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The conflict over water resources exploitation and sharing in the Aral Sea Basin is one of the most pressing environmental issues yet to be resolved in Central Asia. The fall of the Soviet Union in 1991 and establishment of the New Independent States (NIS) within the Aral Sea Bain led to conflicting interests vested in water resources with no mediator to solve these water issues. Presently, the Amu Darya and Syr Darya upstream states of Kyrgyzstan and Tajikistan desire to employ water resources for hydropower; while downstream Kazakhstan, Turkmenistan and Uzbekistan wish to continue practicing irrigated agriculture. This scarce and over-allocated resource, facing the needs of a growing population and climate change uncertainties, should be managed collaboratively and sustainably to be able to meet and withstand the upcoming challenges. This dissertation examines water management practices in the face of government regime change both in large and small river basins within Central Asia by analyzing international water agreements, correspondence between water managers, official reports, maps, and other archival documents. The analysis shows the inter-republican dynamics in water sector starting from 1950s up to early 2000s. The analysis of water relations within the Syr Darya Basin shows that there are different approaches to the change in political regime in both large and small basins. The results reveal that conflict over water resources in Central Asia existed long before the fall of the Soviet Union both in the large Syr Darya Basin, as well as within its small tributaries. The Soviet planned economy, along with the basin planning framework, set competition for water between the riparian states. Analysis of the infrastructure construction negotiations in these small shared tributaries showed that the former Soviet Republics used non-cooperative negotiation strategies to outcompete their rivals. This dissertation calls for regional cooperation in water management as it is shown that hydro-political competition in the basin may lead only to short term benefits, on the long run however, it is proven lead to heavy economic, social, political, and environmental costs.

International River Basin Management in the Face of Change: Syr Darya Basin Case Study

by

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Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

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Mariya Pak, Author

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Dr. Aaron Wolf provided guidance for this dissertation. He advised on the theoretical aspects of the dissertation and directed the research towards key informants and/or literature resources. Dr. Wolf critically reviewed papers compiled in this dissertation.

In Chapter II, I developed the framework for analysis. I analyzed the *Correction Note to the Refinement of the Scheme of the Complex Use and Protection of the Syr Darya River Basin* against the theoretical framework and developed a case study. I wrote the first draft. Dr. Juspipbek Kazbekov, Dr. Aaron Wolf, and Dr. Kai Wegerich contributed by their feedback and comments.

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For my parents,
Irina Saidova and Gleb Pak of Khorezm

International River Basin Management in the face of change: Syr Darya Basin case study

Chapter One: Introduction

Water is essential for life; people use it on a daily basis for numerous purposes such as drinking, agricultural production, recreation, sanitation, environmental protection and religious needs. Water resources are unevenly distributed among its consumers, creating places where access to water is limited. In recent decades, the issue of water resources scarcity has become one of the top problems to solve. In 2003 the United Nations General Assembly proclaimed the years 2005 to 2015 as the International Decade for Action, "Water for Life," and set the world's goals on "a greater focus on water-related issues."

The study of water issues and water conflict resolution splits the assembly of world water experts into two groups. First, there are those that believe that water scarcity greatly increases the risk of violent conflicts over the scarce resource (Gleick, 1993; Gleditsch, 1998; Homer-Dixon, 1994). Second, there is the group that believes that water scarcity presents only a very slim possibility for armed conflict over water resources (Allan, 2001; Dannreuther, 2007; Deudney and Mattew, 1999; Elhance, 1999; Hamner, 2008; Jägerskog, 2003; Wolf and Hamner, 2000; Wolf et al., 2006). Some studies show that conflict and cooperation in the water sector go hand and hand, (Alam, 2002; Elhance, 1999; Iyob, 2010; Sojamo, 2008; Wegerich, 2008; Wolf and Newton, 2008; Zeitoun and Mirumachi, 2008; Zeitoun and Warner, 2006) but most agree that due to the change in population and climate, tension over water resources is likely to increase. Some also argue that change in political system may contribute to water conflict as well (Elhance, 1999; Wolf et al., 2003). What this shows is that there is still a need to better understand how a change in the political system impacts water management.

The aim of this study is to analyze changes that took place in the Syr Darya River Basin management after the fall of the Soviet Union in 1991 and the consequent establishment of the four independent republics within the basin. This study focuses on the actions taken to address the change in the political system and assesses the success of their implementation while identifying the reasons for successful or unsuccessful implementation. The study contributes to the international literature on water conflict and cooperation by exploring why some actions addressing change in water management were more successful than the others.

Water conflict and water cooperation: making adjustments in the face of change

The theme of water as a threat to political stability and war became particularly popular in the late twentieth century (Gleick, 1993; Gleditsch, 1998; Homer-Dixon, 1994; Russel and Morris, 2006; Westing, 1986; Remans, 1995). Theorists and practitioners noticed that as resource scarcity increases, the risks of violent conflicts in shared basins increase as well. Consequently, such observations led to depressing predictions that water wars could be a reality in the near future. The statements made by the former UN Secretary Generals, "rhetoric of politicians'" (Wolf, 2007: 260), and numerous publications (Westing, 1986; Remans, 1995; Ohlsson, 1995; Starr, 1991) made this future alternative seem practically inevitable.

The groundbreaking study dedicated to identifying basins at risk conducted by Dr. Aaron Wolf's team at Oregon State University in the early 2000's (http://www.transboundarywaters.orst.edu) showed that "despite the potential for dispute in international basins, the record of acute conflict over international water resources is historically overwhelmed by the record of cooperation" (Wolf, 2007). In fact, the only water war between the nations was registered as long as 4,500 years ago (Wolf, 2007). Thus, suggesting that as water scarcity increases, there is very limited probability for armed conflict; however, there is an increased likelihood of political tensions and instability.

If water scarcity increases the probability of water conflict, addressing the issue of increasing water scarcity may prevent future conflicts. Water scarcity, frequently driven by climate change (variability in water), rapid change in ruling regimes (change in water policy), and change in population (Elhanace, 1999; Yoffe and Wolf, 1999; De Stefano, 2010; De Stefano, 2012; Zetner, 2012). Wolf et al. (2003: 43) suggests addressing water conflicts by addressing these issues at the institutional level because: "the likelihood of the conflict rises as the rate of change within the basin exceeds the institutional capacity to absorb that change." In this context 'resilience' should be understood as institutional capacity, while rapid change as 'vulnerability,' these two must be assessed in conjunction to achieve hydro-political sustainability (Wolf, 2003). International agreements, River Basin Organizations (RBOs), history of collaborative projects, generally positive political relations, and higher levels of economic development are usually characteristics that contribute to enhancing resilience in shared basins. In contrast, characteristics that contribute to vulnerability include rapid environmental change, rapid population growth or asymmetric economic growth, major unilateral development projects, absence of institutional capacity, and generally hostile relations (Wolf, 2003). This dissertation assesses institutional resilience and vulnerability within the basin and sub-basin scales as they face rapid change in ruling regimes.

Socially produced scalar hierarchy and power: Water management in large and small basins

According to Taylor the geographical scale is one of the crucial principles for organization in human geography (1982). In his 1982 publication, Taylor argued that although many geographers used the scale principle for organization purposes, e.g. Bergman (1975), Muir (1975), Cox (1979), Smith (1979), there was not an attempt to justify this form of organization (Taylor, 1982). Taylor (1982) proposed a materialist framework for political geography, which introduced a three-tier hierarchical model for separation and control: (1) World economy, the macro scale; (2) State, the meso scale of ideology, and (3) City, the micro scale of experience. According to Taylor (1982, p. 26), the tier that "really matters" is the largest world economy. Taylor believes that political institutions and ideas cannot be understood as separate from the underlying material needs of society. Taylor's (1982) 'socially produced' scalar hierarchy has gained both its opponents and proponents within the groups of geography theorists (Amin, 2002; Delaney, 1997; Marston et al., 2005; Cox, 1998) and has become a foundational piece on scale in human geography.

In 1984, Neil Smith brought the theme of inter-scalar relationship and power into the discussion of socially produced scales. Smith expanded upon Taylor's nested scalar hierarchy, focusing on urban, nation-state and global scales, by introducing "the political expansion of the struggle" (2008). Where, "by organizing the fractal spaces at one scale into a coherent, connected place, struggles elevate themselves to the next scale up the hierarchy" (Smith, 2008, p. 232). By doing so, Smith highlights the importance of understanding the nature of the nested hierarchy of scales within the global scale. Smith addresses the issue of competition and cooperation in geography by pointing out that scales are not fixed and their boundaries are subject to change in the process of domination over means for the development of production (Smith, 2008). Smith elaborates on the issues of power within geographical scales and argues that "political claims and power established at one geographical scale are expanded to another" (as cited in Marston et al., 2005, p. 418).

David Delaney and Helga Leitner (1997) expanded on the theme of social construction of scale by reviewing publications of the political geographers such as John Agnew (1993), Andrew Herod (1991), Byron Miller (1994), Peter Taylor (1982), and Neil Smith (1992). Delaney and Leitner concluded that social scale cannot be compared with state borders as it is not a two-dimensional territorial, tangible, or visible space. Moreover, social scale is not fixed and it periodically transforms. Although they found it unclear how political construction of scale take place; they noted that range of contexts, actors, strategies, ideologies, stakes, maneuvers, and time frames are part of this construction. Delaney and Leitner (1997) also noticed that theorist draw their attention to "relationship between space and power, and to conceptions

and ideologies of space and power that social actors bring to practical efforts to change the world and of course, to resist the change" (p. 96).

Kevin Cox's publication from 1997 follows the theme of social construction by looking at the politics through the prism of spaces of dependence and spaces of engagement. Cox defines spaces of dependence as "more-or-less localized special relations upon which we depend for the realization of essential interests…" (p.2). Spaces of dependence are inserted into the broader set of relationships of global character. People, companies, state agencies, etc., organize themselves to secure their spaces of dependence, but while doing so they get engaged with other centers of social power, such as local governments for example. These interactions construct a different form of space which Cox calls a space of engagement. Within the space of engagement, the politics of securing the space of dependence takes place.

The above mentioned political geographers who acknowledge the existence of nested scalar hierarchy and the engagement activities between the scales. Moreover, there is an understanding that social forces pursue their interests through different strategies and attempt to redefine configurations of space boundaries by scale jumping (Brenner et al., 2008; Cox, 1997; Smith, 1992). As upper scale powers can impose their will on the lower level, the lower level powers can organize themselves to resist oppression and exploitation at a higher scale (Smith, 1992). According to Smith (1992, p. 60), jumping scales allow lower level social groups to "dissolve spatial boundaries that are largely imposed from above and that contain rather than facilitate their production and reproduction of everyday life."

Power is identified as a key component of the inter-scalar interaction (Amin, 2004; Cox, 1997; Delaney and Leitner, 1997; Smith, 2000; Jones, 2003). Dahl (as cited in Gregory, 2009) explains power as a situation where one agent makes an open attempt to force other agent to do something that he (or she) would not otherwise do. There are three forms of power (see Lukes, 2005; Strange, 1994) that are briefly introduced in the following. The 'visible' (Zeitoun and Warner, 2006, p. 442) form of power which, in Strange's (1987) definition, is when a state is able to possess and mobilize capabilities; where the last include military might, economic strength and modes of production, and access to knowledge. Zeitoun and Warner (2006) adopt Strange's definition of powerful state by adding on new capabilities such as political support and 'rather more enduring features such as riparian position, size and value of territory'.

The second form of power refers to 'control of the rules of the game' (Zeitoun and Warner, 2006). This form of power is able to "shape political agendas: the power to keep potential issues from becoming actual by determining which are to be the key political issues, preventing existing grievances from entering the political arena and contributing to the 'mobilization of bias' in various ways" (Lukes, 2007). The key

component of this dimension of power is bargaining power. This type of power, in the contrast with its 'visible' form, has different faces as it can be applied to any problem in the agenda through 'issue linkage' (Daudy, 2005). Where the latter can be best described as a situation when 'weakness in bargaining power that a state has in one sector may be compensated for by a relatively high level of the second dimension of power in another sector' (Zeitoun and Warner, 2006).

The third form of power is the power-over-ideas. The key goal of this form of power is to secure the dominance of the strong (Lukes, 1974). Strange's (1994, p. 10) definition of the power-over-ideas is when "strong implant their ideas, even their self-serving ideology, in the minds of weak, so that the weak come to sincerely believe that the value-judgements of the strong really are the universally right and true ones." Additionally, Lukes (cited in Gregory, 2009) argued that "not only were agendas bent to serve certain class interests, but also that many people at the wrong end of power were unable to see their powerlessness."

Power theory in many aspects converges with hegemony theory. Gregory et al (2009) define hegemony as a "capacity to exercise control by means other than coercive force; namely, through constructing a willing mass acquiescence towards, and participation in, social projects that are beneficial only to an elite." The term and definition were originally derived from the publications of Gramsci, who depicted how in the mid 20th century, the majority of Italian citizens gave their support to repressive fascist order. In political geography, if considering a state as the main actor within the socially created scales, it is possible to say that hegemonic power is represented as the single most powerful state in the international system.

The concepts of socially produced scalar hierarchy and jumping scales are utilized in this dissertation. These concepts highlight that policies at the upper level scales can impact the lower level policies, and similarly lower level policies can impact the policies at the higher scales. This concept allows seeing the relationship between socially produced scales in terms of large international basins and small international tributary basins, if the latter is treated as nested scale within the other.

Water conflict in the Syr Darya Basin: geographical settings and historical background

Located in the heart of Central Asia, the Aral Sea Basin consists of the drainage area of two major rivers: Amu Darya and Syr Darya (Map 1). In the 1980's, due to falling water levels caused by water diversions for agriculture, the Aral Sea split into two lakes: The South Aral Sea and the North Aral Sea.

MAP 1.THE ARAL SEA BASIN

The area of the Amu Darya Basin is approximately 1,327,000 km^2 (Benjaminovich and Tershitsky, 1975), 1,018,600 km^2 of which is shared between Kyrgyz Republic, Republic of Tajikistan, Republic of Turkmenistan, and Republic of Uzbekistan. The Pyanj, Vaksh, Surkhandarya, Kafirnigan, and Kunduz rivers are the main tributaries to the Amu Darya River. The Amu Darya starts at the confluence of the Pyanj and Vaksh on the Afghanistan-Tajikistan border; it then flows westwards along the Afghan-Uzbek and Afghan-Turkmen borders. The river then meanders northwest between the Karakum and Kyzilkum deserts in Turkmenistan before flowing into Uzbekistan. The river continues northwest until it hits the transboundary Tuyamuyun Reservoir on the Turkmen-Uzbek border. Leaving the reservoir, the Amu Darya continues northwest until it flows into the South Aral Sea.

The area of the Syr Darya Basin is 444,000 km^2 (Benjaminovich and Tershitsky, 1975) and is shared between four republics: Kyrgyz Republic, Republic of Kazakhstan, Republic of Tajikistan, and Republic of Uzbekistan. The Naryn and Karadarya rivers, the main tributaries of the Syr Darya, start in the eastern part of the Syr Darya Basin in the Kyrgyz Republic. The two rivers converge into the Syr Darya in Uzbekistan and flow westwards through the Ferghana Valley. Once the Syr Darya leaves the valley, it drains into the Kairakum Reservoir in Tajikistan. Leaving the reservoir, the river once again enters Uzbekistan before it draining into the Chardara Reservoir in Kazakhstan. Past the reservoir, the river keeps meandering its way out to the west until it reaches the North Aral Sea.

Both Amu Darya and Syr Darya are part of the cradles of the world civilization. Agricultural settlements in Sappalitepa (Surkahndarya Valley), Dalverzintepa (Ferghana Valley), Kokcha (Amu Darya Valley), Zamanbaba (Zarafshan Valley) established around 2000 b.c. instigated irrigation expansion in the greater Aral Sea Basin. The Russian Empire's interest in the region's commercial potential, specifically cotton, led to a hundred fifty year Central Asian conquest and resulted in the establishment of the Turkestan Governor-Generalship under Russian Empire in 1867. After the 1917 Russian revolution and consequent establishment of the Union of Soviet Socialist Republics (USSR) in 1922, the Central Asian domain remained within the USSR and agriculture remained the heart of the Soviet Central Asian economy.

During Soviet rule, a number of large scale hydro-projects were carried out in the Amu Darya and Syr Darya basins. Nurek hydropower station and reservoir, Tuyamuyun Reservoir, and Karakum Canal are some of the largest water projects on the Amu Darya River. Significantly more water control infrastructure was built on the Syr Darya River due to the fact that upstream Syr Darya is very favorable for irrigation purposes. Toktogul Reservoir, Kairakum Reservoir, Chardara Reservoir, Big Ferghana Canal are some of the largest infrastructures built in the Syr Darya Basin. Numerous smaller reservoirs cover the Ferghana Valley in the upper Syr Darya: Andijan, Papan, Kasansai, Karkidon, Charvak, Tortgul, Nayman reservoirs are among many small transboundary reservoirs in the Syr Darya Basin (Map 1).

