Consider the complex regional influences in Central Asia in 1992—a time of ethnic violence, multiple regime changes, civil wars in Afghanistan and Tajikistan, the breakup of the USSR, the rise of religious extremism—and the uncertainty prompting the emphasis on psychological interests is self-apparent.

This uncertainty is overwhelmingly evident in the language around water rights; references to existing use and equal rights to the interstate resource are frequent. And yet, for the riparians at the time of signing, rights were a new concept: prior to the Soviet occupation, there had been neither population nor industry great enough to outmatch supply, and during occupation water had been a shared resource for the fulfillment of Moscow's imperialist dreams.

Second, the articles themselves are overall short and absent of actionable items. The longest articles, articles 7 through 10, are each two sentences comprised of about eight lines of text. The two shortest articles are 16 and 18 words, respectively—or roughly the length of this sentence. The brevity translates to ambiguity. Little consensus was likely to be drawn from something as open-ended as article 4, which states: “During extremely dry years a special separate decision shall be taken on the problems of water supply to the regions of acute water deficiency.” And, in a time of true drought, article 4 is more likely to exacerbate tensions than relieve it, as its definition provides no structure for proper action.

Third, and of little surprise, references are absent to climate change and infrequent to the environment. The environment is mentioned in the opening remarks, in a reference to the “mitigation and stabilization of ecological stresses,” stemming from “water resource depletion.” The “rational use and protection” of water is further established in article 1, and an expectation for technical cooperation on the problem of the Aral Sea's desiccation is laid out in articles 4 and 10. However, the overall taste of the agreement is prioritization of water use that benefits the economic growth and agricultural demands of

the region.⁸ Again, this prioritization reflects the region’s political climate, but also the overall philosophy of natural resource use in the Soviet Union and, more broadly, throughout most of the 19th and 20th centuries. Natural resources, including water, were to be consumed, used, and refined in order to create economic benefit.

Finally, the psychological emphasis skimmed over two important factors: communication and enforcement mechanisms. Communication is implied generically in a few articles, such as in article 5 where riparians agree to “facilitate wide information exchange,” and in article 7, “having envisaged quarterly meetings.” But the agreement lacks robust expectations for how, when, and about what parties will communicate. Similarly, enforcement is implied generically in article 12: “The parties agreed to elaborate within 1992 the mechanism of economic and such other responsibility for violation of the agreed regime and limits of water use.” However, there is no evidence whether parties ever agreed upon enforcement measures in the final two months of 1992—the agreement was signed in September.

Combined, this analysis gives context to the times, but also to the articles of agreement and the motivations behind them. Equally important, the analysis gives insight into why, sixteen years later, the riparians would essentially rewrite the 1992 Agreement in plainer, clearer, and better-defined terms.

⁸ See Bullet #1, Bullet #4, Articles 6, 8, and 10 for supporting evidence

2008 Agreement

Following sixteen years of ineffectual water governance in the Aral Sea Basin (see Central Asia Conflict Timeline, Appendix A, for details of conflict), the five riparians met in Almaty, Kazakhstan, to reword their resource relations. The 2008 Statute of the Interstate Commission for Water Coordination of Central Asia (hereafter “2008 Agreement”) is significantly longer and more robust than the 1992 Agreement, almost certainly designed to fill in the holes in operation under the former understanding. The Interstate Commission for Water Coordination (ICWC) was originally established in 1993, and conceptualized within the 1992 Agreement, to manage the allocation of water in the Aral Sea Basin. However, the 2008 Agreement significantly reworded the relationship between the riparians and the expectations of cooperative management.

The 2008 Agreement also has a significant portion of the provision list incorporated within its text. The following section will examine the findings from Table 2.2 to discuss the implications of provisions present and absent from the agreement.

Table 2.2. The 2008 Agreement Compared to the Provision List

2008 Agreement Comparison to Provision List				
Present in Agreement			Absent in Agreement	
<i>ID</i>	<i>Name</i>	<i>2008 Article</i>	<i>ID</i>	<i>Name</i>
<i>PrE1</i>	<i>Intergovernmental Institutions</i>	Art. 1.1, 1.2, 1.3, 1.4, 4.3, 5.1, 5.3, 6.1, 6.2	<i>PrM5</i>	<i>Flexibility Mechanisms</i>
<i>PsM3</i>	<i>Reframing Value of Water</i>	Art. 1.5	<i>PsM2</i>	<i>Population Pressure</i>
<i>SM1</i>	<i>Addressing</i>	Art. 2.1, 2.3,	<i>PsE2</i>	<i>Recognition of Rights</i>

	<i>Hydrologic Variability</i>	4.1, 4.2		
<i>PrE2</i>	<i>Vertical, Horizontal Integration</i>	Art. 2.2, 2.11, 5.2		
<i>PrE3</i>	<i>Financial, Technical Cooperation</i>	Art. 2.3, 2.7, 2.8, 2.9, 2.16, 2.19, 3.7, 3.8, 5.4, 5.6, 5.7, 5.11		
<i>SM2</i>	<i>Prioritization of Use</i>	Art. 2.12, 5.5		
<i>SE2</i>	<i>Environmental Consideration</i>	Art. 2.4, 2.5, 2.13, 5.5		
<i>SE1</i>	<i>Reciprocal Resource Trade</i>	Art. 2.6, 2.12		
<i>PrM1</i>	<i>Enforcement</i>	Art. 2.6		
<i>PrM3</i>	<i>Monitoring</i>	Art. 2.7, 2.10, 5.1, 5.6, 5.7		
<i>PsE1</i>	<i>Transparency, Trust-building</i>	Art. 2.10, 5.6, 5.7		
<i>PrE4</i>	<i>Communication Channels</i>	Art. 2.14, 3.2, 3.3, 3.10, 4.6, 5.6, 5.7		
<i>PrE5</i>	<i>Institutional Learning</i>	Art. 2.15, 5.1, 5.8		
<i>PrM2</i>	<i>Dispute Resolution</i>	Art. 2.17		
<i>PrE6</i>	<i>Prior Notice & Consultation</i>	Art. 2.18		
<i>PsM1</i>	<i>Power Balancing</i>	Art. 3.4, 4.4, 5.4		
<i>PrM4</i>	<i>Amendment</i>	7.1		

2008 Agreement Analysis

Like its predecessor, the 2008 Agreement has several noteworthy elements to explore. First, and most obvious in analysis, is the remarkable emphasis on financial and technical cooperation. Elements of the provision PrE3 were evident in twelve distinct clauses across the majority of sections. Compare, for example, clause 2.3, which outlines “planning and control of large interstate reservoir operation regimes,” with clause 3.8, which designates that the Commission may “[allocate] special interstate investment funds for shared financing of work related to regional water sector development.” The agreement is overall thorough in its consideration of where, and of what, technical and financial collaboration is worthwhile and needed in the region.

In stark opposition, the agreement has no references to water rights. The reasons for this may be twofold. First, the agreement creates the ICWC *according* to the 1992 Agreement, which was very articulate in outlining water rights. It may have been that further expression of rights was redundant. Second, the atmosphere at the time of signing was polar to that of 1992. Where the former agreement was signed in fear and uncertainty, the latter agreement was signed in the momentum of cooperation and improvement to the status quo.

Unsurprisingly, considering that much of the 2008 Agreement is dedicated to revamping and formalizing the Interstate Commission for Water Coordination (ICWC), the agreement is heavy on institutional elements required for its operation and growth. The agreement has nine clauses specifically addressing its nature as an intergovernmental institution, including the majority of the opening section. For example, the first two clauses define the role of the ICWC in conjunction with the International Fund for Aral

Sea Saving (IFAS), a separate regional water treaty focused primarily on the Aral Sea crisis, and the following two clauses define its activity “following the principles of collectivity and mutual respect of parties' interests” (Clause 1.4).