The Soviets also planned to develop large hydropower projects in these river basins, including a group of Kambarata hydropower plants and the Toktogul Reservoir/Dam on Kyrgyz part of Syr Darya River, and a group of Sangtuda hydropower stations, the Nurek and Rogun hydropower stations on the Tajik part of the Vaksh River in Amu Darya. The hydropower generated from these large cascade dams was supposed to contribute to the local energy systems as well as to the United Power System for Central Asia, while providing secure water delivery for irrigation in downstream Kazakhstan, Turkmenistan, and Uzbekistan. However, the general terms of the inter-republican water management agreements stated that hydrocarbons rich downstream states would compensate upstream states' water releases with coal and/or gas. When the Soviet Union collapsed in 1991, some transboundary hydropower-irrigation infrastructure, such as Toktogul Reservoir on Syr Darya, had been already finalized and became a source of conflict as Newly Independent States (NISs) had conflicting national water policies.

The upstream states desire to build up their national security using water resources for hydropower production, while the downstream states want to continue irrigated agriculture. The conflicting water utilization policies drive the Central Asian states apart from each other in the Syr Darya and Amy Darya Basins. Closed borders and ethnic tensions also contribute to the mistrust in transboundary water management (International Crisis Group, 2014). International donors' attempts to improve water

management situation often face issues of "weak government capacity and the absence of governmental will to change corruption" (International Crisis Group, 2014, p. 16). Despite of all the challenges present in the area, water issues must be addressed as climate change and population growth pressures pose immanent threats this fragile system.

Research question

This dissertation examines the issues of water conflict in Syr Darya Basin of Central Asia. The first assumption is that water management in shared basins can become (more) conflictive if it is exposed to sudden changes in population, climate, and/or regime change in riparian state(s). In this specific study, I assess water conflict in the Syr Darya Basin through the prism of a change in political regime in 1991, e.g. fall of the Soviet Union. The second assumption is that water management occurs at different socially produced scales, where through jumping scales and via use of power, lower social scales can impact upper scales and vice versa. The third assumption is that international level engagement activities after 1991 affected Central Asian water management at all social levels.

The main questions addressed in this research are focused on water management pre- and post-1991 and are subdivided into three sections: 1. How the NISs addressed the change in regime (and subsequent change in national policies) to prevent escalating water conflicts? 2. How successful were the actions undertaken by the NISs to address the change in regime (and subsequent change in national policies)? 3. Why these actions taken were successful or unsuccessful? These questions assess water management at large scale basin first, and then the same set of questions examined water management in the tributary basins. The method used determined if the issues, their solutions, and results were the same at both scales. Additionally, this method provided cross basin and cross scale recommendations.

The goal of this dissertation is to answer the above questions and identify successful conflict prevention/resolution mechanisms. In the conclusion of this analysis, I will provide recommendations to address water issues in the Syr Darya Basin, and by doing so, contribute to general knowledge on conflict and cooperation.

Methodology and limitations

This dissertation consists of three case studies at the basin and sub-basin scales. Scaling was adapted from Taylor's work on socially produced scalar hierarchy. Therefore this research assumes that there is a similar nested vertical hierarchy in water management as in world economy; where large basins and their larger portions can be considered to be part of the global scale, while small tributaries to these large basins can be treated as local scales or scales of experience. This method was chosen due to its suitability for analysis of water negotiations and implementation of water related agreements. By using this type of qualitative method it is possible to investigate how states addressed the change in policy and why some actions were more successful than the others.

The dissertation is based on two published research papers (Chapter III and IV) and one submitted research paper (Chapter II). Each of these papers addresses the issues caused by the fall of the Soviet Union in 1991 and the consequent water conflict in the Syr Darya Basin. The analyses focus on the process, for example, negotiations and outcome of these negotiations (agreements and benefit sharing) by using theoretical frameworks from international relations, political geography, negotiations, and economics.

The material for the research was collected from the period between 1941 and 2011 from water management organizations in Kyrgyzstan, Tajikistan, and Uzbekistan. Archival documents such as agreements, minutes of meetings, protocol decisions, basin planning documents, scientific reports, maps and letters have been the main source of information since they best depict the water negotiation process and implementation of the agreements. In addition, I have used newspaper reports, internet sources, and books on relevant subjects.

The major limitation of this study lies within the characterization of water as a natural multipurpose resource. Therefore this study cannot fully cover all of the water related issues that arose during this study, such as ethnic conflicts, border issues, water employment, environmental issues, and donor interventions. The second limitation is that although this study was focused on change in Syr Darya River water management after 1991, 1. There appears to be limited data available on large dams operation before 1991; 2. There also is limited data available on water agreements implementation after 1991. The last limitation is the fact that despite intensive groundwater research conducted both before 1991 (See Mirzaev (1972) and Akramov (1985) cited in Gracheva et al., 2009) and after (GGRETA Project), most of the data collected for the purpose of the current research do not address the issue of groundwater withdrawals. Furthermore, transboundary aquifer managements are not discussed in this dissertation.

Dissertation overview

Paper I (Chapter II) examines water management, basin planning processes, and water allocation principles in the Syr Darya Basin before and after 1991 by analyzing the Syr Darya Basin planning document - *Correction Note to the Refinement of the Scheme of the Complex Use and Protection of the Syr Darya River Basin, 1983* (the 1983 Correction Note) and a number of international documents signed after 1991. These documents were assessed by using four-step basin planning and implementation process framework. The framework was adapted from Pegram et al. (2013) and represents a generic process of basin planning.

Paper II (Chapter III) explores the history of transboundary infrastructure negotiations and expansion on four transboundary reservoir: the Karkidon (216 million m^3), Kasansai (165 million m^3), Tortgul (90 million m^3), and Andijan (1750 million m^3), by analyzing water related documents collected from water management departments from all three riparian states. The Transboundary Negotiation Framework merged together the hydro-hegemony (Zeitoun and Warner, 2006), negotiations (Pruitt, 1983), and socially produced scales (Taylor, 1982) frameworks to produce a theoretical framework to analyze water negotiations in terms their outcomes in pre- and post-1991 hydro political relations.

Paper III (Chapter IV) explores the change in water governance practice at the local scale by exploring a small tributary of the Syr Darya: The Isfara River. It was possible to access Isfara River agreements, protocols, and statements through the International Water Management Institute (IWMI) database on small transboundary tributaries in the Ferghana Valley. The in-depth analysis of the historical development of the sharing agreement for the Isfara up to independence and after 1991 was conducted through the prism of the conflict and cooperation framework.

In summary, this two scale water conflict prevention/resolution study employed at the basin and sub-basin levels offers a unique perspective on institutional resilience in the context of international water management. New insights are provided on water management in the Former Soviet countries in Central Asia. This study identified water conflict areas and factors that contribute to and hinder successful resolution of these conflicts. In general, this study expands our understanding of transboundary water management in the face of rapid change and provides policy recommendations for strengthening cooperation over internationally shared water resources.

Chapter Two: Water conflict and cooperation in Central Asia: a view from the Syr Darya River basin planning perspective

Author: Mariya Pak

Abstract

The conflict over water resources exploitation and sharing in the Aral Sea Basin is one of the most pressing environmental issues yet to be resolved in Central Asia. This paper examines the 1983 *Correction Note to the Syr Darya River Basin planning document* in order to understand basin planning principles during the Soviet era. This paper shows that during the Soviet era, basin planning was a four-step process, carried out both at the high and low policy levels. After the fall of the Soviet Union, the newly independent states institutionally recreated the Soviet four-step basin planning process; however, they failed to produce a vision statement. This impedes proper basin planning and allows water management only at the low policy or technical level. Consequently, it is argued that successful basin planning is possible when larger national and/or international water development policies/visions are in place and provide guiding support for the basin planning process.

Introduction

Basin planning is a crucial component of water policy implementation. To ensure successful policy implementation at the basin level, people have to provide adequate decision-making, appropriate planning, and acceptable management (Mysiak et al., 2002; Simonovic, 2004; Bracken et al., 2005). If the right decisions are made, and proper planning and implementation take place, then it is possible to avoid water conflict, water pollution, habitat alteration and/or destruction, and many other issues related to water management.

The concept of basin planning has slowly developed over time, but it was the massive worldwide infrastructure development, beginning in the early 1900s, that led to water resources development planning (Speed et al., 2013). Some of the first basin-wide water development projects took place in 1914 on the domestic scale in the Murray-Darling Basin in Australia (MDBA, 2013), in the 1930s within the inter-republican Syr Darya and Amu Darya Basins in Central Asia (Benjaminovich and Tershitsky, 1975), and in the 1930s in the interstate Tennessee Basin in United States (Barbour, 1937). All of these projects treated

basin development as a technical activity that could be undertaken by engineers, by optimizing the benefits derived from infrastructure development and operation.

In the 1970s and 1980s, with the emergence of the global environmental movement, it became evident that the engineering solutions were no longer addressing the issues of growing water demand and were not recognizing the importance of the environment and public participation. To address these issues, new approaches in water resources management and planning were developed, which became the Integrated Water Resources Management (IWRM) approach in the 1990s. An important part of the IWRM approach includes basin planning.

The Soviet Union practiced basin planning; as Zvonkov (1957) notes, massive basin plans or schemes were developed throughout the Soviet era. The rationale behind these schemes for infrastructure use and the protection of water resources was future inter-sector and territorial water resources allocation. The schemes for the rivers (and for industrial districts of the country) were made for the long term (10 to 20 years), and updated according to the Five Year Plans (Avakyan and Shirokov, 1990). Due to the multivolume character of the basin-planning schemes, the responsible authorities could recommend that the scheme designer "correct" or edit specific sections of the document during the scheme assessment and approval process.

Plans for the Syr Darya Basin in Central Asia were developed in the early 1900's and updated throughout the years (Benjaminovich and Tershitsky, 1975). After an edit in 1982, the Design Institute in Central Asia issued the *Correction Note to the Refinement of the Scheme of the Complex Use and Protection of the Syr Darya River Basin, 1983* (the 1983 Correction Note). The focus of the 1983 Correction Note was dictated by water planning committee members in Moscow, who due to the growing water demands called for the allocation of "water resources limits based on the [water] sources, hydro-economic districts and in the parts of the basin that are shared between the Union republics" (1983 Correction Note).

The unified water management of the Syr Darya Basin disappeared after 1991 with the fall of the Soviet Union (UNDP, 2006; Allouche, 2005; Teasley and McKinney, 2011). Although the states established new regional organizations to address water management issues in the Aral Sea Basin, the conflicting interests between upstream hydropower and downstream irrigation needs impeded proper basin planning. While the current cause of the water conflict in the Aral Sea Basin is well understood, little has been written about water management elsewhere in the Soviet Union republics of Central Asia prior to 1991. This paper examines water management, basin planning processes, and water allocation principles in this region before 1991 by analyzing the 1983 Correction Note for the Syr Darya Basin.

Although this complementary document to the Syr Darya Basin Scheme includes excerpts from the original Syr Darya scheme, e.g., protocol decisions and letters between the water managing organizations; and was approved by the USSR Water Resources Ministry, it was not approved by the USSR Planning Committee (Gosplan). For this reason this paper will not examine specific data presented in the 1983 Correction Note, such as land and water volumes. Since the 1983 Correction Note was not approved by the Gosplan, there were no Five Year Plans based on it. While it is not clear why Gosplan did not approve the 1983 Correction Note, some sources claim that it was due to the disagreements on the water shares allocated by the document (WECP – Central Asia, no date). This paper will examine the document from two perspectives. First, it will examine the step-by-step basin plan development process: e.g., identify USSR water organizations and determine which tasks were performed by which institution and the hierarchy of the institutions. This will help the reader to understand the core of water allocation issues in Central Asia and will point out problem areas. Second, it will examine the principles of irrigation water allocation. The results of this analysis will suggest principles for equitable water sharing.

Framework: Four-step basin planning and implementation process

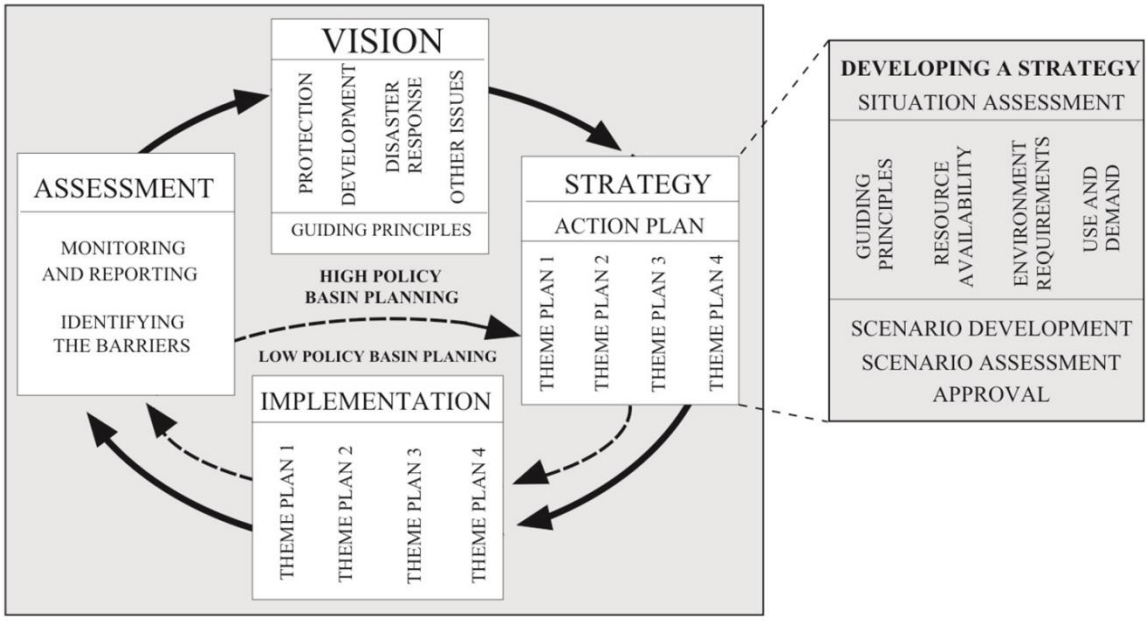


FIGURE 1. GENERIC PROCESS OF BASIN PLANNING FRAMEWORK: HIGH POLICY BASIN PLANNING (HPBP) AND LOW POLICY BASIN PLANNING (LPBP). ADAPTED FROM PEGRAM ET AL. (2013).

Due to the fact that planning is crucial part of any water policy implementation there are some common aspects to all basin plans. Figure 1 presents a four-step basin planning process framework (adapted from Pegram et al., 2013). Pegram et al. (2013) proposes that basin planning is an iterative process that involves the development of a vision, objectives, and basin strategies; implementation of the plan; and monitoring and review, which assumes that there is constant situational assessment going on. This framework assumes that the basin plan may require adaptation to new environments and demands. Worldwide practice has shown that basin plans are frequently reviewed, as is done in South Africa, Australia, the European Union, and the United States (South Africa National Water Act, 1998; EU WFD, 2000; and California Water Plan, 2013; MBDA, 2013).

Globally, basin planning occurs at the High Policy Basin Planning (HPBP) level and/or the Low Policy Basin Planning (LPBP) level (ICPRD, 2009; Speed, 2013). In this framework HPBP assumes participation of the high policy level institutions that have a direct impact on national and international policies, such as international organizations and/or government(s). The main task of HPBP is defining the vision and identifying the guiding principles to implement the vision. LPBP is designed to implement the vision through planned actions or basin plans.

The crucial framework component present in the HPBP is vision or a development goal. Warren and Nanus (1985) define vision as a central concept in the theory of leadership: in order to choose a development direction, the leader must develop a mental image of a desirable future outcome. Pegram et al. (2013) add that vision not only articulates a desired future for the basin, but also defines the guiding principles to achieve it.

Once the basin vision is in place, basin strategies can be developed. Strategies are the actions that should be taken in order to achieve the vision (Pegram et al., 2013). A complete list of these actions represents the basin plan. This plan may have sub-plans or thematic plans on particular water-related issues, such as water quality protection or water allocations. Based on the available data, water management scenarios are developed. The scenario that proves its capacity to best achieve the vision is approved and passed on for implementation.

Basin plan implementation and assessment start simultaneously (Pegram et al., 2013; Speed et al., 2013). As the implementation of plan actions begins, outcome reports are assessed. The assessment labels the actions that are not successfully implemented, identifies the barriers to implementation, and forwards the assessment reports back to those responsible for strategy and/or vision, who decide how to address the issues. Upon the expiration of the basin plan activities implementation and/or the allotted timeframe, basin

planning goes back to the 'defining the vision' process, where planners re-assesses the values and rearticulate a desired future for the basin.

It is important to point out that due to differences in the geographical location of basins, their transboundary setting, and the political system and policies within the riparian state/states, there is no single, worldwide template for basin planning. By comparing international approaches, the Basin Planning Framework provides general guidance to basin planning and possible issues that may hinder implementation. The processes described in the framework are borrowed from water management experiences in national river basins (MDBA, 2013), from rivers within federal political systems (California Water Plan; 2013), and from transboundary rivers (EU WFD, 2000).

The Basin Planning framework is used to examine the basin planning process in the Syr Darya Basin during the Soviet Union and after the collapse of the Union in 1991. The framework allowed us to identify changes in basin planning, as well as in the organizations responsible for the planning processes.

Geographical description

The Aral Sea Basin consists of the watersheds of the Amu Darya and Syr Darya Rivers (Map 1). In 1980's, due to falling water levels caused the water diversions for agriculture, the Aral Sea split into two lakes: The South Aral Sea fed by the Amu Darya and the North Aral Sea fed by the Syr Darya.

The Syr Darya Basin is shared between four republics: Kyrgyzstan Uzbekistan, Tajikistan, and Kazakhstan. The Naryn and Karadarya rivers, the main tributaries of the Syr Darya, start in the eastern part of the Syr Darya Basin in the Kyrgyz Republic. The two rivers converge into the Syr Darya in Uzbekistan and flow westwards through the Ferghana Valley. Once the Syr Darya leaves the valley, it drains into Kairakum Reservoir in Tajikistan. Leaving the reservoir, the river once again enters Uzbekistan before it drains into the Chardara Reservoir in Kazakhstan. Past the reservoir, the river keeps meandering its way out to the west until it reaches the North Aral Sea.

The three main tributaries are the Naryn, Karadarya, and Chirchik rivers. The five main reservoirs in the basin are the Kyrgyz Toktogul reservoir, Uzbek Andijan reservoir, Tajik Kayrakum reservoir, Uzbek Charvak reservoir, and Kazakh Chardara reservoir.

Water planning in the Syr Darya Basin: before 1991

Agricultural development was greatly spurred during the Soviet era, when in the early 1920s, the Gosplan developed a policy for economic regionalization (Mxeczkowski, 1965) and divided the state into 21 economic regions. Central Asia, more specifically Uzbekistan, was assigned to become a major cotton-producing region (Pomfret, 2002). This led to massive irrigation expansion and river-basin planning. From 1923 to 1983, water managers produced a number of irrigation schemes and development plans for the Syr Darya and Amu Darya basins (Benjaminovich and Tershitsky, 1975; Correction Note, 1983; Amu Darya Scheme, 1984).

According to the Friends of The Soviet Union (no date), Gosplan put in place the policy of Socialist Competition in 1929. The Competition promoted rivalry and contests between individual factory workers, between the factories themselves, and so on all the way up to inter-republican contest. As a result, this production-oriented competition put extreme pressure on the water resources.

Soviet water allocation planning started at the high policy level. The best example of directing the national vision towards irrigation expansion can be drawn from the 1960s. The Central Committee of the Communist Party of the Soviet Union (CC CPSU) and the USSR Council of Ministers issued a decree on June 16, 1966. After the decree, the CC CPSU and the Council of Ministers, USSR Ministry of Agriculture, USSR Ministry of Melioration and Water Resources, Union-wide ‘Soyuztehnika’ (union located under the USSR Cabinet), local parties, soviets, villages and water resources institutions, and kolkhozes and sovkhozes began a nationwide fight to improve prosperity through agriculture by increasing soil productivity and implementing a statewide program of soil melioration. Additionally, one of the most important tasks for the Soviet Union starting from 1966 became irrigation development (Benjaminovich and Tershitsky, 1975; Bilik, 1994).

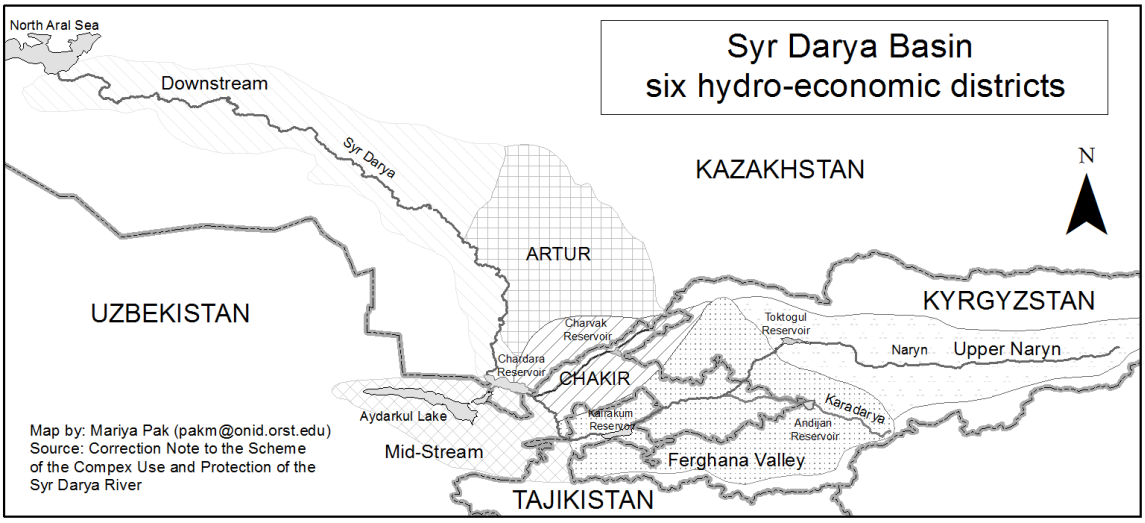
Figure 2(A) depicts the basin planning process in the Soviet Union. The vision was identified by the CC CPSU. The USSR Council of Ministers communicated the policy direction to Gosplan, the institution under the Council responsible for national economic planning by defining the rules and methods for development, and setting timeframes for implementation (Vasilyev, 1967). At this point the high policy level (HPBP) shifted to the low policy level (LPBP), where the USSR Water Resources Ministry, in collaboration with the nationwide and local design institutes and Union Republics, designed detailed basin action plans and carried out their implementation.

The analysis identified that water allocation planning involved several revisions. Based on the comments from the Union Republics, Gosplan, and the USSR Ministry of Water Resources, the Syr Darya scheme was revisited by the Central Asian design institute – Sredazgiprovodkhoz. From the 1983 Correction Note, it is evident that Sredazgiprovodkhoz corrected the document and forwarded it to the USSR Ministry of Water Resources. The Ministry reviewed the document and issued recommendations to improve the document. Once the recommendations were incorporated into the document, the Ministry forwarded the document to Gosplan. On April 12, 1982, Gosplan assessed the document and issued a number of guiding principles that would enable the proper implementation of the irrigation plan. The most important water allocation principles described in the 1983 Correction Note are listed below:

1. Average annual inflow to the Chardara Reservoir is recommended to be equated to 12 km^3/year. The guaranteed water delivery to Chardara Reservoir should be equal to10 km^3/year. Allocate 1.36 km3/year from that volume to the Aral Sea. The remaining water resources are allocated between the Soviet Republics.
2. As of January 1st, 1981, water should be allocated proportionally based on the irrigated land available in each republic, crop type (1980 data), irrigation norms (1969 data), and irrigation system efficiency.
3. Water limits should be based on the water source, hydro-economic regions, and sections of the basin that are shared between the republics.
4. It is recommend to established inter-republican water resources allocation such that further irrigation development in the Syr Darya Basin would be based on the economic and rational use of the local water resources.

According to the 1983 Correction Note, these principles were utilized by the Sredazgiprovodkhoz to allocate water resources between the Union Republics. Because of water scarcity and high irrigation demands, the plan for future inter-republican irrigation water allocation called to allocate water to the "level of total exhaustion of the water resources."

According to the 1983 Correction Note, the water was divided among six hydro-economic districts (Map 2). The first irrigation district is Upper Naryn. It occupies the high altitude area of the upstream Naryn River until the river flows to Ferghana Valley in Kyrgyzstan. The second district is Ferghana Valley, which starts downstream of the Naryn and Karadarya rivers and continues to the Farkhad Reservoir in Tajikistan. The Mid-stream District stretches from the Farkhad Reservoir to Chardara Reservoir. The next district, Chirchik-Akhangaran-Keles (CHAKIR), is mainly irrigated by the Syr Darya tributaries. The Arys-Turkestan (ARTUR) district irrigates the right bank of the Syr Darya located inryxpio;'a Kazakhstan. The last district is Downstream, which stretches from Chardara Reservoir to the Aral Sea.



MAP 2. THE SYR DARYA BASIN AND SIX HYDRO-ECONOMIC DISTRICTS.

Within each district, water was allocated by source (e.g., differentiated if the fields received irrigation water from the main stem Naryn-Syr Darya or small rivers), and then by republic, based on the principle of proportionality. The principle of the proportional or equalized (water) supply requires defining hydrologic basin boundaries, because the percent water share of a riparian is equal to the percent share of the irrigated area within a defined hydrological basin. In the Soviet water allocation practice, the basin boundary was defined according to the watershed line and irrigation water sources. The water source was a complementary factor in defining the hydrologic boundary. All of the lands receiving water from a specific (river) source were considered within its hydrological boundary. Table 1 shows an example of the large-scale Syr Darya water allocation plan. Notice the differentiation between the hydro-economic districts, republics, and water sources.

TABLE 1. WATER ALLOCATION PLAN: PLANNED IRRIGATION EXPANSION UP TO 3.39 MILLION HECTARES.

Water intake in the hydro-economic regions up to the level of the total depletion of the Syr Darya					
Hydro-economic district	Republic	Source	Irrigated land (thousand hectares)	Return flow use (km^3/year)	Surface water use (km^3/year)
Upper Naryn	Kyrgyz SSR	NA	95.9	0	0.7
Upper Naryn	Kyrgyz SSR	NA	34.4	0	0.23
Ferghana Valley	Uzbek SSR	Main stem	409.8	1.2	3.49

		Small Rivers	471.7	1.08	4.67
	Tajik SSR	Main stem	97.7	0.42	0.94
		Small Rivers	46.2	0.1	0.45
	Kyrgyz SSR	Main stem	22.5	0.6	0.14
		Small Rivers	293.7	0.45	2.76
Mid-stream	Uzbek SSR	Main stem	629.7	1.23	5.96
		Small Rivers	33.6	0.02	0.28
	Tajik SSR	Main stem	87.6	0.21	0.82
		Small Rivers	30.5	0.02	0.21
	Kazakh SSR	Main stem	117	0.24	1.1
CHAKIR	Uzbek SSR	Small Rivers	347.2	0.68	2.75
	Kyrgyz SSR	Small Rivers	9.5	0	0.04
	Kazakh SSR	Small Rivers	89	0.17	0.72
ARTUR and Downstream	Kazakh SSR	Main stem	374	NA	NA
		Small Rivers	200	NA	NA
Syr Darya Basin	GRAND	TOTAL	3390	NA	NA

Once the 1983 Correction Note was produced, which took into consideration all comments issued by the Union Republics, the recommendations proposed by the Gosplan, and the USSR Water Resources Ministry, it was supposed to be sent to the Gosplan for final approval, and then to the Communist Party and the Supreme Soviet. However, due to disagreement between the riparian republics regarding the proposals of the 1983 Correction Note, the document was only approved by the Scientific Committee under the USSR Water Ministry, but was not forwarded to the Gosplan for further approval (WECP – Central Asia, no date). This way, water allocations between the republics were made according to the Gosplan-issued documents from April 12, 1982 and May 5, 1982 (WECP – Central Asia, no date).

Water planning in the Syr Darya Basin: after 1991

In late 1991, the Soviet Union collapsed and the Union-wide water management system disappeared. A response to this institutional void came from the heads of the water resources departments of the New Central Asian Republics. In February of 1992, the heads of the water sector signed Almaty Agreement, which stated:

> Article 7
> Parties have made decision to create under parity conditions Interstate Commission for Water Coordination on the problems of regulation, rational use and protection of water resources from interstate sources, involving in its constitution first leaders of water-related organizations and establishing quarterly meetings […].
>
> Article 8
> Interstate Commission for Water Coordination (ICWC) is entitled:
> To determine of water policy in the region, elaborate of its directions with due regard to all economic branches' needs, complex and rational use of water resources, prospective program on the region water supply and measures for its realization;
>
> Article 9
> ICWC executive and interdepartmental control entities to charge BWO "Syr Darya" and BWO "Amudarya", which must function under conditions that all structures on the rivers and water sources are property of the republics […].

The Almaty Agreement was signed between the heads of the national water sectors just before the start of the new growing season in 1992. It was fortunate that the water ministers made this decision in the absence of a greater political decision because there were an enormous number of end water users who expected water deliveries for the 1992 growing season. Articles 7, 8, and 9 of the Almaty Agreement, to a certain extent, copy the old Soviet water-planning system. The water allocation tasks carried out by the USSR Supreme Soviet, Council of Ministers, Ministry of Water Resources, and Gosplan were re-allocated between the new ICWC and its member organizations. For example, ICWC was entitled to elaborate the policy in the region, and the Scientific-Information Center (SIC ICWC) was charged with developing methods and approaches of prospective development. River basin authorities (Basin Water Organizations) for the Syr Darya and Amu Darya were in charge of implementation of decisions made by ICWC.

In this way, the new water planning organizations established by the heads of the national water sectors (ministries) entitled themselves to the right to develop water policy—the task usually performed by the higher political entities such as leader(s) of the government(s). The 1992 agreement made ICWC responsible for high policy basin planning (HPBP) activities in the region. As a result, during the timeframe from February 1992 to March 1993, there was an institutional mismatch where LPBP organizations took

over HPBP responsibilities. The 1993 Kyzil Orda agreement put an end to this institutional mismatch as the presidents declared that:

> Article II
> States-participants consider it necessary: To establish, on a parity basis, the Interstate Council on the Problems of the Aral Sea Basin, and under it: Standing Tashkent-based Executive Committee; Commission for Social and Economic Development and Cooperation in Scientific, Technical, and Ecological Spheres; Interstate Commission for Water Coordination, acting in conformity with the Agreement signed on February 18, 1992 in Almaty.

The Kyzil Orda Agreement was a logical move. By establishing the Interstate Council on the Problems of the Aral Sea Basin (later reorganized into the International Fund for saving the Aral Sea, IFAS) the Agreement returned the task of defining water policy back to the national governments.

With the establishment of IFAS and re-distribution of the tasks between the organizations, the new independent states accomplished the complete recreation of the Soviet Basin Planning system. Figure 2 graphically shows the transition from Soviet basin planning to a new independent system. The USSR Supreme Soviet and Council of Ministers was replaced by the IFAS Board (e.g., the Presidents). The role of the state planning committee, the research institute was transferred to the ICWC. The technical work on the ground remained at the levels of BWOs. The BWOs, established in 1986, worked under the USSR Water Resources Ministry and focused on long-term plan implementation, e.g., production of the annual water allocation plans based on the Gosplan-approved quotas. The new system theoretically was able to run the four-step HPBP process as it was done during the Soviet era.

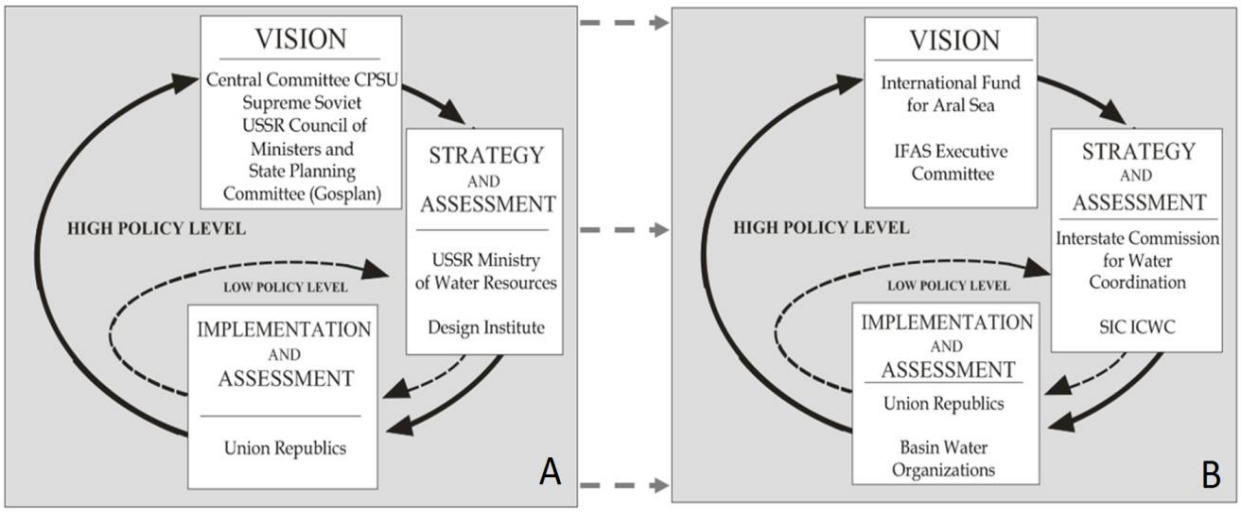


FIGURE 2. TRANSITION FROM SOVIET BASIN PLANNING SYSTEM TO NEW INDEPENDENT BASIN PLANNING SYSTEM. AUTHOR'S OWN COMPILATION.