Another interesting component of the 2008 Agreement is its seven clauses for communication, in what is likely a direct response to the communication void of the 1992 Agreement. These clauses range from logistical details like clause 3.10, which establishes Russian as the working language, and 4.6, which waives visa requirements for individuals travelling for the ICWC, to more facilitative clauses like clause 2.14, which establishes a joint program for early warning in emergencies and disasters related to hydro-structures.

Finally, the 2008 Agreement added reciprocal resource trade in Section Two, which outlines the main objectives of the ICWC. Central Asia has attempted—with mixed success—to trade energy from downstream riparians for water from upstream riparians. Article 2.6 delegates to the ICWC the “preparation of recommendations...on the development of uniform pricing policy and possible losses compensation mechanism related to shared water and energy use.” In simpler words, this article implies that the region would self-police resource trade according the prices and punishments established by the ICWC. Article 2.12 states that “reconciliation of releases from reservoirs for irrigation needs...with consideration of hydropower generation requirements” is likewise a priority objective of the ICWC. Article 2.12 is, essentially, the process-oriented half of Article 2.6, which discusses the pricing and legal frameworks of energy and water.

The 2008 Agreement was written in a different era than the 1992 Agreement, and the tone is reflected in both the political and environmental context of the agreement. The

question, however, is whether the 2008 Agreement is truly a more resilient agreement than the 1992 Agreement. At first glance, it appears almost certainly superior—the 2008 Agreement has more substance, more depth to the clauses, and a greater breadth of coverage. Yet, in the decade since its conception, conflict has continued to simmer over water and water-related issues. Is it truly resilient?

Section Three

Oh, I have oft been too anxious for rivers

To leave it to them to get out of their valleys.

Robert Frost, "Too Anxious for Rivers"

Comparison of the 1992 Agreement and the 2008 Agreement

A strength of the Central Asia case study is that the differences between the 1992 and 2008 Agreements allows for tracking the evolution of the riparians' relations. Provisions that were added, removed, or ignored reflect elements that the riparians self-identified as important and necessary changes. Furthermore, it allows for an apples-to-apples comparison of basin management before and after changes in the articulation of basin management. This will help to clarify the role that provisions play in aiding resilient basin management, as well as the future role that provisions can play in responding to climate change.

The following section will identify and weight the significance of changes between 1992 and 2008 in three ways. First, a textual analysis will discuss content changes in the two agreements. Second, a textual analysis will identify the types of words used, changes in the types of words used, and the possible reasons behind changes. Third,

by weighting the frequency of words as relative to the word count of the agreements, we will identify the relative importance of selected themes to the riparians at the time of signing. The three-part analysis will then enlighten a discussion of how much words matter in contrast to implementation and riparian relations.

Textual Analysis

A textual analysis addresses the “content, structure, and functions” of a message, or the way that words interact to deliver the purpose of a communication (Frey et al., 1999). There are four subdivisions to a textual analysis (Frey et al., 1999). Rhetorical criticism is the analysis of persuasion in a text; content analysis is the identification of characteristics in the text; interaction analysis is the analysis of communication between communicators; and performances studies is the identification of the aesthetics of a text. The following textual analysis focuses on content analysis, as the study of the messages’ characteristics is most relevant to the study of provisions.

The predominant difference between the 1992 Agreement and the 2008 Agreement boils down to size. The original agreement is a mere 857 words—not including the title and signatories—with 14 articles. The 2008 Agreement, in contrast, is a 250% size increase, with 2,138 words—not including the title and signatories—with seven sections and 59 clauses [articles]. The size difference directly influences the following analyses. Comparing the *1992 Agreement to Provision List* (Table 2.1) to the *2008 Agreement Provision List* (Table 2.2) highlights the differences between topics that were significant at the time of signing and provisions that are absent from the agreements. The following subsections will analyze differences accordingly.

Textual Analysis: Topics of Significance

Though broadly discussed in the individual analyses above, there are four topics worth featuring in a side-by-side comparison. These include the types of interests emphasized in the two agreements, the two shifts in emphasis, and the additions of communication and institutional learning.

First, there is a definite procedural-interest orientation in the 2008 Agreement, as opposed to the psychological-interest orientation in the 1992 Agreement. Take, for example, the first six articles of the 1992 Agreement: articles 1 and 3 address recognition of rights (PsE2), articles 2 and 6 addresses power balancing (PsM1), article 4 addresses population pressures (PsM2), and article 5 addresses transparency and trust-building (PsE1). Conversely, the first four clauses [articles] of the 2008 Agreement address intergovernmental institutions (PrE1), and then soon thereafter address vertical and horizontal integration (prE2) and financial and technical cooperation (PrE3). Comparatively, a procedural interest does not come up until article 4 (PrE3) in the 1992 agreement. In the 2008 agreement, reframing the value of water (PsM3) comes up in clause 1.5, but otherwise psychological interests are absent until transparency and trust-building in clause 2.10. Thus, the emphasis on procedural elements represents a shift in the content of the 2008 and 1992 Agreements.

Second, the 2008 Agreement underscores a financial and technical cooperation (PrE3) only implied in the 1992 Agreement. There are 12 clauses in the 2008 Agreement that mention interstate technical and/or financial cooperation—nearly as many articles as comprised the 1992 Agreement. Conversely, there are only two articles in the 1992 Agreement regarding technical and financial cooperation. The cooperative motivations

that cause the psychological-to- procedural reorientation may have also influenced this shift. The first agreement is focused on water rights, water allocation, and water use, all of which are internally-oriented foci for the benefit of the fledgling nation-states. The second agreement is more outward-oriented, with language reflecting the shared and interdependent relationship between riparians. Cooperation is naturally a theme that accompanies an outward orientation.

Third, the 2008 Agreement shifts much more towards consideration of the environment than the 1992 Agreement. This is of little surprise, considering that climate change and environmentalism had begun to plant deep roots in the upper echelons of global governance by the mid-2000, emerging in rhetoric at the highest levels. In the 1992 Agreement, mentions of the environment or ecosystems are directly or implicitly linked to economic and social advantages. In the 2008 Agreement, the frequency of mentions and the tone towards the topic changes to reflect the looming environmental crisis of Central Asia. That being said, the provisions within the 2008 Agreement are not specifically framed as a response to the environment, but rather as conscientious of the environment.

Fourth, the riparians added communication channels and institutional learning elements to the 2008 Agreement, in contrast to the brevity of the 1992 Agreement. The 2008 Agreement has seven clauses regarding communication, compared to zero in the 1992 Agreement, and three regarding institutional learning, compared to zero in the 1992 Agreement. The changes reflect what was likely the actual situation, in which communication and feedback-loops organically developed through trial and error. For example, consider the clause establishing Russian as the working language of the ICWC.

There is no language outlined in the 1992 Agreement, likely because former working relations had been determined by the greater Russified framework of the USSR. When the next generation of officials rose into the ICWC, however, they brought with them new frameworks of national identity and linguistic differences; hence, a language clause was necessary for framing the communication of the ICWC.

Textual Analysis: Overlooked Provisions

What is present in the texts is only half the picture; just as important to understanding and evaluating the agreements is what is absent. Absent text can imply intentionality, subconscious dispositions, accidental overlooks, or ignorance towards the importance of a clause. However, what was most surprising during the analysis of the 1992 and 2008 Agreements was that no provision from the provision list was entirely overlooked. Though a handful of provisions were left off of each agreement, the entire list is represented between both agreements. Therefore, this section analyzes “overlooked provisions” to be areas where provisions are too weak to improve resiliency.