In theory, the new institutions were established and planning could be properly distributed amongst them. However, problems arose when it became evident that the national water policies of the new independent states completely contradicted each other (UNDP, 2006; Allouche, 2005; Teasley and McKinney, 2011). Upstream states wanted to produce hydropower and downstream states wanted to use water for irrigation. Presently, at the high policy level no agreement has been reached on long-term water allocation and use. With IFAS focusing on small-scale environmentally, socially, and economically oriented projects (IFAS, no date), ICWC had to allocate water resources in the absence of a unified basin-wide vision.

Although the Nukus Declaration signed in 1995 states that the parties agree that for maintaining continuity, the Central Asian republics recognize and accept all the earlier signed agreements and other normative documents that regulate the relationship between them on water resources in the Aral Sea Basin, the water resources in the Syr Darya Basin are managed according to the annual agreements (Protocol, 2000; Protocol, 2001; Protocol, 2003; Agreement, 2004; Protocol, 2006a; Protocol, 2007; Protocol, 2008b; Protocol, 2009; Protocol, 2010b). These agreements are reached in collaboration between the ICWC, BWO Syr Darya, and the republics' water organizations.

It worth mentioning that Aral Sea Basin management institutions are criticized for being corrupt and quasi-international (McKinney, 2003; Wegerich, 2004). This is because the BWOs executive bodies are located in Uzbekistan. According to McKinney (2003, p. 198) Uzbek influence in these organizations is prominent because "they do not rotate management staff or hire specialists from other republics." According to Hodgson (as cited in Wegerich, 2004) the Syr Darya BWO is not recognized in Kyrgyzstan and it is believed that the Syr Darya BWO in Tashkent supports Uzbekistan's interests.

During the past 16 years, IFAS implemented two Aral Sea Basin Programs (ASBPs). ASBPs initiated in 1994 represent a consortium of international organizations such as UNDP, UNEP, the World Bank, and the EU (Chatterjee et al., no date), which focused on the stabilization of the ecological situation in the Aral Sea Basin, the disaster zone recovery, improvement of transboundary water management, and strengthening the potential of the regional organizations (IFAS, no date). Currently IFAS is operating the 3rd ASBP, which, from 2011 to 2015, promises to "develop [a] national and regional water use vision" (ASBP, 2009:17). If this basin-wide vision is well developed and is accepted by the IFAS members, the year 2015 may become a turning point in Central Asian water management. However, while these basin-wide policies are being developed in the Syr Darya Basin, the whole Central Asia is still trapped at the LPBP and operates solely at the technical level.

Discussion

The analysis of the 1983 Correction Note identified that Soviet basin planning was carried out at HPBP and LPBP levels. The vision was set by the government; other players—water ministries, design institutes, and local Union republics—collaboratively took care of the vision implementation. At the LPBP, the relationship was not necessarily a top-down process. The Union republics could take an active role in shaping the plan to implement the vision, for example by proposing dam or channel construction (Pak et al, 2014). In other words, at the small scale there was freedom for actions.

After the fall of the Soviet Union, the states faced a problem wherein the institutions responsible for the basin planning disappeared. This gap was quickly filled by IFAS and ICWC, and from the institutional perspective, there were no barriers for basin planning. However, the problem that the Syr Darya Basin faces today is not of institutional origin; it lies within the political will of the member states of the IFAS to come up with a shared vision for the basin. In the absence of a vision for the future outcome of the basin, long-term planning is impossible.

The Soviet inter-republican water allocation practices resembled some of the well-known aspects of international water-sharing principles, such as equitable water allocation and managing waters within hydrological boundaries. It is evident, however, that the Soviets customized the definitions of "hydrological unit" and "equity." The hydrologic unit, in Soviet understanding, was not associated with a classic watershed—or land and water area that has the entire surface drainage within its boundary and converging to a single point (Berelson et al., 2004)—but as a land area that has water supply from a certain source. Within that defined hydrologic unit, irrigation water resources were allocated equitably or proportionally to the lands irrigated within each republic in the hydrologic unit. Thus, equity in water resources allocation was associated with a quantifiable resource—irrigated land. According to the previous research, it is evident that since equity on its own is a quite ambiguous term (Lautze and Giordano, 2006; Wolf, 1999), shifting from ambiguous, right-based allocation to quantifiable, need-based allocations may allow the riparians to see some degree of 'equity' in the agreement (Wolf, 1999).

Soviet water-allocation principles had their own flaws. The irrigation development-driven policy treated water as a non-exhaustible resource, and led to over-allocation and environmental degradation. These drawbacks of Soviet water-allocation law and principles should be taken into consideration when developing new water-sharing agreements.

The analysis of the 1983 Correction Note highlighted the importance of the republican borders between the Soviet states. The fact that the 1983 Correction Note is primarily dedicated to inter-republican water allocation suggests that boundaries between the Union states were of a very high priority. In fact, the 1983

Correction Note water-allocation principle resembles a conflict prevention tool, where a scarce resource was equitably allocated among the multiple water users. Indeed, there is evidence that conflicting water-use interests in the Syr Darya Basin existed during the Soviet Union (Megoran, 2004; Pak et al., 2014; Pak and Wegerich, forthcoming). Zvonkov's (1957) observations about differences in Soviet-era planning, political-economic, and engineering ideas among neighboring republics in the transboundary Amu Darya and Syr Darya basins demonstrate that competition between agriculture and hydropower was an issue in Soviet Central Asia.

The examination reveals that Soviet basin planning was a step towards the IWRM. The schemes outlining complex uses and protections demonstrate an understanding that water resources are an integral component of social and economic prosperity, as well as ecosystems. Concurrently, due to the national priority of increasing cotton production, it was impossible for the water managers to utilize water resources in environmentally sounds ways. Fully understanding the negative environmental consequences, water planners developed basin plans to expand irrigation to satisfy the national goals in this sector at the expense of the environment. The 1983 Correction Note analysis shows that the Soviet government to a certain degree recognized environmental needs, and Gosplan recommended the allocation of 1.36 km^3/year to the Aral Sea. However, most of the water was diverted for development purposes.

Moreover, the Design Institute's proposal to allocate Syr Darya water resources up to the level of total depletion demonstrates the development-oriented (competition driven) culture within the water institutions. Despite Gosplan's recommendations to plan irrigation development based on available water resources in the basin, the Design Institute in Central Asia proposed an irrigation expansion plan that allocated all of the Syr Darya water resources and called for the transfer of Siberian waters to Central Asia. It is possible that the Design Institute intentionally promoted the inter-basin water transfer due to growing doubts over whether Siberian water diversions would take place. Indeed, the Design Institute's fears came true, when in 1986, due to strong environmental concerns, population-growth concerns, and concerns over the high costs of inter-basin water transfer, these plans were postponed (Avakyan and Shirokov, 1990: 9; Gustafson, 1980).

Conclusion

The Soviet Central Asian water allocation principles and planning, at their core, provide a model on how the international basin planning could be achieved. Soviet basin planning was well organized and went through both HPBP and LPBP cycles. Water allocation planning was a top-down process when it came to defining the basin-wide vision; however, at the implementation level, the planning process was inclusive and permitted Union republics take the initiative. On the other hand, the planning was development oriented

and was driven by the national development policy, e.g., cotton production, which led to environmental degradation.

After the loss of the Union-wide water-planning system, the new Republics reproduced the old Soviet water-planning system by establishing IFAS and ICWC. The tasks that earlier were carried out by the USSR Supreme Soviet, Cabinet of Ministers, Gosplan, and Union-wide Water Ministry were distributed between the policy-developing institution, IFAS, and the planning and implementation institution, ICWC. Even so, there are weaknesses in water management, such as failure to address water quality issues and/or the impotence to address potential conflicts that might arise. Most importantly, the IFAS members have contradicting national water policies. And, therefore, IFAS has not yet established a basin-wide water policy vision. Thus, institutions at the HPBP do not provide guiding principles and development orientation to the institutions at the LPBP level. Water management at the LPBP works on autopilot mode.

This type of water management in the Syr Darya Basin has been performed since early 1990s and, under current, pressing issues of climate change and population growth, it is uncertain how much longer the system can continue operating at the technical level. Conflicts between republics regarding reservoir operations and water use already took place during the water-poor years of 2001 and 2009. The basin planning institutions established after 1991 should use the existing institutional capacity and should urgently proceed with basin-wide policy development and water-allocation planning. The IFAS member states should develop a single vision, in the spirit of collaboration, that will provide guiding principles for new allocations and future development that will be fair and will be able to deal with future uncertainties.

The Syr Darya Basin planning experience presented in this paper showed that, in Central Asia there has not been a problem with water policy implementation. Water management institutions successfully implemented irrigation-development-oriented policies issued by the government. The quality of the policy decision rested with the national government. After 1991, however, despite the fact that the institutions were recreated from the Soviet era and the whole system has had the capacity to perform, the system fails to operate at its full capacity due to the lack of political guidance from IFAS members and their inability to develop joint vision for the basin. Thus, it is important to keep in mind that water allocation is primarily a political issue. If water allocation is ignored at the policy level, technical collaboration is the best that any basin can hope for.

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Chapter Three: Competition and benefit sharing in the Ferghana Valley – Soviet Socialist Republics' negotiations on transboundary small reservoir construction[1]

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Abstract

While there has been a regional and international focus on large reservoirs in Central Asia, smaller transboundary reservoirs within the Ferghana Valley have been overlooked. The valley is shared by Kyrgyzstan, Tajikistan, and Uzbekistan, three riparian countries of the upstream Syr Darya. Located within the valley are 16 small transboundary tributaries and 7 transboundary reservoirs. In order to understand the complexity of this transboundary setting, this paper explores the history of transboundary infrastructure expansion, with a focus on three small transboundary reservoirs: the Karkidon, Kasansai, and Tortgul; and one medium-sized reservoir, the Andijan. An analysis of the initial proposals and documented negotiations for these reservoirs reveals a changing pattern of benefit sharing. During the Soviet Era, the downstream riparian state of Uzbekistan attempted to claim water rights by initiating negotiations on transboundary reservoir construction and ownership. These past approaches call into question the argument that the boundaries set by the Soviets did not matter, as well as the assumption that Moscow as a hegemon planned infrastructure in order to divide and rule Central Asia. A review of these past negotiations brings forward new perspectives that can help inform the debate on proposed transboundary reservoirs in Central Asia.

Introduction

When examining the international literature on cooperation and conflict in transboundary river basins, it becomes evident that although cooperation is the most common phenomenon, the main focus is on conflict (Wolf et al., 1999). When the emphasis is on hydro-hegemony, even cooperation is viewed critically (Zeitoun and Warner 2006). In the literature on dam/reservoir construction, again the emphasis is on conflicting issues, rather than on positive examples of cooperation. A prominent example of cooperation on a dam is the renegotiation of the Aswan High Dam between Egypt and Sudan in 1959 (Elhance, 1999); in reaching their agreement, however, these two riparian states did not consider the claims of other riparian

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states. Another example is the Columbia River Treaty of 1964 between Canada and the United States. The provisions of this treaty feature equal sharing of downstream benefits from hydropower and flood control in the U.S. resulting from dam construction and the use of 19 $km^3$of stored water in Canada (Muckleston, 2003; Bankes, 2012). The Lesotho Highlands Water Project between Lesotho and South Africa is another positive example of benefit sharing between two countries, although the social and environmental aspects of the project have been questioned (Mwangi, 2007; Keketso, 2003).

The literature on Central Asian water conflict is similar to the literature on the international scale. Most of the transboundary water research in the region covers the hydropower and irrigation nexus, and portrays the presence of conflicting interests between upstream and downstream states, looking either at existing large reservoirs (Toktogul, Nurek) or potential hydropower plants (Rogun, Kambarata) (Wegerich, 2004,2008a, 2009, 2011; Allouche, 2005; Wegerich et. al., 2007; Sojamo, 2008; Jalilov et. al., 2011). To date, the research has not focused on cooperation on smaller reservoirs or other transboundary infrastructure (Wegerich, 2008b; Wegerich et. al., 2012). Little attention has been paid to historic benefit-sharing approaches regarding reservoir construction and operation or to the historic development of agreements between riparian states. In this paper, instead of trying to identify potential conflicts, we explore past water control infrastructure projects and the evolution of benefit-sharing agreements, negotiation processes, project implementation, and out comes on small- and medium-sized reservoirs in the Ferghana Valley of Central Asia.

While there has been a regional and international focus on large reservoirs in Central Asia, smaller transboundary reservoirs within the Ferghana Valley have been overlooked. The valley is shared by Kyrgyzstan, Tajikistan, and Uzbekistan. Located within the valley are 16 small transboundary tributaries and 7 transboundary reservoirs. These transboundary reservoirs are the larger Kairakum and Toktogul reservoirs, the medium-sized Andijan reservoir, and the four smaller Karkidon, Kasansai, Papan, and Tortgul reservoirs. In order to understand the complexity of this transboundary setting, we explore the history of transboundary infrastructure negotiations and expansion, with a focus on four case studies: the Karkidon (216 million m^3), Kasansai (165 million m^3); Tortgul (90 million m^3) and Andijan (1750 million m^3) reservoirs in the Ferghana Valley. We begin with a brief overview of hydro-hegemony and negotiations processes, followed by an introduction to regional policy and the geographical settings within Ferghana Valley. After the case studies section, we discuss the consequences of applied tactics and strategies of the riparian states in this region, as related to the case studies. Finally, we explore whether the dominant strategy during the negotiations over water control infrastructure in Soviet Central Asia was cooperative, and whether it was driven by the local riparian states themselves.

Framework: Hydro-hegemony and Negotiations

Zeitoun and Warner (2006) provide a "framework of hydro-hegemony" for classifying the tactics and strategies used by riparian states to consolidate their control over water resources within basins. They note that "hegemony can be considered as leadership buttressed by authority," and define dominance as "leadership buttressed by coercion." They (2006:438) state "the methods of hegemony employed depend on the capacity of the hegemon to persuade subordinate actors to accept not just the hegemon's authority, but to adopt and internalize its values and norms intended to impose on solution over others." Zeitoun and Warner (2006) refer to Lustick's (2002) four forms of compliance-producing mechanisms: coercion, utilitarian, normative, and ideological hegemony. According to Lustick, coercion is the least efficient and ideological hegemony the most efficient compliance mechanism. Lustick (2002) explores ideological hegemony in the form of nationalism; hence, the concept is mainly explored within a state. This may be the reason that Zeitoun and Warner (2006: 452) distinguish between the "negative/dominative" and "positive/leadership" forms of hydro-hegemony. The hydro-hegemonic framework has been further explored in different transboundary basins (Cascao, 2008; Wegerich, 2008a; Doudy, 2008).

Within their framework, Zeitoun and Warner (2006: 447) interpret utilitarian compliance-producing mechanisms as "incentives" and normative compliance-producing mechanism as "treaties." They make special reference to "mutually beneficial 'shared interest' water projects" as incentives, and appear to link treaties with water-sharing agreements only, for "institutionalizing a status quo." Hence, there appears to be an opaque understanding of water projects and also a limiting usage of the term "treaty." This shortcoming hinders the ability to look at long-term developments, particularly if different water projects and additional treaties are implemented between the same riparian states. Although the framework allows Zeitoun and Warner (2006) to identify the tactics that a riparian state applied, the framework does not focus on negotiations; instead, it focuses on identifying the hydro-hegemon. Hence, the framework fails to explain why each of the negotiating parties has chosen a certain strategy and how that strategy was implemented. This gap can be bridged by borrowing from studies on behavior and negotiations. Pruitt (1983) identified four main strategies for negotiations: problem solving, contending, yielding, and inaction. This classification has since been used to analyze bilateral negotiations and their outcomes at the individual and group levels (Carnevale and Isen, 1986; Carnevale and Pruitt, 1992; Curhan et. al., 2006). Das and Kumar (2011) built on Pruitt's theory and developed a framework that indicates the impacts of the negotiation strategies on the inter-partner relations. They argue that there are cooperative (problem solving and yielding) and non-cooperative (inaction and contending) strategies and tactics leading to either positive or negative outcomes.

In their negotiation strategy classifications, both Pruitt (1983) and Das and Kumar (2011) utilized Blake and Mouton's (1964) motivational studies and Dual Concern Model. According to the model, the negotiators' goals are determined by two independent factors: concern for themselves and concern for the other party (Pruitt, 1983). In the model, the concern can be either high or low for each of the factors, e.g., self and other. The Dual Concern Model, combined with four strategies, makes the following predictions: high concern about one's own and the other party's outcome encourages a problem-solving strategy; high concern about one's own outcome encourages a contending strategy; concern only about the other party's outcome encourages a yielding strategy; concern about neither party's outcome encourages an inaction strategy (Pruitt, 1983).

In terms of negotiation outcomes, the problem-solving strategy yields positive outcomes for both parties; the contending strategy yields a positive outcome for one and a negative for the other; yielding brings a negative outcome for the yielding party and a positive for the other; and inaction damages both parties. Although the negotiation frameworks developed by Pruitt (1983) and Das and Kumar (2011) present four negotiation strategies and four sets of outcomes, the list is not complete. The Pareto efficiency concept, borrowed from studies on economic efficiency, can contribute to the negotiation framework by adding a facilitation negotiation strategy that yields a positive outcome for one party and a neutral outcome for another. A situation is called "Pareto efficient" if the existing set of rights and arrangements and the allocations of resources can be changed in a way that would make at least one person better off without making anyone worse off. Jaeger (2005:136) defines a potential Pareto improvement as "change with winners and losers, but if the winners compensated the losers for their losses, no one would be worse off and at least one person would be better off than before."