The first of these overlooked provisions is enforcement. Clause 2.6 in the 2008 Agreement says that the ICWC will prepare “possible losses compensation mechanisms” for shared water use, suggesting that a noncompliant riparian would be obligated to compensate the injured riparian for losses. Likewise, article 12 in the 1992 Agreement says that the parties commit to create a “mechanism of economic and such other responsibility for the violation of the agreed regime and limits,” but there is no formal agreement indicating that any such mechanism was created. The textual hints of

enforcement suggest that the Central Asian states understand its importance, but are unwilling politically and sovereignly to commit to the risk that accompanies enforcement.

Flexibility is also weakly represented within the agreements. The sole flexibility mechanism is in article 8 of the 1992 Agreement, which says the future ICWC will annually evaluate water use limits and actual water availability in order to allow for adaptation, or “correction,” at the water reservoirs, allowing some degree for implementing short-term adaptations. This sole provision underscores the weakness of flexibility in the agreements for two reasons: first, the flexibility mechanism is solely limited to adapting water allocation from water reservoirs; second, the flexibility is limited to the seasonality of water releases, thereby limiting year-round flexibility. Even more unfortunate is the flexibility within the 2008 Agreement. Though there is emphasis on collaboration, cooperation, and coordination, the new agreement has no mention of a mechanism specifically for adapting to unforeseen circumstances. This arrangement, especially when compared to the U.S.-Mexico minutes process, in which riparians can create self-governing provisions as needed, or when compared to the literature on the need for flexibility in basin management, limits innovative adaptability in Central Asia.

Third, and alarming through the lens of resiliency, are the weak dispute resolution mechanisms expressed in both agreements. Article 13 of the 1992 Agreement delegates “all disputable matters” to the heads of the water agencies for resolution. Similarly, clause 2.17 of the 2008 Agreement delegates “disputes and disagreements” for “investigation” to the ICWC, with conflict escalation vaguely assigned to “a special commission to establish facts, as well as setting procedures for liabilities.” Taken together, the contradictory dispute resolution mechanisms are even less coherent.

Syntactical Analysis

The syntactical analysis analyzed specific units of the messaging through a focus on words and word choice (Frey et al., 1999). The hypothesis of the analysis was that the frequency of words used in each of the agreements would reveal differences in the ultimate purpose of the respective documents (this hypothesis is further expanded in the following section, in which words are weighted according to the length of the document by percentage). A list of fifty words, each with connotations identified as relevant to the provision list, were compared. The selected words have enhancement, mitigation, procedural, psychological, substantive, or resiliency connotations, and include nouns, adjectives, and verbs.

The methodology of this analysis began with using translations directly from the ICWC site.⁹ These translations were not the translations used in the textual and thematic analyses above, but were selected under the assumption that the ICWC translators have similar communication goals and may have utilized similar words. To balance vocabulary differences, however, the author identified and paired synonyms together (i.e. Shared and Joint) to better represent both agreements. Additionally, the words within the ICWC—Interstate Commission for Water Coordination—were excluded from word counts when within the name of the ICWC.

The findings speak to the character differences of the agreements. In the chart below (See Table 2.3), word findings of significance are highlighted: shared / joint, international, interstate, shall / will / must, environmental / ecological, flexible /

⁹ See: <http://www.icwc-aral.uz/statute4.htm>; <http://www.icwc-aral.uz/statute1.htm>

flexibility, law / legal, economic, develop-(-ment, -ed, -ing, -s), information, improv-(-ement, -ed, -ing, -es), rational use / quotas. These words were highlighted because of their connotations to the content of the agreement or because of their frequency.

Shared / Joint: This pairing is noteworthy because it shows the dramatic shift in expectations from the riparians. The 1992 Agreement used the terms a total of 6 times, whereas the 2008 Agreement used the pairing 24 times. This underscores the analysis that the 1992 Agreement was inward-focused, and the 2008 Agreement was outward focused.

International / Interstate: The use of these words also shifts dramatically between the two agreements. The pair are employed 19 times in the 2008 Agreement, versus only 4 uses of interstate in the 1992 Agreement. Like shared and joint, the use of international and interstate reflects the outward momentum of the 2008 Agreement.

Shall / Will / Must: The writing style employed by each agreement framed expectations of riparians through differing strength of language. In the 1992 Agreement, the words shall, will, and must were used 11 times, whereas “will” was used only once in the 2008 Agreement. Instead, the 2008 Agreement framed the expectations of the ICWC through various verb usage, which gives a softer tone overall to the document.

Environmental / Ecological: Mirroring many of the findings above, the use of environmental and ecological was higher in the 2008 Agreement than the 1992 Agreement. This also reinforces the textual analysis above that the global political sphere was much more contentious of environmental impacts in 2008 than in the 1990s.

Flexible / Flexibility: The observation that neither agreement employed the term flexible or flexibility, including synonyms, represents a concerning trend in Central Asian water management. Mechanisms for flexibility are critical to regional resiliency.

Law / Legal: The 2008 Agreement used law and legal 4 times, whereas the 1992 Agreement never did. This may reflect an interest in engaging with outside standards and organizations—the outward orientation—that was absent in negotiations in the 1990s. It also employs an external standard as a means of determining fairness.

Economic: Both agreements used the term economic with relative frequency: 5 uses in the 2008 Agreement, and 6 uses in the 1992 Agreement. The frequency reflects the national priorities, identified in the preamble of the 1992 Agreement, of growing their economies, raising the standard of living, building up infrastructure for development, and improving overall GDP. Regional development has improved in the past quarter century, as exemplified by GDP changes, but not at a universal rate.

Information / Scientific / Monitor / Research / Facts: These five terms are paired together because of the connotations that accompany them, connotations of truth-finding and transparency. The group was employed 14 times in the 2008 Agreement, but only 4 times in the 1992 Agreement. The implications are that Central Asian riparians believe scientifically-grounded evidence is a fair standard upon which to make decisions.

Develop- / Improve-: These verbs represent forward momentum, continuous engagement, and critical consideration of process. To develop and improve requires cooperation and communication when things go well and when things go poorly. It should be of little surprise, then, that the words were used 22 times in the 2008 Agreement and 0 times in the 1992 Agreement. It is a stark example of the limited scope in 1992, as well as the positivity in 2008.

Table 2.3 Syntactical Analysis of Selected Words in 2008 and 1992 Agreements

Syntactical Analysis of 2008 and 1992 Agreements					
Word/s	# in 2008	# in 1992	Word/s	# in 2008	# in 1992
Shared / Joint	18 / 6	1 / 5	Rights	1	3
International	9	0	Interstate	10	4
Protection	6	6	Rational Use	0	4
Equal / Parity	1 / 0	2 / 2	Equitable	2	1
Proportion-	1	0	Ensure	4	3
Cooperation	2	0	Respect-	1	1
Shall / Will / Must	0 / 1 / 0	8 / 2 / 1	Water	66	47
Management	10	3	Responsibility	2	1
Releases	7	3	Together	5	1
Problems / Issues	2 / 2	2 / 2	Mitigate	0	1
Environmental	4	0	Ecological	2	1
Allocation	2	3	Flexible / Flexibility	0	0
Dispute	1	1	Users	3	1
Compliance	0	1	Law- / Legal	1 / 3	0
Economic	5	6	Stabilize	0	1

Liability	0	1	Coordinat-	6	3
Social	1	0	Establish (verb)	4	1
Established (adj.)	3	3	Develop-	15	0
Facts	1	0	Policy / Rules	5 / 0	2 / 1
Scientific	4	2	Research	3	1
Information	5	1	Monitor	1	0
Improve-	7	0	Strict-	0	2
Use	17	14	Regulation	2	2
Control	4	1	Interests / Needs	1 / 3	3 / 1
Integrate-	1	2	Quotas	0	4

Scaled Word Frequency

My analytical hypothesis purported that analyzing the frequency of words in each of the documents would reveal differences in the purpose of the respective documents, by examining actual versus relative use of certain words. While the syntactical analysis revealed insight into the changes between the documents, conclusions about the *purpose* of the documents are implicit. This final analysis scales word use to word count, to give a proportionate picture of how frequent a word was in comparison to the overall amount of words within each document. The methodology was drawn from frequency analysis, which studies the frequency of words and phrases within a given context. To scale the usage, the frequency of the word was divided by the agreement word count, and then

multiplied by 1000 to give a full number. So, for example, if “word” has been used eight times in this paragraph of 135 words, then the actual frequency is 0.059%. Multiplied by 1000, that percentage changes to 59.2, which is easier for comparison.