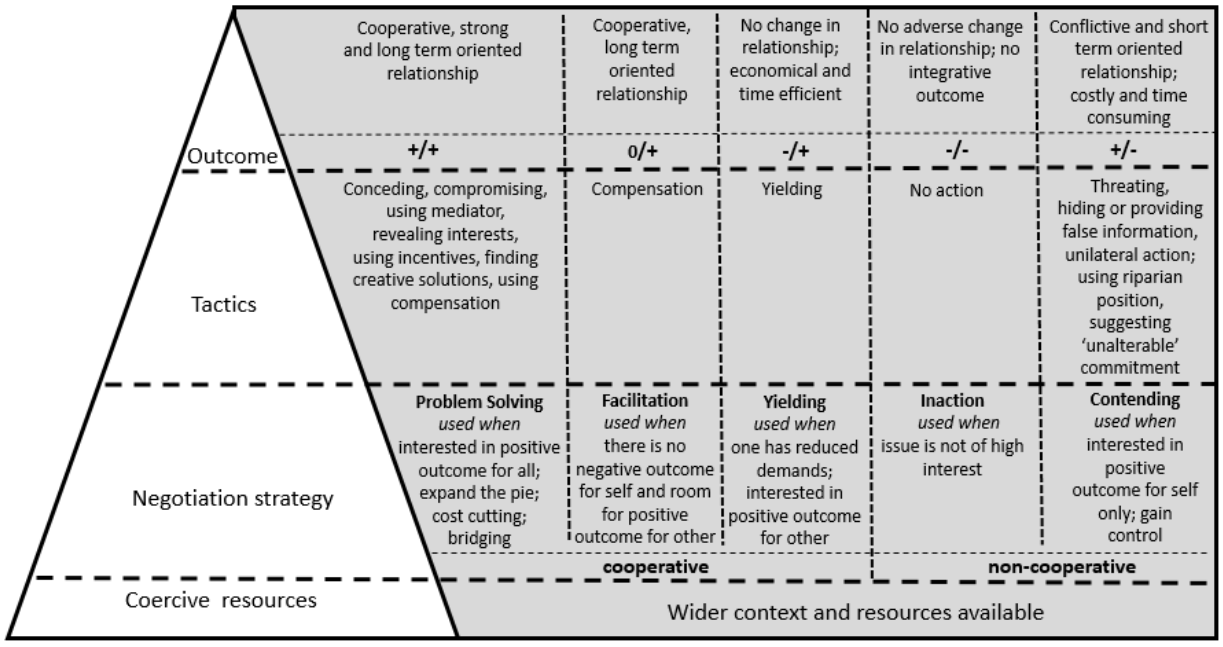


FIGURE 3. TRANSBOUNDARY NEGOTIATION FRAMEWORK[2]

Zeitoun and Warner (2006:441) state that "[The] same conflict can undergo various levels of intensity through time," indicating that water resources negotiations is a dynamic process. Building on this concept of a hydro-hegemony framework, Mirumachi and Allan (2007) developed the Transboundary Freshwater Interaction NexuS (TWINS) framework to analyze water policy dynamics in a three-dimensional matrix that includes conflict intensity, cooperation intensity, and robustness of political economy. The TWINS framework provides the ability to illustrate intensities of riparian conflicts and cooperation over time. Missing from this framework is an element that clearly explains the change in classifications within bilateral relations. The negotiation frameworks based on Pruitt (1983) and Das and Kumar (2011) provide the tools to examine multiple negotiations and therefore explain how partners adapt and change their strategies based on positive or negative experiences from past negotiations. This provides the means to predict the possible future relationship situation between the partners.

Although the hydro-hegemony and TWINS frameworks allow identifying the hydro-hegemon, these frameworks do not cover the issue of the nested scales of the hegemon. This gap can be captured through Taylor's (1982) materialist framework for political geography, which introduces a three-tier hierarchical model for separation and control: (1) World economy, the macro scale; (2) State, the meso scale of ideology,

[2] The framework combines the hydro-hegemony and negotiation frameworks as well as Pareto efficiency concept (Zeitoun and Warner, 2006; Pruitt, 1983; Das and Kumar, 2011; and Jaeger, 2008)

and (3) City, the micro scale of experience. According to Taylor (1982), the tier that "really matters" is the largest world economy; thus, the assumption here is that the lower the tier the less the power. Taylor's model allows us to hypothesize that in moving from the micro scale to the macro scale, and as the stakes get higher, the lower tier hegemon might be replaced by the higher tier hegemon.

Background

In Central Asia, irrigation for growing cotton was an important activity during the Tsarist Russia and the Soviet Union eras. The cotton grown in Central Asia supplied the textile industry of the Russian Empire with the necessary raw materials and eliminated the need to import from abroad (Whitman, 1956; Lipovsky, 1995). Early on, the Tsarist government carried out expeditions to explore the region and plan potential irrigation projects for increasing cropland (Benjaminovich and Tersitskiy, 1975).With the fall of the Russian Empire and the creation of the Soviet Union, the economic policy for Central Asia did not change.

From the start, the Soviet Union focused on establishing the Uzbek SSR as a center for cotton and irrigation development for Central Asia. Tashkent hosted many irrigation research institutes, such as the Central Asian Water Resources Management (Sredazvodkhoz, later Sredazgiprovodkhlopok), Central Asia Research Institute for Irrigation (SANIIRI), and Turkestan State University. These institutions were responsible for conducting research on irrigation, agriculture, infrastructure design, and exploitation, as well as providing training. These organizations served as bridges between individual republics and the central government in discussions of irrigation-related activities and plans (Benjaminovich and Tersitskiy, 1975).

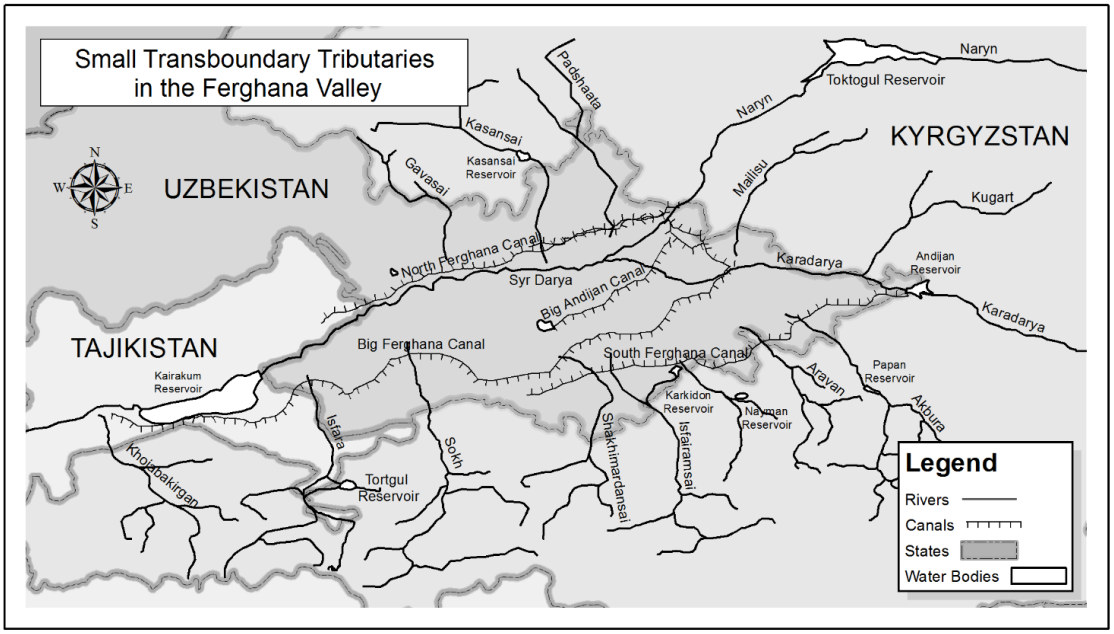
Case Studies

The case study area, the Ferghana Valley, is located within Central Asia and is shared between three countries: Kyrgyzstan, Tajikistan, and Uzbekistan, with Uzbekistan mainly located within the valley and Kyrgyzstan and Tajikistan on the mountain slopes. During the Soviet era, the Ferghana Valley was the leading cotton-growing area for the Central Asian region (Benjaminovich and Tersitskiy, 1975). The main water resources in the valley come from the Syr Darya, which is formed at the confluence of the Naryn and Karadarya in Uzbekistan and is fed by many transboundary rivers, among them the Kasansai, the Isfara, and the Kuvasai. The tributaries of the Syr Darya originate in mountainous Kyrgyzstan (Wegerich et al., 2012). While the Isfara is shared between Tajikistan, Kyrgyzstan and Uzbekistan, the Kasansai, Kuvasai, and Karadarya are shared between Kyrgyzstan and Uzbekistan only. Reservoirs have been constructed on all four tributaries: the Kasansai (formerly Urta-Tokay) Reservoir on the Kasansai, the Tortgul Reservoir

on the Isfara, the Karkidon Reservoir on the Kuvasai, and the Andijan (formerly Kampir Ravot) on the Karadarya (Map 3).

TABLE 2. LIST OF THE SMALL TRANSBOUNDARY TRIBUTARIES IN THE FERGHANA VALLEY. THE LIST OF SMALL TRANSBOUNDARY RIVERS IS NOT COMPLETE. SOURCE: AUTHORS OWN COMPILATION BASED ON BENJAMINOVICH AND TERSITSKIY (1975), THE 1983 SCHEME AND JAMGIRCHIEV (2008).

No	River Name	Average flow (m^3/sec)	Upstream Riparian	Downstream riparian 1	Downstream riparian 2	Location in the Ferghana Valley
1	Akbura	21.5	Kyrgyzstan	Uzbekistan	-	SE
2	Aravan	10.7	Kyrgyzstan	Uzbekistan	-	SE
3	Gavasai	5.9	Kyrgyzstan	Uzbekistan	-	N
4	Kasansai	9.9	Kyrgyzstan	Uzbekistan	-	N
5	Padshaata	6.1	Kyrgyzstan	Uzbekistan	-	N
6	Koksereksai	1	Kyrgyzstan	Uzbekistan	-	N
7	Tentyaksai	12.5	Kyrgyzstan	Uzbekistan	-	E
8	Mailisai	8	Kyrgyzstan	Uzbekistan	-	E
9	Isfara	14.7	Kyrgyzstan	Tajikistan	Uzbekistan	SW
10	Sokh	41.6	Kyrgyzstan	Uzbekistan	-	S
11	Isfairamsai	22.4	Kyrgyzstan	Uzbekistan	-	S
12	Shakhimardansai	9.9	Kyrgyzstan	Uzbekistan	-	S
13	Aksu	4.6	Kyrgyzstan	Tajikistan	-	W
14	Khojabakirgan	11	Kyrgyzstan	Tajikistan	-	W
15	Isfana	0.5	Kyrgyzstan	Tajikistan	-	W



MAP 3. SMALL TRANSBOUNDARY TRIBUTARIES IN THE FERGHANA VALLEY.

Kasansai Reservoir

The Kasansai Reservoir on the Kasansai River is located within the Jalabad Province of Kyrgyzstan in the north of the Ferghana Valley. The reservoir is owned by Uzbekistan, and the Uzbek Namagan Province Basin Irrigation Authority is responsible for its operation and maintenance. The reservoir capacity is 165 million m^3.The negotiations on the Kasansai Reservoir started in the 1930s. According to the former leader of the Kyrgyz SSR, Turdakun Usubaliyev (1998), in the 1930s and 1940s, cotton growing in the Ferghana Valley became very important for the USSR; therefore, the central government requested that the Kyrgyz SSR allocate most of the water resources for irrigation development in the Uzbek SSR. The purpose of the Kasansai Reservoir was to capture winter flow and extreme spring flows from the Kasansai River. The water resources could then be used to cover water shortages during the growing season, as well as to further allow the expansion of the irrigated area within the Ferghana Valley. Under pressure from Moscow, the Kyrgyz SSR had to obey to the request of the Uzbek SSR to allocate land for the construction of the reservoir. The Kyrgyz SSR transferred 660 hectares, which were well suited or the construction of the Kasansai Reservoir, to the Uzbek SSR (Decision, 1941). The construction of the reservoir began in 1941 and was completed in 1954; the Uzbek SSR was responsible for its operation and maintenance.

The next phase of Kasansai Reservoir negotiations started in 1967, when the Uzbek SSR decided to increase the water holding capacity of the reservoir. The Kyrgyz SRR Cabinet, in its *Resolution on land allocation for state and community needs* (1967), complied with the Uzbek SSR's request to allot lands for the expansion of the reservoir. This time, however, the Kyrgyz SSR requested compensation of the allocated lands in same amount and value. The *Resolution* (1967) allocated 190 hectares for the Kasansai Reservoir upgrade. When the Uzbek SSR enlarged its reservoir capacity in 1972, the land compensation to the Kyrgyz SSR was completed in full. At that time, the new border demarcation between the Kyrgyz and Uzbek SSRs was finalized (Decision, 1972a; Decision, 1972b).

After the Soviet Union collapsed and the successor independent states emerged, the ownership of the Kasansai Reservoir was contested. Kyrgyzstan claimed the ownership of the reservoir (Letter, 2005), and as of 2012, the issue had not been resolved. Water management for downstream Uzbekistan has been complicated by the necessity of crossing the Kyrgyz-Uzbek border for operations and maintenance of the reservoir (Namangan Province Water Management Department, 2012).

Tortgul Reservoir

The Tortgul Reservoir is located on the Isfara River within Kyrgyzstan. The reservoir capacity is 90 millionm^3. Water in the reservoir is shared between Kyrgyzstan and Tajikistan. The *Protocol decision* from the 1958 meeting between the Kyrgyz, Tajik, and Uzbek SSRs resulted in an agreement to share the Isfara River waters as follows: Kyrgyz SSR, 2%; Tajik SSR, 57%, and Uzbek SSR, 41% (as cited in Letter, 2008; Kohirov, no date). The plan for the Tortgul Reservoir was adopted by the Cabinet of the Kyrgyz SSR in 1962, and construction began a year later.

From the initial stage, the Soviet Water Planning Institute (*Giprovodhoz*) was involved in project development. However, the Kyrgyz SSR underestimated the costs, and had to ask the Central Committee of the Communist Party of the Soviet Union to increase funding. In 1967, a meeting was held in Moscow; the USSR Minister of Water Resources, Deputy of the Head of the Cabinet of Kyrgyz SSR, and Deputy of Minister of Melioration and Water Resources of Kyrgyz SSR were among the participants. They brought forward the issue that the three republics had not agreed on new water allocations for after the reservoir was complete. At the meeting, it was agreed that the Kyrgyz SSR would continue reservoir construction and would utilize the free flow of the river. The USSR Minister of Water Resources approved the protocol and required that the project proposal on the Tortgul Reservoir be rewritten and that the republics agree on the water shares.

The revised project proposal was created by Giprovodhoz and the Kyrgyz Water Planning Institute in 1968, and was approved in 1969 by the USSR Ministry of Water Resources. Under the revised plan, the Kyrgyz SSR's share of the Isfara would increase from 2% (as cited in Letter, 2008; Kohirov, no date) to 26.7% (Letter, 1998). However, neither the Tajik nor the Uzbek SSR were involved in the planning; they therefore had not agreed to the construction of the reservoir or the increase in the Kyrgyz SSR's water share (Pak et al., 2013). The Kyrgyz SSR appealed directly to Moscow with the request to approve the construction of the reservoir and the expansion of irrigation within its territory. The construction of the reservoir was finalized in 1971. Although no new water agreement was signed, the new infrastructure changed the water allocations within the basin. Possibly to compensate for the increase in the share of the Isfara allocated to the Kyrgyz SSR, the Tajik and Uzbek SSRs constructed numerous lift irrigation schemes, which were financed by Moscow (Pak et al., 2013).

In1980, the Kyrgyz SSR invited Moscow to mediate water-sharing negotiations for the entire Isfara Basin, including agreements concerning the Tortgul Reservoir. During the negotiations, the parties came up with the following solutions: they agreed to gradually increase the Kyrgyz percentage of the water share within the Isfara Basin, while delivering more water resources to the downstream Tajik and Uzbek SSRs via large inter-basin transfers through main canals (e.g., the Big Ferghana Canal (BFC), water sources are the Naryn and Karadarya) and lift stations (directly from the Syr Darya) (Letter, 2008). They also agreed to switch the water sources for the downstream users (Tajik and Uzbek irrigated areas) from the Isfara River to the BFC (Protocol, 1980). Finally, the riparian states agreed that the mediator, the USSR Ministry of Water Resources, would be responsible for determining the annual water shares among the Isfara riparian states.

After 1985, the USSR Ministry of Water Resources stopped determining the annual water shares for the three riparian parties (Kohirov, n.d.). The riparian states agreed that the 1982 allocation principals as set by the USSR Ministry of Water Resources should be used from 1986 onwards (Letter, 2008). Immediately after the former Soviet republics gained independence in 1991, the new republics continued to use the proportions indicated in the 1982 agreement. However, because of Kyrgyzstan's increased dependence on the hydropower operations of the Toktogul Reservoir less water was released into the BFC. The reduced flows made it impossible for the Tajik and Uzbek irrigated areas to switch from the Isfara River to the BFC, and water sharing between them stopped operating despite the 1980 Protocol Agreement (Pak et al., 2013). Water sharing and cooperation on the Tortgul Reservoir between Kyrgyzstan and Tajikistan continued, however (Interview, 2012).

Karkidon Reservoir

The Karkidon Reservoir is located on the Kuvasai within the larger Isfairamsai Basin in the southern Ferghana Valley. The reservoir receives water from the Isfairam and Karadarya. The reservoir capacity is 216 million m^3. The negotiations over the construction of the Karkidon Reservoir began in1961. Both the Kyrgyz and Uzbek SSRs were interested in increasing water availability for irrigation purposes in their respective territories within the Kuvasai Basin. The most suitable location for the reservoir was on the border between the two republics within the territory of the Kyrgyz SSR. The republics agreed that the Kyrgyz SSR would allocate land for the reservoir construction and receive 13% of the stored water resources in the reservoir annually (Decision, 1962). The Uzbek SSR, as the main water consumer, took over responsibility for the construction of the reservoir and became the owner of the reservoir, therefore making it responsible for operation and maintenance. According to Muchkaev (reference note, n.d.), the land allocated for the Karkidon Reservoir construction remained within the administrative borders of Kyrgyz SSR.

In 1965, the Uzbek SSR wanted to increase the water holding capacity of the Karkidon Reservoir. Because the reservoir had been built within the territory of the Kyrgyz SSR, the Uzbek SSR had to request land (698 ha) from the Kyrgyz SSR for the anticipated enlargement (Chernushin, n.d.). The Kyrgyz SSR agreed, but requested compensation from the Uzbek SSR for the land as well as to pay for individual relocations (Decision, 1965). On May 22, 1972 the Uzbek SSR compensated the Kyrgyz SSR with land resources, as specified in the resolution, *Partial change of the border between the Kyrgyz SSR and Uzbek SSR* (Resolution, 1972). During the negotiations over the Karkidon Reservoir upgrade, the Kyrgyz right to 13% of the reservoir water was applied to the new holding capacity of the upgraded reservoir.

The Karkidon Reservoir water-sharing percentages and water delivery issues were raised in the correspondence between the republics during the Soviet era (Letter, 1980; Report, n.d.). According to the Kyrgyz Communist Party, Uzbek water authorities violated the inter-republican agreement and did not deliver the Kyrgyz13% share of the water from the reservoir (Letter, 1980). The Kyrgyz authorities stated that the Uzbek Water Ministry delivered water to Kyrgyzstan at its own discretion and primarily during the flood season, when there were no water shortages. Since the collapse of the Soviet Union in 1991, the situation has remained somewhat similar: the Kyrgyz water authorities cannot monitor and control the implementation of the agreement (Letter, 2011b). As of 2011 the Kyrgyz authorities stated that they "do not have data on the factual reservoir filling" and therefore "there is no capacity to monitor the implementation of the agreement" (Letter, 2011a). Lack of access to the facilities and inability to jointly conduct water measurements create an environment for mistrust.

Andijan Reservoir

The Andijan Reservoir is located on the Karadarya in the southeastern part of the Ferghana Valley. The reservoir capacity is 1,750 million m^3. The reservoir is owned by Uzbekistan, and the Uzbek Andijan Province Basin Irrigation Authority is responsible for its operation and maintenance. The negotiations over the Andijan Reservoir started in 1962, when Uzbekistan proposed the construction of the reservoir within the territory of the Kyrgyz SSR in order to expand its own irrigated area within the Karadarya Basin. The Kyrgyz SSR was also interested in increasing its irrigated area within the basin. The proposed agreement anticipated that the Kyrgyz SSR would allocate land for the construction of the reservoir, but would receive land in an equal amount, as well as cash compensation for village relocation expenses from the Uzbek SSR. In addition, the Kyrgyz SSR was supposed to receive water resources from the new reservoir (via a new channel), as well as a share of the planned Sokh Reservoir in the Sokh Basin (Protocol, 1965). In return, the Uzbek SSR would receive the lion's share of the water resources and would be responsible for the construction, operation, and maintenance of the reservoir.

During the negotiations, the Kyrgyz SSR requested that the Uzbek SSR indicate the exact location of the lands that would receive water from the reservoir and name the organizations that would pay for the individual resettlements from the construction zone (Minutes, 1962; Letter, 1962b). The Uzbek SSR addressed the Kyrgyz concerns and in 1965 the parties agreed to build two canals, one on the right and one on the left bank of the reservoir, for irrigating areas within the Kyrgyz SSR. (Letter, 1980).The right bank canal, the Pravoberejniy Kampir-Ravotsky Channel (PKRC), was supposed facilitate irrigation in the Kugart River Valley, and the left bank canal, the Levoberejny Kampir-Ravotsky Channel (LKRC), was supposed facilitate irrigation in the Sokh River Valley. The PKRC was supposed to be built by the Kyrgyz SSR, and the LKRC was supposed to be built by the Uzbek SSR (Protocol, 1965). It was anticipated that both canals would be finalized at the same time as the Andijan Reservoir (Letter, 1980).

The Tashkent Sredazgiprovodkhlopok developed the Andijan Reservoir proposal and was supposed to submit the proposal to the USSR Water Resources Ministry and USSR Sredazgiprovodkhlopok. The Uzbek SSR proposed to the Kyrgyz SSR that construction begin before the agreement was approved by Moscow; the Kyrgyz SSR agreed to this proposal. However, in 1969 the USSR Water Resources Ministry in Moscow did not agree to the original proposal, and asked to reduce the costs by excluding both the cash compensation for village relocation (9.2 million rubles), as well as the construction costs for the Kyrgyz LKRC, which was supposed to be built by the Uzbek SSR. Neither Sredazgiprovodkhlopok nor the Uzbek SSR informed the Kyrgyz SSR about the decision from Moscow, and in fall of 1969 they submitted a new proposal to the USSR Water Resources Ministry that excluded these two items. Moscow approved the new

proposal on October 2, 1969; however, the Uzbek SSR did not share the information that the proposal has been updated with the Kyrgyz SSR until November 10, 1969 (Letter, 1970). When the Kyrgyz SSR complained to the Uzbek SSR regarding the poor information sharing, the Kyrgyz SSR was informed that it could file an official complaint to the USSR regarding the decision to reject the original proposal. Despite this, the Kyrgyz SSR did not file the complaint.

Since 1991, the management of the Andijan Reservoir has been cooperative; Kyrgyzstan and Uzbekistan regularly communicate on reservoir operation and maintenance (Protocol 2006b; Protocol, 2008a; Act, 2012).

Discussion

To detect and understand the change in the negotiation strategies applied by the riparians, we will examine two distinct features of the water negotiation process: the changing character of the negotiation strategies and the tactics utilized to implement these strategies.

From the perspective of negotiation theory, the first construction of the Kasansai Reservoir during the 1940s could be interpreted as yielding and therefore cooperative. However, taking into consideration the macro scale hydro-hegemon, Moscow, and particularly the political leadership at that time, it may not have been possible to discount plans that would have benefited the (larger) Soviet Union's goals. Although it is possible to classify the act of handing over the land as cooperative (under negotiation theory), it is likely that coercion by the macro hydro-hegemon in Moscow was feared; thus, this was forced cooperation.

In the early 1960s, the situation in the Ferghana Valley changed, however; the construction of new infrastructure (construction of the Karkidon reservoir and planning of the Andijan reservoir) was beneficial for both riparian states, the Kyrgyz and the Uzbek SSRs, who gained access to additional water resources. Here the riparians utilized what from the negotiation perspective is identified as a "problem-solving strategy" and from the hydro-hegemonic perspective as a "utilitarian" approach. Analysis of the Karkidon and Andijan reservoir negotiation outcomes shows that the Kyrgyz SSR benefited from the new reservoirs constructed by the Uzbek SSR.

It could be argued that both partners learned from the outcomes of past negotiations and therefore adapted their strategies and tactics. While this development cannot be explained by using the hydro-hegemony framework, the Transboundary Negotiation Framework does provide insights by allowing a comparison between the negotiations for the reservoirs. The Kyrgyz SSR appeared to have learned from negotiations over the Karkidon (1961) that, as a minimum, it could secure water shares. Hence, in the negotiations on

the Andijan (1962), it negotiated a much larger package, which included water shares, land compensation, individual compensations, the construction of an expensive canal, and shares for a different reservoir.

The Kyrgyz SSR began to unilaterally construct the Tortgul reservoir in 1963. Within the hydro-hegemony framework, this could simply be explained by using the power of the upstream position. Arguably, because the reservoir was located within its own territory, the Kyrgyz SSR did not need to negotiate with the other riparian states regarding land or border issues. It is evident that from the beginning, the Kyrgyz SSR must have known and anticipated that the new construction would change the water allocations within the basins, and therefore would negatively affect the other riparian states. However, it appears that the Kyrgyz SSR may have learned from the Karkidon negotiations that it could claim at least non-captured water rights within the basin, such as winter flow and extreme spring flows.

Although the negotiations on the Karkidon (1965) and Kasansai (1967) reservoir upgrades utilized the compensation tactic, the strategies chosen by the riparians were different. During the negotiations over the Karkidon Reservoir upgrade in 1965, the Uzbek and Kyrgyz SSRs chose to continue their previous, positive negotiation experience (i.e., the Karkidon negotiations in 1961) and they utilized problem-solving and/or utilitarian strategies. In the case of the Kasansai upgrade, however, the Kyrgyz SSR facilitated irrigation expansion in the downstream Uzbek SSR, but applied a facilitation strategy. It stands to reason that the Kyrgyz SSR was not able to claim a water share due to the geographical location of the existing reservoir.

Looking at the later phases of the Andijan reservoir construction, one could assume that the Uzbek SSR learned from the Kyrgyz SSR behavior on Tortgul and therefore also followed a contending strategy of hiding information. From the hegemony perspective, the Uzbek SSR behavior could be explained in two ways. First, following the request of the hegemon, e.g., the federal government, it reduced the construction costs. Second, following its personal interests in increasing the benefit from the river, the Uzbek SSR utilized a contending strategy and concealed the information from the Kyrgyz SSR. Hence, the Andijan case presents a two-level hydro-hegemony interpretation: within the basin (meso scale) and beyond the basin (macro scale).

According to the Transboundary Negotiation Framework, sustainable agreements are those based on problem solving, facilitating, or yielding strategies, all of which are based on cooperation. In all analyzed reservoirs, at some stage, these positive strategies were used. However, in the case of the Kasansai Reservoir, the identified forced cooperative and yielding strategy may have created a negative outcome, since today the reservoir is contested. In the case of the Tortgul Reservoir negotiations, which were contested from the start by the Uzbek SSR, but were facilitated by Moscow, the cooperative strategy was

implemented through compensation and mediation (1980s). Since Moscow stopped participating in mediation in 1985, this might suggest that remaining as the mediator for these small tributaries was not much of a priority. Hence, it is possible that Moscow did not in fact intend to "divide and rule" (O'Hara 2000: 430), at least in these small basins. After independence in 1991, the conflictive situation in the Isfara Basin concerning the Tortgul Reservoir continued. As of 2012, however, the conflict has mainly been between the downstream riparian states, Tajikistan and Uzbekistan, and is related to the broken compensation mechanism for switching from Isfara to BFC (Pak et al., 2013).

From the hegemony perspective, the most efficient and perhaps therefore the most sustainable strategy would be ideological hegemony. Arguably, Moscow never achieved a complete 'ideological hegemony' in Central Asia because the republics reserved the ability to negotiate reservoir construction arrangement and ownership rights for themselves. They also preferred utilitarian and/or facilitating strategies to a hegemonic belief strategy for working to achieve their irrigation expansion goals. Also, given that the USSR collapsed and the Soviet Union ideology vanished, it may be argued that those projects based on "ideological hegemony" are not sustainable, since they were easily questioned after the hegemon's collapse.

The most frequently utilized tactics for coming to an agreement between the riparian states on building new or upgrading existing water-control infrastructure were incentives, compensation, and ownership rights. Incentives were largely utilized because all of the transboundary water projects were developed collaboratively through the regional organization Sredazgiprovodkhlopok, wherein the riparian states worked together, and because the projects were aimed to increase agricultural production in Central Asia, which was demanded by Moscow. The parties also saw the incentive in the "increased pie," because reservoirs that improved water availability allowed for future irrigation expansion. It appears that if compensation alone was utilized, either regarding land (Kasansai Reservoir) or water (Tortgul Reservoir), the long-term outcome was not positive. This particularly applied in the case of the Tortgul Reservoir, in which the compensation was based on annual allocations rather than a single installment. With the collapse of the Soviet Union, the compensation mechanism (costly lift irrigation and water transfers dependent on other riparian states) collapsed as well (Pak et al., 2013). In this respect, the determination of clear, single-ownership rights of reservoirs based on who benefits most, as a creative solution, followed the same approach as that of reducing transaction costs. In a case where a joint ownership among the riparian states would have been applied, there would have been annual negotiations and agreements on dividing the operation and maintenance costs of the infrastructure.

TABLE 3. RESERVOIR NEGOTIATION STAGES, STRATEGIES AND OUTCOMES.

No	Starting date	Reservoir	Negotiation Tactics		Negotiation framework strategy	Hydro-hegemony framework strategy	Hegemon	Outcome
			Uzbekistan	Kyrgyzstan				
1	1941	Kasansai	No action	Uncompensated land transfer	Yielding	Coercion Moscow - hegemon	Moscow	Cooperative
2	1961	Karkidon	Incentive, 13 % of reservoir water	Incentive, land transfer	Problem solving	Utilitarian	Uzbek SSR	Cooperative
3	1962	Andijan	Incentive, water from the new infrastructure; compensation	Incentive, more water	Problem solving	Utilitarian	Uzbek SSR	Cooperative
4	1965	Karkidon	Compensation, land transfer	Compensation, land transfer	Problem solving	Utilitarian	Uzbek SSR	Cooperative
5	1967	Kasansai	Compensation, land transfer	Compensation, land transfer	Facilitating	Coercion Moscow - hegemon	Moscow	Cooperative
6	1968	Tortgul	Construction disapproval	Unilateral action, reservoir construction	Contending	Disapproval, unilateral action	Kyrgyz SSR	Non-cooperative
7	1980	Tortgul	Mediation; gradual change in water share	Mediation, using Moscow; Inter-basin transfers	Problem solving	Infrastructure construction, mediator	Kyrgyz SSR	Cooperative

Conclusion

The analyzed documents, agreements, protocols and letters highlight that certain arguments made in the past are no longer valid. First, the referenced documents show that the SSRs themselves came up with the proposals for infrastructure outside or at the boundaries of their SSRs. Hence, it was not Moscow that drove the development to "divide and rule" O'Hara (2000: 430). However, it is important to point out that this was true only for the relatively small-scale water infrastructure studied in this paper. This would confirm the nested approach to hegemony, wherein Moscow focused on large-scale projects, leaving smaller basins and their infrastructure to the Central Asian SSRs. Secondly, the land exchanges for infrastructure development show that boundaries mattered already during the time of the Soviet Union (Megoran, 2004).

This study showed that in all cases, at some stage of negotiations, cooperative (i.e., problem-solving and facilitating) strategies were utilized. Hence, riparian states either increased their benefit or at least was/were not made worse off. However, the case studies also highlighted that equal compensation may not be sufficient for yielding long-term positive outcomes. This study also showed that problems may occur if compensation was based on annual allocations. Moreover, if the benefit of one riparian increased and the increase was defined in percentages, not volumes, e.g. 13% share of the annual water stored in Karkidon, there were problems with monitoring. Such problems may have been foreseen and therefore clear ownership rights of the party benefitting the most and the obligations of that party were determined in order to allow long-term, sustainable cooperation.

The Transboundary Negotiation Framework suggests that there is a learning curve inherent to the negotiations; hence, there could be a positive feedback loop of making both riparian states better off. The case of Ferghana Valley showed that even though there was a learning process, there also appeared to be ruptures. Arguably, since the study evaluated only four reservoirs, the full picture is missing. One has to take into consideration that on the one hand, negotiations are influenced by the wider political context and therefore there may be jumps from one strategy to the other (as was the case at the end of the Stalin era), on the other hand, third parties can also influence the outcomes (i.e., Moscow imposing its will, and later withdrawing from mediation).

The analysis showed the importance of looking at the historical evolution of cooperation on transboundary infrastructure and learning from experience before building new infrastructure in a region. In this respect, past negotiations on proposed reservoirs, e.g., Rogun and Kambarata, should also be analyzed.