The scaled list is comprised of key words from the syntactical analysis above, but reframes their comparative significance (see Table 2.4). Take, for example, the use of the word “interstate.” The 2008 Agreement uses the word 10 times, and the 1992 Agreement uses the word 4 times. However, when the frequency is divided by the overall word count, the scaled frequency of the word is equal. The 2008 Agreement employed it more in actual terms, but not in relative terms. Similarly, consider the use of the word “economic.” It was used 5 times in the 2008 Agreement and 6 times in the 1992 Agreement. The scaled use, however, implies that the word was much more important in the 1992 Agreement, as it is three times more frequent in relative terms. Finally, the use of shared and joint is not as imbalanced as the syntactical analysis first suggests. Though much more frequent in actual terms in the 2008 Agreement, when scaled to consider overall word count, it is only 1.6x more frequent in relative terms than the 1992 Agreement.

The implications of scaled word frequency raise new questions about the significance of wording. Does content matter as much as intent? Does content matter as much mechanisms for amending or adding content? Does the length of an agreement, instead of word choice, increase the likelihood of an agreement’s success?

Table 2.4 Scaled Frequency of Word Use for Comparison between Agreements

Word/s	2008 Use Scaled	1992 Use Scaled	Comparative Frequency
Shared / Joint	11.2	7	1.6x more frequent in 2008
International	4.2	0	-
Interstate	4.7	4.7	Equal
Shall / Will / Must	0.5	12.8	25.6x more frequent in 1992
Environmental	1.9	0	-
Law / Legal	1.9	0	-
Economic	2.3	7	3x more frequent in 1992
Develop-	7	0	-
Information	2.3	1.2	1.9x more frequent in 2008
Improve-	3.3	0	-

Analyses Discussion

The following three sections will probe deeper into the implications and discussions stemming from the analyses. The first section will overview expected and unexpected findings, to raise the question of whether provisions are significant to a treaty's success. The second section will specifically address whether the provisions impacted the resiliency of the 1992 and 2008 Agreements. The third and final section will more broadly discuss the problems and constraints of the analysis and the hypothesis.

Analyses Discussion: Expected and Unexpected Findings

The analysis of the 1992 and 2008 Agreements highlighted findings both expected and unexpected. On one hand, the agreements reflected expected changes in size and tone. Regarding size, it is of little surprise that the 2008 Agreement was larger and more robust than its predecessor. Had the 1992 Agreement been sufficient, there would have been no need for an updated agreement, as the 1992 Agreement's amendment mechanism would have been appropriate for minor changes in governance. Therefore, the size increase of the 2008 Agreement is a logical finding. Regarding tone, the historical context of the 1992 Agreement established the expected tone, as extreme and volatile shifts in governance and infrastructure impacted the inward-focus of negotiators. The 2008 Agreement, conversely, was created in a time of relative regional stability.

In terms of unexpected findings, the breadth of provisions and the relative frequency of words illuminated the surprising and complex nature of agreement creation. First, it was surprising that the full breadth of the provision list was incorporated within the two agreements. The weight of this finding will be discussed in the next section, to determine whether the inclusion of the provisions has direct impact the resiliency of the agreement. Second, the relative frequency of words, versus the actual frequency of words, was surprising. Throughout the early stages of the analysis, it was easy to assume that the findings would support the superiority of the 2008 Agreement. However, the relative frequency of words suggested that the 1992 Agreement prioritized many themes as much, and even more, than the 2008 Agreement.

However, the most significant extraction from the analysis is the implication that the content of an agreement matters less than its implementation. Though logical, the

underlying assumption has been that content determines the success of an agreement—that the right provisions will determine the resiliency of an agreement. If the treaties combined included the entirety of the provision list, and if the treaties independently included the majority of the provision list, then why is Central Asia a hotbed of latent water conflict? The next section will continue this discussion, with a deeper examination of the impact of provisions on resiliency and a discussion of how success in this case study is measured.

Analyses Discussion: Did the Provisions Impact the Resiliency of the Agreements?

The agreement analyses raised a distressing question about the impact of provisions, and even content more generally, on the success of an agreement. In this context, the goal is resiliency to climate change impacts and success is the measured ability of a basin's management structures to withstand negative trajectories. In evaluating the impact of provisions on the resiliency of the 1992 and 2008 Agreements, the success of the Central Asian case study is surmised implicitly and defined explicitly. Implicit success is determined through content trends in literature, media, and NGOs, and their opinions on Central Asian water conflict and management. Explicit success is determined by comparing factors of Central Asia to indicators of resiliency (Crow, 2018). Unfortunately, the findings from both suggest that success in Central Asia is far from a benchmark for provisions.

In the 25 years that Central Asia has managed its water resources through agreements and the ICWC, a large body of literature has remarked on its overall inefficiencies. In 2008—prior to the 2008 Agreement—Beatrice Mosello wrote, “The

imposition of a half-hearted version of Soviet central planning on the fractious Central Asian states has not proven a recipe for success” (2008, 161). Mosello later quotes the International Crisis Group, who in 2002 complained that the ICWC was “a club for water officials that makes no real decisions” (ICG, 2002, 9, qtd in B. Mosello, 2008, 162). Among other concerns, Mosello underscores issues with the pre-2008 ICWC such as its possible bias stemming from its headquarters in Uzbekistan, its weak institutional capacity and technical expertise, its limited budget,¹⁰ and the “state of paralysis” drawn from its consensus-based authority (2008, 163).

More recent articles continue to reiterate the shortcomings of the ICWC and basin management in Central Asia overall. An article by Yegor Volovik for the UNDP in 2011 identified six major gaps in regional agreements. His report reads similarly to the comparative analysis on the 1992 and 2008 Agreements above, identifying gaps in monitoring and evaluation, climate change issues, information exchanges, enforcement mechanisms, the water-energy dilemma for upstream riparians, and, most tellingly, a “regional cooperation and coordination platform” (Volovik, 2011, 23). Volovik writes, “There have been some attempts...to establish a cooperation/coordination platform to discuss water related issues but they have not materialized in effective legislative, institutional, and economic means for cooperation” (2011, 23). The question stemming directly from Volovik’s analysis is what—if not a cooperation/coordination platform—is the ICWC? And if nothing effective has materialized, then why has the ICWC failed in

¹⁰ Mosello writes that only Uzbekistan and Turkmenistan fulfill their financial obligations.

its mandate “to deal with joint solution of issues related to shared water management”? (2008 Agreement).

Success can also be measured through factors associated with community resiliency (Crow, 2018, see Table 2.5). These factors include infrastructure and services, community competence and agency, equal access to resources, values and beliefs that benefit the overall community, and governance. The theory is that these factors are both indicators and impetus for resiliency; if a system has a strong representation of these factors, then it is more resilient. However, when these categories are placed beside the Central Asia case study for comparison, it is evident that resiliency is not a guiding concept in water management.

Table 2.5. Factors Associated with Community Resiliency (Source: Crow, 2018)

Factor	Author, year	Desired condition for resiliency
Economic development/stability	Norris et al. (2008); Gooch, Rigano, Butler, and Cullen (2010); Maclean, Cuthill, and Ross (2014)	Robust and diverse state of the local economy
Infrastructure/services	Buikstra et al. (2010); Gooch et al. (2010); Maclean et al. (2014)	Numerous and functioning built physical assets and related services in a community
Social capital/networks	Buikstra et al. (2010); Norris et al. (2008); Maclean et al. (2014)	Strong and meaningful social relations and connections
Information/communication/knowledge/skills	Norris et al. (2008); Gooch et al. (2010); Maclean et al. (2014)	Available information and knowledge and efficient mechanism of communicating and sharing them
Community competence/agency	Norris et al. (2008); Magis (2010); Davidson (2010); Matarrita-Cascante and Trejos (2013)	Existing ability to learn and work together flexibly and creatively towards the overall community good
Active agents/leaders	Magis (2010); Buikstra et al. (2010)	Presence of numerous, diverse, and responsible individuals/organizations leading efforts
Equality/equal access to resources	Magis (2010); Matarrita-Cascante and Trejos (2013)	Existing ability of all community members to gain access to and utilize community resources
Participation/collective action	Magis (2010); Kulig et al. (2013)	Existing and broad involvement of community members
Values and beliefs/disposition	Kulig, Hegney, and Edge (2010)	Existing codes of conduct geared toward the overall community wellbeing
Governance/local institutional arrangements	Gooch et al. (2010); Kulig et al. (2013); Matarrita-Cascante and Trejos (2013); Maclean et al. (2014)	Robust, responsive, and adaptable governance system/institutional arrangements

For example, resiliency has been tied to well-functioning infrastructure and services (Buikstra et al., 2010, see Table 2.5). Yet, as discussed in the conflict analysis above, the crumbling infrastructure installed by the Soviet Union loses up to half of all irrigation water in Uzbekistan (Ilkhamov, 2017) and is serviced by a weak network of water user associations (Anarbekov and Mukhamedova, 2017, 16). Similarly, equal access to resources is a factor in resiliency (Magis, 2010; see Table 2.5). Yet, the weak infrastructure and embroiled tensions of ethnicity in the Ferghana Valley create real and perceived horizontal inequalities between groups (Kreutzmann, 2016).

Community competence and agency—meaning the existing ability of a community to collaborate in flexible and innovative ways for mutual gain—is another factor associated with resiliency (Norris et al., 2008, see Table 2.5). In Central Asian border communities, however, communities have frequently forsaken collaboration for conflict escalation, including frequent violence (see Appendix A for a timeline of Central Asian water conflict). Similarly, another factor for resiliency is community values and beliefs, or the norms that promote community wellbeing (Kulig, Hegney, and Edge, 2010, see Table 2.5). The historical quarrels amidst border communities, however, point to weak or nonexistent resiliency in the Aral Sea Basin.

Finally, multiple authors (Gooch et al., 2010; Kulig et al., 2013; Matarrita-Cascante and Trejos, 2013; Maclean et al., 2014; see Table 2.5) underscore the importance of governance and local institutional arrangements in determining resiliency. Resilient governance is defined as “robust, responsive, *and* adaptive” (Crow, 2018, emphasis added). Yet, these adjectives are rare, if not wholly absent, from discussions on

Central Asia's water governance. On the contrary, the system has been described as "legal nihilism" (Abdullaev et al., 2010, 1030).

The implication of this discussion is that the provisions failed to provide resiliency in the 1992 and 2008 Agreements. The analysis implies that even when the content of an agreement satisfies the provisions identified in the literature, the *implementation* of the agreement—or lack thereof—may rupture the momentum of cooperation, flexibility, stability, and other factors foundational to resiliency, which were established in the treaty's language through provisions. In other words, implementation is conditional for the success of provisions. Now the question is, if the perfect agreement is insufficient for creating climate change resiliency, what will?

Analyses Discussion: Discussion of Provisions and Research

The research behind provisions and the case study were thorough but far from comprehensive, leaving space for critique within the findings and outcomes, and also for areas of future research. First, provisions raise potential questions about their interconnected nature, relevance to vertical tiers of governance, and completeness. Second, the case study did not consider the influence of major external pressures, power between riparians, or the absence of a strong enforcement mechanism in its conclusion that provisions failed to provide resiliency. And finally, the inclusion of implementation as a provision was not considered until the conclusion of the analyses.

Provisions

Regarding provisions, the interconnected nature of provisions was not considered in the analysis of the agreements' effectiveness. For example, Keohane and Martin (1995) argued that enforcement should be coupled with monitoring to be more effective (qtd. in Greet et al., 2013). There may be strong connections between certain provisions that negate or minimize the impact if not paired together. If so, weak basin management may be tied to the combinations of content in the agreements, which would undermine the above conclusion that implementation is conditional for the success of provisions. Further research is needed to determine whether the provision list should be reformed into a provision network, with linked provisions critical to the one another's success.

Provisions were also assumed to be universal within a basin. The case study did not consider that some provisions may be more relevant at different tiers of governance. If vertical integration extends from the United Nations to the household, then it is logical to assume that some provisions will have more or less relevance along the continuum of governance. As such, further research is needed in identifying the impact of provisions within vertical integration.

Additionally, an assumption in applying the provision list to the case study was that the provision list is complete, fully representing the substantive, psychological, and procedural needs of parties. It is possible that the provision list is incomplete. If so, the Central Asian case study may have significant holes in its 1992 and 2008 Agreements, which could explain its poor record of water management.

Case Study

Regarding the case study, there are two potential weaknesses in the analysis and conclusion. First, the absence of a strong enforcement mechanism was identified, but no conclusion was drawn that determined whether or not enforcement is critical to the success of an agreement. Further research is needed on the significance of enforcement and its relationship to compliance. Assuming that enforcement is a critical provision, it may explain why Central Asia has weak implementation of water governance.

Second, the case study did not consider the element of power in riparian interactions. In the US-Mexico Commission, for example, stability in the flexibility mechanism may be due to the huge power imbalance – the US, as both the upstream riparian and the global hegemon, dwarfs the capabilities and desire of Mexico to disrupt cooperation. In Central Asia, on the other hand, the upstream riparians are Kyrgyzstan and Tajikistan, both of whom are poorer and smaller than downstream riparians Kazakhstan and Uzbekistan. The latter riparians have large export-economies in oil and cotton, respectively, with GDPs well above those of the former riparians. Some authors have addressed the influence of power in shared basins (see Lee and Mitchell, 2010), but more research is needed in identifying how provisions and/or implementation are impacted by various power arrangements.

Third, the case study did not consider two external pressures on the water agreements. First, Afghanistan is an upstream riparian who is absent from 1992 and 2008 Agreements, despite having potentially significant impact on water flows and allocation. Afghanistan was typically not included in the literature on Central Asian water governance, though regularly identified as a potential issue. Further research is needed on

the impact of Afghan water use on Central Asian water agreements. Second, the case study did not address the pressure of water infrastructure in context of the 1992 and 2008 Agreements. Infrastructure was thoroughly discussed in the conflict analysis, but only discussed in generic terms of “development” within the agreements. More research is needed to determine whether a provision addressing specific regional problems, such as infrastructure in Central Asia, would positively impact the success of an agreement.