In this paper, instead of trying to identify potential conflicts, we explore past water control infrastructure projects and the evolution of benefit-sharing agreements, negotiation processes, project implementation, and outcomes on small- and medium-sized reservoirs in the Ferghana Valley of Central Asia. The results suggest that future negotiations on proposed reservoirs, should take into account the outcomes that any chosen negotiation strategy may generate. As the evidence from the small- and medium- sized reservoirs construction negotiation in the Ferghana Valley shows, the negotiations which were based on cooperative strategies, such as problem solving, facilitating and yielding, resulted in long term positive outcomes for the parties involved.

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Chapter Four: Re-examining conflict and cooperation in Central Asia: a case study from the Isfara River, Ferghana Valley[3]

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Abstract

While conflict and cooperation in Central Asia are mainly focused on the larger basins (Amu and Syr Darya) and the implementation of the agreement reached directly after independence (1991), here an analysis of the history of water-sharing agreements in the Isfara Basin is presented. The paper reveals that there have been fierce negotiations and renegotiations even during the Soviet Union period between the Central Asian riparian republics; agreement was reached mainly though engineering solutions that brought more water to the basin. The paper highlights that although water-sharing agreements were reached early on, the technical capability of implementing these agreements was lacking. Similarly, even after independence, agreements had been reached but lack of water control hindered their implementation.

Introduction

In the realm of conflict and cooperation, researchers often raise the issue of the potential for water conflict in Central Asia (Human Development Report, 2006; Intelligence Community Assessment, 2012). Others, however, state that there is a low probability of conflict, and there are precedents for both conflict and cooperation over water resources management in Central Asia (Sojamo, 2008). Despite this ongoing debate, scientists talk mainly about the main stem rivers – the Amu Darya and Syr Darya. Recent case studies on conflict and cooperation in Central Asia (Sojamo, 2008; Wegerich, 2004, 2008) have utilized internationally discussed conflict-and-cooperation frameworks (Zeitoun and Mirumachi, 2008; Zeitoun and Warner, 2006). Analysis of agreements in Central Asia focusing on cooperation in large, basin-wide agreements is also widely available (Rahaman, 2012). However, no research has been undertaken on conflict and cooperation on small tributaries. Such research is needed to understand the relationship between conflict and cooperation on both small and large rivers in Central Asia.

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This paper focuses on the Isfara River, a tributary of the Syr Darya, within the Ferghana Valley of Central Asia. The Isfara Basin is shared by Kyrgyzstan, Tajikistan and Uzbekistan. Different projects and water authorities in the riparian states reference different water-sharing agreements for their water allocations, and all of them claim that these agreements are still valid. A UNDP report (2011) makes reference to water-sharing principles of the mid-1950s; a GIZ (2011) report makes reference to a protocol of April 1980; the Tajik Sugd Province Water Management Department (WMD) makes reference to a sharing principle of 1982; and the Uzbek Ferghana Basin Irrigation System Authority makes reference to principles of June 1980. Hence, there seems to be a mismatch of what international and national organizations claim are the official riparian water allocations. Through the International Water Management Institute (IWMI) database on small transboundary tributaries in the Ferghana Valley it was possible to access all these agreements, protocols and statements on sharing the water resources of the Isfara. It appears that there have been rapid changes in water-allocation principles since the first agreement in 1946 (Table 4).[4] While having a long history of agreements and constantly updated agreements on water sharing is a great sign of cooperation, it also raises questions as to what triggered the changes and whether and how the riparian states adapted.

TABLE 4. JUNE – SEPTEMBER WATER ALLOCATIONS (AVERAGE OF 10-DAY PERIODS) IN PROTOCOLS READING ISFARA RIVER FROM 1946 TO 1991.

Republic	Protocol 1946	Protocol 1958	Protocol 1980 Apr	Protocol 1980 Jun	Protocol 1982	Protocol 1991
Kyrgyzstan	2%	2%	37%	17%	22%	33%
Tajikistan	50%	57%	55%	48%	40%	34%
Uzbekistan	48%	41%	8%	35%	38%	33%

Source: IWMI database.

The paper continues with a short framework section looking at different approaches to conflict and cooperation. The next section provides the background to the Ferghana Valley and the Isfara Basin. This is followed by a historical overview of the agreements as well as the causes and consequences of changes in the agreements from the former Soviet Union up to independence in 1991. The historical overview is structured into three subsections: agreements under high uncertainty; getting more water to compensate for the new user; and from borderland cooperation to riparian exclusion. The last section concludes that early sharing agreements on the Isfara and the Big Ferghana Canal (BFC) were made without the technical ability to actually deliver the agreed water resources and that agreements on the BFC did not take into

[4] The rest of the article uses the averages for the June–September months of the vegetation period. The protocols exclude percentage water allocations for April and May because these have not changed since the 1958 protocol.

consideration the BFC's dependence on the operation regime of Toktogul Reservoir in upstream Kyrgyzstan. In addition, the case study on Isfara reveals that Tajikistan has so far not been correctly seen as a downstream riparian that is dependent on Toktogul operations. Furthermore, by highlighting the costly compensations to downstream riparian states to facilitate irrigation expansion in the midstream riparian, Kyrgyzstan, the case study also puts into question the current focus on benefit sharing on the Syr Darya.

Framework

Water conflict and cooperation have been extensively studied, mainly from two different angles: large-scale evaluation of international water treaties and case studies on individual basins. Wolf, Nathanus, Danielson, Ward, and Pender (1999) identified 261 international basins. Wolf, Yoffe, and Giordano (2003) examined these international watersheds and contributed greatly to understanding conflict and cooperation on the global scale. Whereas large-scale document analysis reveals broad and general trends in international water management practices, the case-study approach provides very detailed analysis of a specific watershed. Case studies highlight the existence of both conflicts and cooperation (Alam, 2002; Iyob, 2010; Wegerich, 2008; Wolf and Newton, 2008). Zeitoun and Warner (2006) introduced the concept of hydro-hegemony. They reasoned that treaties can be the outcome of exertion of power and that a hegemonic state could use different strategies to gain water control. The hydro-hegemony concept envisions the possibility of conflict and cooperation coexisting.

Mirumachi and Allan (2007), building on the concept of hydro-hegemony, developed the Transboundary Freshwater Interaction NexuS (TWINS) framework to analyze water policy in a three-dimensional matrix of conflict intensity, cooperation intensity and robustness of political economy. According to them (2007, p. 9), since the focus is on agreements alone, there is "incomplete information on negotiations"; hence the matrix provides approximations only. Mirumachi and Allan (2007, p. 14) make reference to the "robustness of political economy" as a 3rd dimension and explain this dimension with "resource capture, resource sharing and resource alternatives". This seems to be an ambitious interpretation of Ohlsson and Turton (1999, p. 3), who distinguish between "engineering efforts (more water), end-use efficiency (more use per drop) and allocative efficiency (more value per drop)", which supposedly could explain the resource basis of the brokered agreement.

These different approaches have one thing in common: they focus on national solutions. Recently, Wegerich, Kazbekov, Kabilov and Mukhamedova (2012a), utilizing the concept of border communities, showed that cooperation at the intermediate level, between border communities and water management organizations, continues, even though on the national levels there is a lack of cooperation. In addition,

looking at agreements only implies an underlying assumption that what has been agreed upon is technically implementable. Although this has already been contested for the local level, pointing to appropriateness and the ability of technology to control water resources and the interaction between the technology at the outlet and system levels affecting water rights and water markets (Kazbekov, Wegerich, and Musayev, forthcoming; Wegerich, 2010), this debate is rarely extended to the national transboundary setting.

Geographical setting of the Ferghana Valley and the case-study area

The Ferghana Valley is located within Central Asia. It is shared between Kyrgyzstan, Tajikistan and Uzbekistan, with Uzbekistan mainly in the valley and Kyrgyzstan and Tajikistan on the mountain slopes. The Ferghana Valley is in the south-western part of the Tien-Shan mountain range. This range is the main source of all rivers in Central Asia. The Syr Darya River is formed at the confluence of the Naryn and Karadarya Rivers in Uzbekistan. These two rivers originate in mountainous Kyrgyzstan. Similar to these two main tributaries, more than 30 small mountain rivers are transboundary tributaries to the Syr Darya, most of them within the Ferghana Valley (Map 3). Overall, the small transboundary tributaries in the Ferghana Valley contribute 7.8 km^3 per year to the flow of the Syr Darya, whose total flow is 37 km^3 per year.

The Isfara (average annual flow 0.4 km^3) is one of these small transboundary tributaries, located on the western slope of the valley (Map 4). The Isfara is shared between Kyrgyzstan, Tajikistan and Uzbekistan. Its formation zone is located in Kyrgyzstan. On its way towards the Syr Darya, the Isfara River passes through a Tajik enclave, Vorukh, before re-entering Kyrgyz territory (Batken District). Tangi Vorukh is located within the Vorukh enclave (part of Tajikistan within Kyrgyzstan). Constructed in 1909, strengthened with concrete in 1956 and partly renovated in 1980, it is the main metering station for water allocation within the basin. After the Vorukh enclave in Batken District, the area in direct proximity to the river is disputed between Tajikistan and Kyrgyzstan. After Batken District, the river re-enters Tajikistan (Isfara District). Directly at the boundary, the main flow (during the non-vegetation season: October to March) of the Isfara is diverted into the Tortgul Reservoir (constructed in 1971, began operation 1975), located in Kyrgyzstan. Here, the exact boundary demarcation is contested between the states.

The Tortgul Reservoir has two outflow canals. One diverts water to Kyrgyzstan (Batken District), and the other diverts water back to the Isfara (during the early vegetation season: April to September) within the Isfara District to compensate for possible water shortages. The Isfara River continues within Isfara District until it reaches the Rovot water-control facility (constructed in 1910), located at the administrative boundary of two Tajik districts. The facility allocates water to Tajikistan (Kanibodom District) and Uzbekistan

(Besharyk District). For these two districts, water is mainly diverted from the Isfara into the BFC, which flows through Uzbek as well as Tajik territory; however, some of the water is utilized before entering the BFC. The 270 km BFC (constructed 1939) diverts water from the Naryn and Karadarya Rivers. The main source of the BFC is the Naryn. This transboundary canal originally supplied 311,000 ha in the Kyrgyz SSR (Osh Province), Uzbek SSR (Andijan, Namangan and Ferghana Provinces) and Tajik SSR (then Leninabad Province, now Sugd Province) (Benjaminovich and Tersitskiy, 1975). On its way, the BFC is fed from different transboundary tributaries (Wegerich, Kazbekov, Mukhamedova, and Musayev, 2012b). The Isfara is the last tributary contributing to flow in the BFC, the implication being that some of the flow of the Isfara River will re-enter Tajikistan through the BFC channel.

MAP 4. THE ISFARA RIVER BASIN.

Historical development of the sharing agreement for the Isfara up to independence

Agreements under high uncertainty

The first Isfara River water-allocation protocol dates from April 1946 (Protocol, 1946). The main emphasis within the protocol is on water sharing from April to June, when water is more scarce. However, the protocol also mentions that if it becomes necessary, water should be shared from July to September according to the allocation for the third decade (10 days) of June (which gives Uzbekistan a 49% share).

According to this protocol, Isfara shares were allocated as follows: Kyrgyz SSR 2%; Tajik SSR 50%; Uzbek SSR 48% (June–September).

Between 1953 and 1962, the BFC went through major reconstruction, which increased the water intake in the upper Naryn section from 98 to 150m3/s, and increased constant flow from the BFC to Tajikistan from 8 to 13m^3/s (Benjaminovich and Tersitskiy, 1975). It should be noted that during this period the rivers were still uncontrolled, because major dams had not yet been constructed. The reason for the upgrade was the expansion of irrigated area within all parts of the Ferghana Valley. However, it is not clear whether the increase to the Tajik SSR through the BFC described by Benjaminovich and Tersitskiy (1975) actually materialized. A protocol of 1957 (Protocol, 1957) reveals that the water in the Isfara and the BFC was already contested, and that both downstream riparian states, the Tajik SSR and the Uzbek SRR, took water from either the BFC or the Isfara if the water allocation from one of these sources was not delivered from the other source as agreed. The Tajik SSR was to receive 13m^3/sec from the BFC during the whole vegetation period (Protocol, 1957), and Uzbekistan was to receive water allocation from the Isfara according to the 1946 protocol.

Only one year later, a new protocol established water allocations in the Isfara for the whole vegetation period (Protocol, 1958). According to this protocol, Isfara shares were allocated as follows: Kyrgyz SSR 2%; Tajik SSR 57%; Uzbek SSR 41%. In the 1958 Protocol, reference is made to the June–September months of the vegetation season.

Although the first agreement on the Isfara Basin mentions only percentages, one has to remember that the Isfara River was at that time uncontrolled. In addition, although the expansion of BFC started at the end of the 1930s it is highly questionable whether during the time of the First World War, the Russian Civil War and Second World War data were always collected from Tangi Vorukh which could have been used for accurate predictions or even 10-day estimates. That the structure was strengthened in 1956 implies that it may have been damaged over the years or may not have been accurate. Furthermore, it is highly unlikely that at that time accurate water withdrawals at different points would have been possible to implement. In this respect, it is even more astonishing that after the reconstruction of the BFC, but without appropriate control on the main river and only some control on the canal, itself an agreement was reached which specified delivery in to m^3/s to the Tajik SSR.

Already in these early days, the situation of not being in control of the water resources either on the canal or on the Isfara River led to compensation mechanisms. Arguably, Uzbekistan was in a better situation,

having access to two sources (the BFC and the Isfara). The increase in water allocation to the Tajik SSR from the Isfara appears to be directly linked to the inability of the Uzbek SSR to deliver the agreed limit of 13m^3/s from the BFC. Arguably, the increased share of the Isfara for the Tajik SSR was based on the Uzbek SSR's getting more water from the BFC. It is not evident whether more water from the Isfara implied less water from the BFC for the Tajik SSR, that is whether a change in the priority of supply for irrigated areas took place – supplying the upstream Tajik SSR from the Isfara compared to the downstream Tajik SSR from the BFC. Nevertheless, we may assume that the irrigated area in the Tajik SSR (downstream BFC) was at that time not yet developed, since the improvement started only in 1953. Since neither the Uzbek nor the Tajik SSR had to pay for the additional water (funding was provided from Moscow), it appears that the solution was in the interest of both riparian states.

Getting more water to compensate for the new user

During the 1960s and 1970s, numerous reservoirs were constructed in the Ferghana Valley to combat water shortages as well as to further increase the irrigated area (Matveev, 1988). Toktogul (start of operation 1974), Andijan (1978), Tortgul (1975) and other reservoirs were built during that period. Arguably, it was only with the construction of these reservoirs that water control within the large transboundary canals, including the BFC, could be achieved.

The construction and operation of the Tortgul Reservoir was planned by the Soviet Water Planning Institute (Giprovodhoz) and the Kyrgyz Water Planning Institute in 1968 and approved in 1969 by the USSR Ministry of Water Resources. According to the plan, the Kyrgyz SSR's share of the Isfara would increase from 2% (Protocol, 1958) to 26.7% (Letter, 1998). Neither the Tajik nor the Uzbek SSR was involved in the planning; the therefore had not agreed to this increase in the Kyrgyz SSR's share. Despite the disagreement of the other riparian states, the construction of the reservoir went ahead, and consequently Isfara water allocation started changing (Figure 4). Possibly to compensate for the increase in the share of the Isfara allocated to the Kyrgyz SSR, the Tajik and Uzbek SSRs constructed numerous pump stations. In the Kirov (now Besharyk) District of the Uzbek SSR, four pump stations – Uzbekistan (completed 1972, lift 35 m, irrigated area 250 ha), Rapkon-2 (1974, 20 m, 290 ha), Rapkon-1 (1980, 200 m, 1000 ha) and Bahmal (1984, 85 m, 820 ha) – were constructed to lift water from the BFC towards the Isfara. In addition, a larger pump station was constructed in Besharyk District to lift water from the Syr Darya towards, but not reaching, the BFC (1978, 54 m, 5020 ha). In the Tajik Kanibodom District, three pump stations were

constructed: Mahram (1975, 69 m), to lift water from the Kairakum Reservoir into the BFC; Shurkul (1980, 22 m, 400 ha); and Poymennaya (1983, 22 m, 1400 ha).