Implementation

From the case study analyses, implementation was identified as the likely cause of Central Asian governance issues. As such, provisions guiding the implementation of an agreement were not considered until after the research was complete. Such provisions could have included research into mechanisms for jump-starting cooperation. Further research is needed in determining whether a provision can directly influence the implementation of the agreement, which could then influence the resiliency of a basin, or whether implementation is inherently separate from, though dependent upon, an agreement. If so, there may be additional procedural provisions to guide riparians in ensuring that their agreement is implemented in a resilient manner resiliently.

Analyses Discussion: Conclusion

The preceding three sections examined the expected and unexpected findings, determined that provisions failed to provide resiliency in the greater Aral Sea Basin, and identified areas for further exploration pertaining to provisions, the case study, and implementation. Overall, the conclusion is that expectations for provisions did not align

with the findings of the research: the provision list was well represented between the 1992 and 2008 Agreements, yet failed to provide resiliency in Central Asian water governance. Though there are possible critiques of the research, the outcome presented is that implementation is as important, if not more important, to resiliency than treaty content.

Rejected Hypothesis

The findings from the analysis of the 1992 and 2008 Agreements strongly suggest that the hypothesis, which tied provisions to climate change resiliency, is rejected. The provision list purported that the provisions would improve basin management despite culture, geography, and political structures, and, when used in the majority, would increase the resiliency of an agreement to withstand climate change. The hypothesis further outlined resiliency theory as a worthwhile goal because of its positive reorientation of climate change impacts.

However, in response to the elements of the hypothesis, the provision list has not appeared to improve basin management in Central Asia. There is no reason to believe that the provision list has harmed basin management, but it is evident that the impact of the provision list is contingent upon successful implementation of an agreement.

Additionally, the entire provision list was represented between the two agreements, yet the provision list did not appear to increase the resiliency of the agreements to withstand climate change. Again, there is little reason to believe that the provision list negatively impacted the resiliency of the agreements, but there is only fractured evidence that the greater Aral Sea Basin is more resilient because of the provisions. So, to return to the

question raised at the end of the Mexico-U.S. flexibility mechanism discussion, what is the balance between articulating the perfect agreement and implementing resilient, productive basin management?

Conclusion

There is little doubt that giant rifts in international treaties are coming: climate change will impact preexisting water agreements as it forces changes in the hydrologic cycle. Such shifts threaten to bring increased conflict over shared resources, as riparians fail to adapt to new water circumstances. Addressing these eventualities will require resiliency within transboundary water agreements. Yet, how to promote climate change resiliency remains vague, at best.

The assumption that incorporating a specific array of provisions within a water agreement to create mechanisms for adapting to climate change is not uncommon. This thesis began by extracting provisions from the literature to propose a comprehensive provision list, comprised of twenty provisions for enhancing cooperation and mitigating conflict in a way that addressed the procedural, psychological, and substantive interests of riparians. The hypothesis was that this provision list, when included in a water agreement, would ensure climate change resiliency. However, the conclusion is that provisions may promote resiliency, but do not ensure resiliency.

When the provision list was applied to the case study, this hypothesis was rejected. The case study considered two of Central Asia's water agreements, one from 1992 and the other from 2008. Central Asia is a region shaped by latent water conflict stemming from historical legacies and horizontal inequalities, and also faces severe

climate change impacts due to its glacier-fed rivers. Through textual, syntactical, and frequency analyses, the agreements revealed that the provision list is, overall, represented in the two agreements. This prompted questions about the significance of the provision list, and whether implementation of an agreement is more relevant to climate change resiliency than the content of an agreement.

The initial hypothesis that climate change provisions promote resiliency was ultimately rejected. Instead, two new questions were raised for future consideration. First, what is the balance between articulating the perfect agreement and implementing resilient, productive basin management? And, similarly, if the perfect agreement is insufficient for creating climate change resiliency, what will?

To conclude, the importance of promoting strong, resilient agreements for withstanding the pressures of climate change cannot be understated. As writer James Cascio articulated, “Foresight turns out to be a critical adaptive strategy for times of great stress” (Cascio, n.d.). Irrespective of *how* resiliency is implemented within water governance, the intentionality to thrive despite the pressures of climate change provides a forward-orientation for designing and guiding water agreements.

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Appendices

Appendix A

Timeline Highlighting Water Conflict in Central Asia

The Pacific Institute Water Conflict Chronology Timeline gives a picture of water conflict and violence in Central Asia since the 1990s (World Water).

- The first record of violence over water was in the Ferghana Valley, in 1990, which led to the death of 300 people on the Kyrgyz and Uzbek border.
- In 1997, 130,000 Uzbekistani troops guarded reservoirs between Kyrgyzstan and Uzbekistan. At the same time, Uzbekistan cuts off 70% of water flowing to Kazakhstan, which instigates a riot by Kazakh farmers.
- In 1999, Tajikistan flooded water from the Kairakum reservoir without giving notice or consultation, in a move that resulted in significant cotton losses to Kazakhstan farmers.
- In 1999, Kyrgyzstan halted flows to Kazakhstan for its failure to reciprocate coal for water, as laid out in a previous agreement. A year later, in 2000, Uzbekistan also cut off water to Kazakhstan for non-payment of debt.
- In 2001, Kyrgyzstan declares water a commodity and began charging its downstream riparians for water. Reciprocally, Uzbekistan halts all natural gas deliveries for Kyrgyzstan's failure to comply with its reciprocal resource trade.
- In 2008, border disputations between Kyrgyzstan and Tajikistan lead to water conflicts along the border. Tajik villagers crossed into a Kyrgyz district to remove a dam, which later resulted in Kyrgyzstan blocking irrigation water to Tajikistan in the growing season.
- In 2012, escalatory rhetoric over the proposal of dams in Central Asia heightens discord over water. The Kambarata-1 dam in Kyrgyzstan and the Rogun Dam in Tajikistan would impact water supplies for the downstream riparians. Uzbekistan's president Islam Karimov threatens that the dams could escalate relations into wars, and resultantly cuts off natural gas deliveries to Tajikistan.

- In 2013, Kazakhstan and Kyrgyzstan have a water dispute between villagers, in which Kyrgyz villagers blocked irrigation water flowing to Kazakh farmers.
- In 2014, border forces from both Kyrgyzstan and Tajikistan were injured over a dispute regarding a small dam and electricity substation.

Appendix B

The 2008 and 1992 Agreements

The Interstate Commission for Water Coordination of Central Asia, 2008, and the Cooperation in the Field of Joint Water Resource Management and Conservation of Interstate Sources, 1992, are attached for consultation of the agreements in the English translation.

Statute of Interstate Commission for Water Coordination of Central Asia

1.1. The Interstate Coordination Water Commission of Central Asia (ICWC) is created by the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan, Turkmenistan and the Republic of Uzbekistan according to Agreement on co-operation in shared management of international water resources use and protection adopted by Heads of State on 18th February 1992 in Almaty.

1.2. By the decision of the Heads of State of Central Asia of March 26, 1992 and April 9, 1999 and the decision of IFAS Board of March 27, 2004, ICWC and its executive bodies are annexed to the International Fund for Aral Sea Saving (IFAS) and rank as international organizations.

1.3. ICWC in its activity is led by bi- and multilateral agreements between the State-Founders on water resources use from interstate sources, by Decisions of IFAS Board and by the present Statute.

1.4. ICWC is a regional body of the Central Asian states to deal with joint solution of issues related to shared water management, effective use and protection in the Aral Sea basin and to implement of commonly elaborated programs following the principles of collectivity and mutual respect of parties' interests.

1.5. ICWC and its executive bodies implement a set of measures and procedures ensuring equitable water allocation along the interstate sources, taking into account nature needs and future development.

1.6. Any other state may join ICWC as a member or an observer upon consent of the Governments of State-Founders.

II. Main objectives

The main objectives of ICWC are as follows:

2.1. Elaboration and implementation of a regional policy of efficient shared water use and protection in order to meet social, economic and environmental needs of the State-Founders on equitable basis, as well as development and implementation of joint programs for water supply improvement in shared basins in the region.

2.2. Shared water management in the Aral Sea basin by applying IWRM principles.

- 2.3. Elaboration and approval of annual limits of water withdrawals from shared sources for State-Founders and supervision over their observance; planning and control of large interstate reservoirs operation regimes, water allocation management under actual flow probability and water-economic situation.
- 2.4. Ensure annual releases for environmental protection and the Aral Sea and sanitary releases along canals.
- 2.5. Development and implementation together with ICSD of regional environmental programs related to the Aral Sea desiccation and water sources exhausting, including catchment zone and wetlands.
- 2.6. Preparation of recommendations to the Governments of State-Founders on the development of uniform pricing policy and possible losses compensation mechanisms related to shared water and energy use, as well as on legal framework of shared water use.
- 2.7. Coordination and control over implementation of joint research aimed at scientific and engineering solution of regional water-related problems and of regional projects, with the use of available scientific capacities of the State-Founders and implementation of the results achieved.
- 2.8. Preparation of projects and initiation of work on improvement of active international agreements in area of shared water management.
- 2.9. Render assistance to the Governments of State-Founders in cooperation with international organizations and institutes.
- 2.10. Development and operation of unified regional, basin and national information systems on water use, on dissemination and exchange of information related to water resources and their use by the State-Founders.
- 2.11. Facilitation and coordination of relationships between the regional, national water organizations and the regional, national hydrometeorological services; initiation of regional programs and works on the improvement of monitoring system and hydrometric provision.
- 2.12. Reconciliation of releases from reservoirs for irrigation needs with the Coordination Dispatch Center “Energy”, with consideration of hydropower generation requirements, as well as coordination of actions with national ministries and departments of Central Asia - electric energy producers.
- 2.13. Facilitation of corporate affairs in developing and implementing water-conservation technologies, advanced irrigation methods and technique, modern facilities for water measurement and automation, in designing and developing general metrological system, and accrediting metrological services and in other measures promoting better water use.
- 2.14. Elaboration of joint programs for prevention, early warning and liquidation of consequences from emergencies and disasters related to operation of interstate hydrostructures.
- 2.15. Establishment and development of a training system at national and regional levels in order to increase skills of water-management organizations’ staff and of water users.

- 2.16. Strengthen financial, material-technical and legal bases and scientific and technological capacities of ICWC executive bodies.
- 2.17. Investigation of disputes and disagreements between shared water users; if necessary, development of a procedure for creation of a special commission to establish facts, as well as setting procedures for liabilities.
- 2.18. Investigation of notification by one of the Parties about construction of new water structures impacting water regimes in shared waterways.
- 2.19. Elaboration of country proposals on construction, reconstruction and operation of interstate water structures, with cost sharing among the Parties.

III. Structure and organizing the activities

- 3.1. ICWC members are comprised of leaders of national water ministries or departments of State-Founders or of authorized representatives of country Governments.
- 3.2. ICWC meetings are held on a quarterly basis, by turns in each of State-Founders under chairmanship of ICWC member of the respective state. The host-country bears responsibility for timely approval of meeting dates and submission of agreed agenda to ICWC members by executive bodies in due time.
- 3.3. Extraordinary ICWC meeting can be held upon initiative and with agreement of the Parties.
- 3.4. ICWC's decisions are made on consensus basis.
- 3.5. ICWC may make "Protocolar decision" on individual questions.
- 3.6. ICWC members, leaders of ICWC executive bodies and of international organizations who have made considerable contribution to ICWC activities, would be awarded a title of "ICWC Honorary Member" and a breastplate of standard form. The ICWC Honorary members can participate in ICWC meeting and have a right of advisory vote.
- 3.7. ICWC establishes its executive bodies for fulfillment of set tasks and provides financing of their activities, as well as of approved programs and measures at expense of State-Founders and, if necessary, changes duties of the executive bodies or ceases their activities.
- 3.8. ICWC may crease special interstate investment funds for shared financing of work related to regional water sector development and for fulfillment of other tasks as mentioned in given Statute.
- 3.9. The costs of ICWC meetings on the spot are covered by the host-country.
- 3.10. The working language of ICWC is Russian.

IV. Rights and obligations

- 4.1. Annually ICWC approves water-withdrawal limits from shared water sources (for a hydrological year with division into growing and non-growing periods) for State-Founders, with consideration of foreseen flow probability and established releases to the Aral Sea and river deltas. ICWC makes decisions on water-withdrawal limits correction, according to actual water situation.

- 4.2. Based on actual water situation, ICWC permits to BWOs to make on-line water-withdrawal corrections within the established limits, with notification of ICWC members.
- 4.3. ICWC considers and approves activity program of ICWC and its executive bodies (plans of financing, capital investments, research, development and metrology, training activity and other costs), work programs for preparation of draft interstate agreements, international cooperation, for improvement of ICWC and its executive bodies, performs control over work, financing and economic activities of executive bodies.
- 4.4. Decisions made by ICWC regarding regulation, use and protection of shared water are obligatory for all water consumers and users, irrespective of their citizenship or affiliation and ownership form.
- 4.5. The members ensure execution of ICWC's decisions on territories of their respective states.
- 4.6. Leaders, officials and staff of ICWC executive bodies, who have business trips to State-Founders, can enter, leave and stay without visas on territories of these states no more than 30 days provided that they have national passports, service certificates in form approved by the Parties, and travel authorization.

V. Executive bodies

5.1. ICWC executive bodies include:

- Secretariat;
- Basin water organization "Amudarya" (BWO "Amudarya");
- Basin water organization "Syrdarya" (BWO "Syrdarya");
- Scientific Information Center for water related problems (SIC) and its national branches;
- Coordination Metrological Center (CMC) and national organizations;
- Training Center (TC) and its branches.

5.2. ICWC may establish work groups for a certain period of time, with involvement of other economic sectors, to solve individual thematic tasks.

5.3. ICWC Secretariat together with other executive bodies prepared agenda, measures and draft decision for ICWC meetings and performs control over execution of ICWC decisions and receipt of funds from State-Founders for financing of ICWC executive bodies.

5.4. BWO "Amudarya" and BWO "Syrdarya" operate intake structures, waterworks facilities, reservoirs and other interstate structures that are transferred to BWO's responsibilities for temporal operation, make estimates of water use in shared sources, make proposals for setting water-withdrawal limits, depending on water availability in sources for a planned period and ensure delivery of ICWC-set water limits in order to supply with water economic sectors, population and environment in State-Founders.

5.5. On annual basis, BWO "Amudarya" and BWO "Syrdarya" prepare agreed proposals on water releases for nature, Aral Sea and on sanitary releases along canals that should not be used for other purposes. The heads of BWO "Amudarya" and BWO "Syrdarya"

bear personal responsibility for execution of ICWC-set releases to the Aral Sea within the zones of BWO jurisdictions.

5.6. SIC ICWC together with its branches prepares draft decisions and programs on prospective development and implementation of a common regional water policy, on improvement of shared water use and management, common water conservation program, on environmental improvement in the basin, rationale and creation of automated water management systems in river basins, on creation and operation of common regional, basin and national information systems on water and land use; develops draft interstate agreement on shared water management in the Aral Sea basin; analyses water situation in the region and in the world and prepares proposals; upon agreement with ICWC cooperates with international donors and funding agencies; initiates and upon agreement with ICWC coordinates regional project implementation; organizes and provides training activity; organizes and stuffs reference-information fund, prepares and issues periodical and non-periodical publications. SIC ICWC undertakes publishing activity by authority of ICWC.

5.7. CMC ICWC together with national metrological organizations coordinates technological policy and its implementation in area of metrological provision of ICWC programs and decisions on water use, protection and accounting in sources and water systems; organizes joint preparation and use in practice of normative-technical basis of metrological provision for water measurement, conducts integrated policy on water accounting, measurement technologies, automation devices and facilities developed and applied in water sector; organizes and performs work on accreditation, certification and training in area of hydrometry.

5.8. TC ICWC together with its branches trains national water sectors' higher and medium level staff through training workshops on IWRM, national and international water laws, irrigated agriculture and nature management improvement, etc. and ensures equal representation of the region's countries, prepares and publishes essential courseware.

5.9. ICWC executive bodies are legal entities having their independent balances, stamps with their titles in Russian and English, budget, settlement and other accounts. They act according to Regulations (Statues) approved by ICWC.

5.10. The executive bodies may represent ICWC only after agreement by all ICWC members.

5.11. Financing of ICWC executive bodies is made by the State-Founders:

- for upkeep of personnel and basic operations of an executive body; moreover, the costs are shared proportionally to water withdrawals from interstate sources, with obligatory consideration of all efforts made by the executive body on the territory of given state;
- for research, development and metrological work – on the basis of ICWC-approved plan of this work, by each national water department of State-Founder according to territorial affiliation, towards assignments to IFAS;

- financing of Secretariat's activities is made by ICWC State-Founder, which hosts the Secretariat, towards assignments to IFAS;
- financing of SIC ICWC' national branch is made by the State-Founder, which hosts given branch, towards assignments to IFAS.

5.12. The property of ICWC executive bodies (real estate, cars, machinery, equipment and other material and technical values) is not subjected to privatization. Renting is made only upon permission of ICWC.

VI. Order of rotation of the executive bodies and their heads

6.1. The heads of ICWC executive bodies are appointed, with determined term of office and rotation order, and dismissed by ICWC decision.

Location of executive bodies and their redislocation (rotation) are determined by ICWC decision.

6.2. Rotation of ICWC executive bodies is made according to the Provision about order of rotation of executive bodies of the Interstate Coordination Water Commission (ICWC) and their heads.

VII. Order of Statute change or activity cessation

7.1. The Statute of ICWC is reviewed and adopted at ICWC meeting. Changes and amendment to the Statute are inserted in the same way.

7.2. ICWC ceases its activity according to decision of the Heads of State-Founder.

7.3. If ICWC ceases its activity, the property and jointly created assets, as well as structures transmitted to BWOs for temporal operation will be transferred to State-Founders based on their belonging and according to established order of their creation.

7.4. This Statute enters into force since the date of its signature.

Done in the city of Almaty on 18th of September in 2008.

For the Republic of Kazakhstan	A. Ryabtsev
For the Kyrghiz Republic	B. Koshmatov
For the Republic of Tadjikistan	S. Yokubzod
For Turkmenistan	K. Ataliyev
For the Republic of Uzbekistan	Sh. Khamrayev

Accessed at: <http://www.icwc-aral.uz/statute4.htm>

The Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan, Turkmenistan and the Republic of Uzbekistan hereinafter referred to as "the Parties",

- guided by the need for coordinated and organized solution of issues related to joint management of interstate water resources and for further pursuing coordinated policy in the interests of economic growth and raising living standards;
- based on the historical community of people living in the republics, their equal rights and responsibilities for ensuring rational use and protection of water resources;
- recognizing interdependence and interconnection of interests of all the republics in dealing with joint use of water resources according to the principles common for the entire region and equitable regulation of their use;
- considering that only integration and joint coordination of actions will enable favorable conditions to deal with socio-economic problems, mitigate and stabilize ecological stress, which originated as a consequence of water resources exhaustion, as well as taking into account that there is imbalance in irrigated land availability per capita in the Republic of Tajikistan, and recognizing potential increase of water supply for irrigated agriculture,
- respecting established structure and principles of water allocation and relying on regulatory documents on allocation of water resources from interstate sources currently in force;
- have agreed upon the following:

Article 1

While recognizing community and integrity of water resources in the region, the Parties shall have equal rights to water use and responsibility to ensure rational use and protection of water.

Article 2

The Parties shall ensure that the agreed procedure and established rules for water use and protection are strictly observed.

Article 3

Each Party to the Agreement shall refrain from actions on their respective territories that might affect interests of other contracting Parties and cause them harm, lead to deviation from agreed volumes of water discharges and pollution of water sources.

Article 4

The Parties shall work together to address environmental problems resulted from drying up of the Aral Sea and set amounts of sanitary water releases for every given year in view of water content in interstate sources.

In case of extremely dry years, a special separate decision shall be made to supply water for areas experiencing severe water scarcity.

Article 5

The Parties will facilitate wide information exchange on scientific and technological advances in the field of water management, integrated use and protection of water resources [as well as promote] joint research to provide scientific and technological inputs and expert appraisals of project plans of water management facilities and economic assets.

Article 6

The Parties agree on joint use of productive potential of the republics' water economy.

Article 7

The Parties decided to establish on a parity basis Interstate Commission for Water Coordination to deal with the issues related to regulation, rational use and protection of water resources from interstate sources, which would be comprised of the heads of water agencies to meet quarterly and as the occasion requires - on the Parties' initiative. The Commission's meetings are held by turns under the chairmanship of the host country's representative in the capital of this country.

Article 8

The Interstate Commission for Water Coordination is authorized to:

- determine water policy in the region, elaborate its key directions taking into account all economic branches needs, integrated and rational use of water resources, and long-term regional water supply program and measures for its implementation;
- elaborate and approve annually water consumption quotas for each republic and the region as a whole, schedules for reservoir operation regimes, their correction according to revised forecasts, depending on actual flow probability and water-economic situation.

Article 9

The executive and interministerial control bodies of the Interstate Commission for Water Coordination are Basin Water Organizations "Syrdarya" and "Amudarya", which must function under conditions that all structures along the rivers and water sources operated by these organizations are the property of the republics and provisionally transferred [to BWOs] without the right of disposal and redemption as of 1.01.1992.

The Basin Water Organizations are financed through allocation of national water agencies on parity and shared basis.

Article 10

The Commission and its executive bodies shall ensure that:

- water releases regime and water use quotas are strictly observed;
- measures for rational water use and conservation, sanitary water releases along the river channels and through irrigation systems (where appropriate), and guaranteed water supply to river deltas and the Aral Sea with a view of environmental enhancement and water quality maintenance, according to achieved agreements, are implemented.

Article 11

Decisions taken by the Interstate Commission for Water Coordination regarding compliance with established water withdrawal quotas, rational water use and protection are mandatory for all water consumers and users.

Article 12

The Parties agreed to elaborate within 1992 a mechanism of economic and other liability for violation of the agreed water use regime and quotas.

Article 13

All disputes shall be settled by the heads of national water agencies, with involvement of third party, if necessary.

Article 14

This Agreement can be amended or supplemented only through collective discussion by all the Parties to the Agreement.

Article 15

This Agreement shall become effective on the date of signing.

The Agreement is signed in Alma-Ata on the 18th of February 1992.

For the Republic of Kazakhstan N.Kipshakbayev

For the Kyrgyz Republic M.Zulpuyev

For the Republic of Tajikistan A.Nurov

For Turkmenistan A.Illamanov

For the Republic of Uzbekistan R.Giniyatullin

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