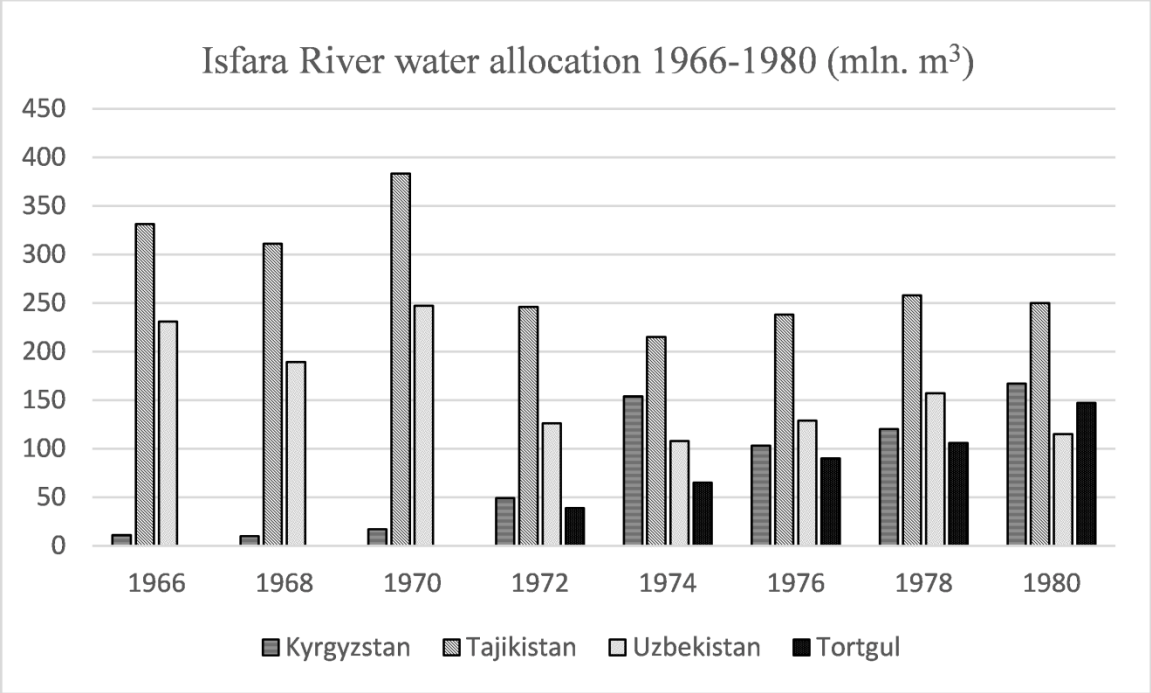


FIGURE 4. CHANGES IN ISFARA WATER ALLOCATION, 1967 TO 1986. SOURCE: DATA PROVIDED BY THE SOGD WATER MANAGEMENT DEPARTMENT.

In 1980, at the request of Osh Province (Kyrgyz SSR), the USSR Ministry of Water Resources facilitated a meeting between the Kyrgyz SSR and the Uzbek SSR to address water allocations of small rivers within the Ferghana Valley. The meeting was held in Moscow on 11 April, 1980 (Protocol, 1980a). The Tajik SSR did not take part in this meeting; however, of the different tributaries discussed, only one (the Isfara) is shared by Tajikistan. The participants at the meeting took into consideration all the water sources (mainly between the Kyrgyz and Uzbek SSRs), including new reservoirs, water from the main canals adjacent to the Naryn and Karadarya, groundwater and the small rivers themselves, and proposed to the USSR Ministry of Water Resources that they approve the following water allocations for the Isfara: Kyrgyz SSR 37%; Tajik SSR 55%; Uzbek SSR 8%.

The Uzbek SSR did not approve the April 1980 protocol regarding the allocation of the flow of the Isfara River. Therefore, a new meeting between all the riparian republics was held in Isfara City (12 June 1980b). A new water allocation for the Isfara was proposed: Kyrgyz SSR 17%; Tajik SSR 48%; Uzbek SSR 35%. In addition, the riparian states requested the "USSR Ministry of Water Resources to ask the Design Institute

to develop a proposal on Isfara River flow redistribution for 1981 and the following years, also identify objectives (based on years and volumes) to cut off from the Isfara River these areas, which are below the BFC: the Kirov [Besharyk] and Kanibodom Districts (of the Uzbek and Tajik SSR, respectively)" (Protocol, 1980b). Hence, it appears that the proposed allocation was temporary until other sources for the Uzbek SSR and Tajik SSR could be determined and utilized. It is important to emphasize that this protocol only made reference to irrigated areas below the BFC. This implies that the BFC was identified as one of the alternative sources of Isfara water supply. It was decided that on an annual basis, starting in 1980, the USSR Ministry of Water Resources would define the Kyrgyz share of the Isfara and the rest of the flow would be divided between the Uzbek and Tajik SSRs according to the 1958 Protocol (Kohirov, no date).

In 1982, the USSR Ministry of Water Resources defined the Isfara shares as follows: Kyrgyz SSR 22%; Tajik SSR 40%; Uzbek SSR 38%. These allocations were accepted by all the riparian states. After 1985, the USSR Ministry of Water Resources stopped calculating the Kyrgyz share of the Isfara (Kohirov, no date). Starting in 1986, the water from Isfara River was allocated "according to the 1982 principle" (Letter, 2008).

Just before the USSR collapsed, a new protocol was signed between the Tajik and Uzbek SSRs in which the Basin Water Organization (BWO) Syrdarya was also involved. This protocol (Protocol, 1991a) divides the Isfara shares as follows: Kyrgyz SSR 22%; Tajik SSR 46%; Uzbek SSR 32%. In the protocol, it is explicitly stated that new water allocations take into consideration additional water resources delivered to the Isfara downstream from the Syr Darya River. Just one month later, in May 1991, the USSR Ministry of Water Resources issued a new protocol. The new protocol used the 1982 Protocol provisions as a guiding tool to allocate water among the Isfara riparians. This way, the Kyrgyz per cent of water share from Isfara increased to 33%. The remaining water flow was shared between downstream Tajik and Uzbek SSR in the same proportions as in the 1982 Protocol (Protocol, 1991b). This was the last agreement made in the Soviet Union on the Isfara allocations.

This period is characterized by facilitating the rising share of the Kyrgyz SSR within the already closed Isfara Basin through engineering solutions which would provide additional water sources for the other riparians, the Tajik as well as Uzbek SSRs. Again, since the budget for construction as well as operation and maintenance was facilitated in Moscow (the hegemon), it is clear that the Tajik and Uzbek SSRs complied, if hesitantly. In addition, given that during this period other reservoirs (the Toktogul and Andijan,

but also the downstream Kaikakum) started to operate, there was more control of water – and at the same time cheap electricity available – which facilitated compensation infrastructure.

Nevertheless, the rising involvement of Moscow in determining annual water allocations on the Isfara as well as the proposal to hand over the operations to the BWO Syr Darya highlights that the water resources on the Isfara had become more contested. The strong emphasis on changing allocations with the completion of compensation mechanisms further underlines that the Isfara Basin as well as BFC water was closed.

From borderland cooperation to riparian exclusion

According to the Ferghana Province representative (personal communication, 2012), the 1982 protocol's water allocations "worked" for some time after independence (1991a), but later they became irrelevant. In the past (but after 1991), there were informal agreements (Gabriel Eckstein discusses this in his blog International Water Law Project between the US and Mexico) to discharge all the Isfara water allocated to Kanibodom District to the BFC in Besharyk. In return, Besharyk provided a constant flow in the BFC from Uzbekistan to Tajikistan (Map 5). These allocations were negotiated and agreed between the two downstream districts and worked quite well. The administration at the province level in both republics was aware of the informal gentlemen's agreements between the districts, and in a way was satisfied with their solution. The Ferghana Province representative stated that they "are happy that they [districts] are resolving the issue among themselves". According to a key informant from the Ferghana WMD, the amount Uzbekistan received from the Isfara could have been anywhere between 60 million m^3 and 150 million m^3 (informal discussion, 2012). This would have been between 12% and 30% of the annual average runoff of the Isfara (502 million m^3, 1955–1984). It appears that the gentlemen's agreement stopped working after the 1998 Syr Darya Basin Agreement stopped working (Figures 5 and 6). In the period from 2001 to 2010, Uzbekistan officially received from 10 million to 40 million m^3 (2–8%) of the Isfara's annual average runoff. This case shows how amicable local bilateral relationships can be deteriorated once they are affected by the large scale conflict.

The Syr Darya Basin Agreement (1998) focuses on use of the water and energy resources of the Naryn River below Toktogul Reservoir and was adopted on 17 March 1998 by the governments of Kazakhstan, Kyrgyzstan and Uzbekistan. An amendment to include Tajikistan was adopted on 19 June 1998. According to the agreement, the downstream riparian states agreed to purchase Kyrgyzstan's hydro-electric power during the summer and sell other energy resources to Kyrgyzstan in the winter. How much energy the downstream riparian states were to purchase, and therefore how much water they should receive, was to be

determined annually. The amendment incorporated the operation of the Kairakum Reservoir into the agreement, stating that electrical energy would be supplied to Tajikistan when the reservoir was filling and that amounts of energy equal to these supplies would be repayable by Tajikistan during the summer.

Isfara River is closely linked to the operation of Toktogul Reservoir through water deliveries into the BFC. The BFC takes mainly water from the Naryn, and the Naryn water is influenced by the releases from Toktogul Reservoir in Kyrgyzstan. Since Uzbekistan and Kyrgyzstan do not cooperate regarding the operation of Toktogul, the water received in the BFC is unstable. It should be noted that Tajikistan had never been (and still is not) considered to be a downstream riparian dependent on Toktogul Reservoir. The implication is that Tajikistan never purchased electricity from Kyrgyzstan to guarantee its water supply in the transboundary canals fed from the Naryn (including the BFC). Hence, strictly speaking, since Tajikistan does not buy electricity from Kyrgyzstan, Tajikistan officially is not entitled to water delivery from Toktogul through the BFC. This puts into question whether there can be limits for Kanibodom District from the BFC in the first place, and more broadly, given that Uzbekistan and Kyrgyzstan do not cooperate on the Toktogul Reservoir, whether planned limits for individual districts from the BFC are deliverable and make sense.

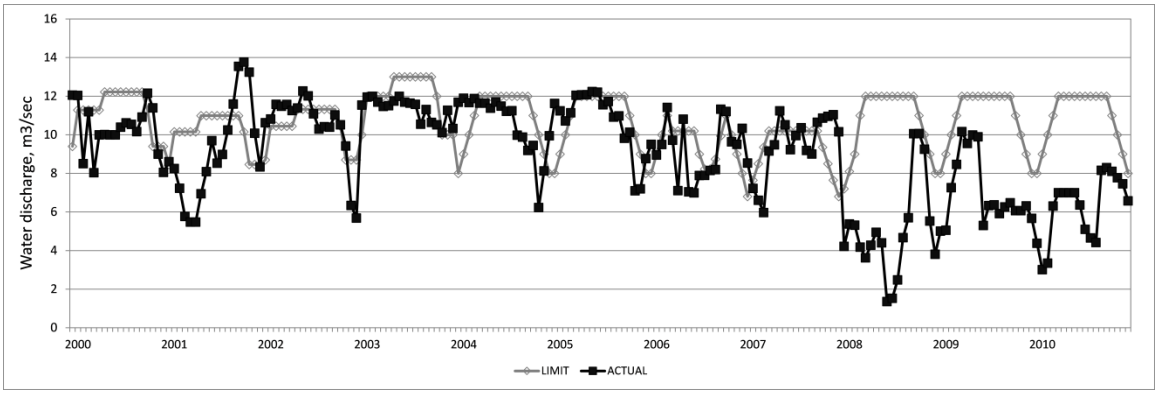


FIGURE 5. WATER ALLOCATION LIMITS AND ACTUAL DELIVERY TO KANIBODOM DURING THE VEGETATION PERIOD – TAJIKISTAN'S SHARE FROM THE BFC (M^3/S). SOURCE: ADAPTED FROM CAREWIB (2011).

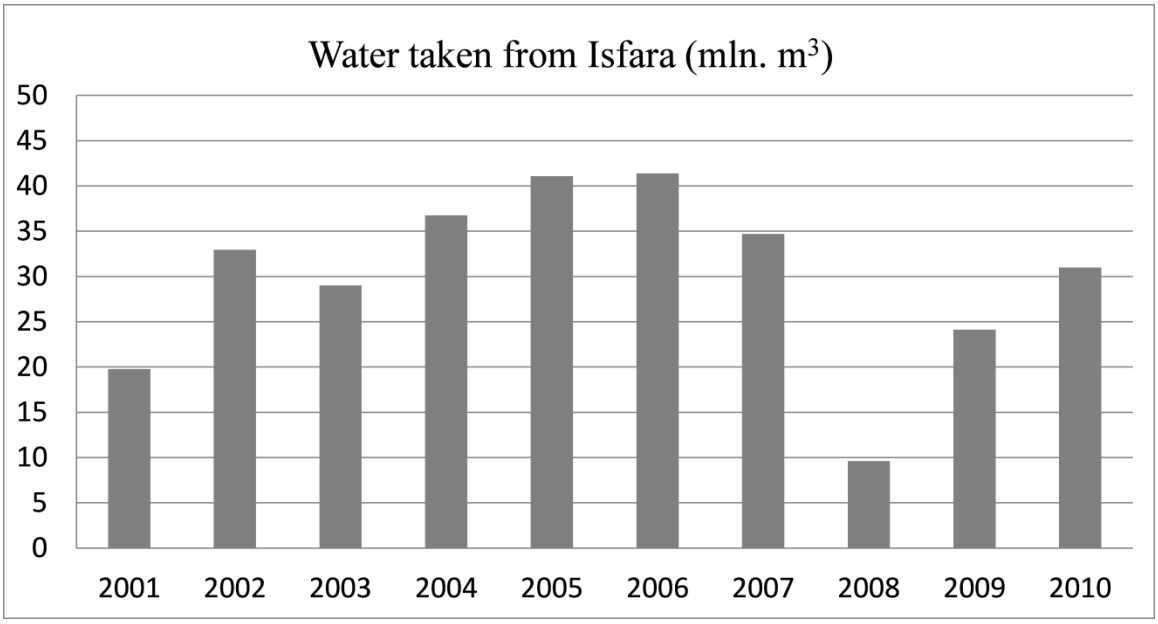


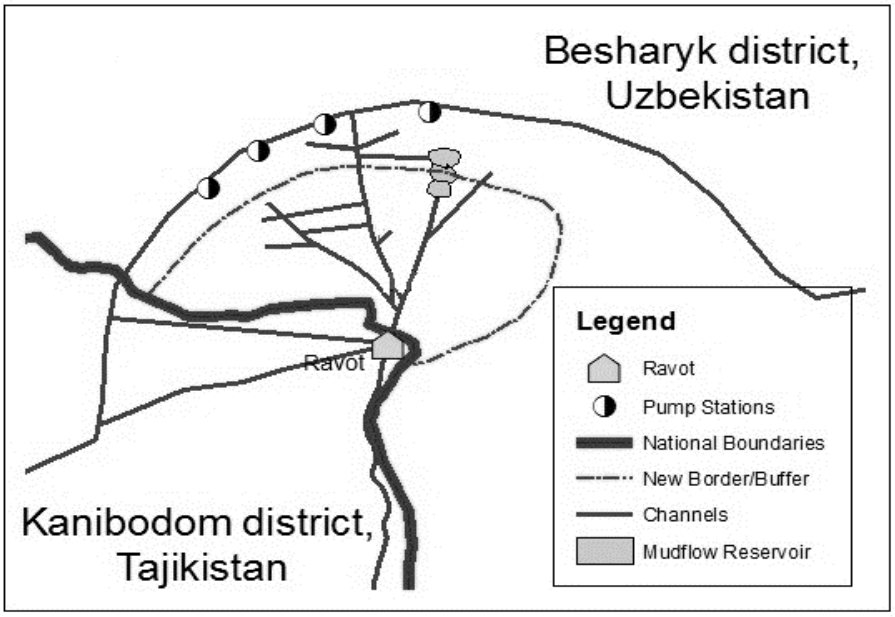
FIGURE 6. ISFARA CONTRIBUTION (MILLION M^3) TO BESHARYK DISTRICT (WAS KIROV DISTRICT), 2001-2010. SOURCE: DATA PROVIDED BY THE FERGHANA PROVINCE WATER MANAGEMENT DEPARTMENT.

It also worth noting that water sharing between Uzbekistan and Tajikistan on the BFC was specifically mentioned in the Kairakum Reservoir operation agreements (2001, 2008b, 2009 and 2010b) (2000, 2001 and 2008 were dry years). Indeed, in the usual debate, water allocations from the Isfara and the BFC are addressed separately, but in some of the annual agreements (dry years) the BFC–Isfara water-compensation mechanism was officially acknowledged. For example, at the meeting between Kazakhstan, Tajikistan and Uzbekistan on Kairakum Reservoir water use in 2008, the parties agreed that "Uzbekistan, according to the agreed volumes, and if water from the Rovot water regulating unit [on the Isfara River] is allocated 50%/50%, shall deliver from the BFC 5m^3/s . . . to the Republic of Tajikistan" (Protocol, 2008c). The content and implementation of the annual Tortgul and Kairakum Reservoir operation agreements make it clear that there is not enough water in the BFC.

Very recently, Tajikistan has constructed a timber dam on the Isfara and now diverts about 23 m^3/s to Kanibodom Canal in Tajikistan (with excess flow of about 3–4 m^3/s diverted into Kairakum). According to the key informant from the Ferghana Province WMD, the Uzbek part of the Isfara receives only 0.5 m^3/s (check to see if all units are the same). Hence, it appears that Tajikistan compensated for the reduced flow from the BFC by blocking the Isfara and diverting most of the water to the Kanibodom Canal feeding the BFC. The Tajik key informant from the Sugd Province WMD described the situation as "peaceful silence

as Uzbeks do not provide our limits in the BFC – we do not complain, we do not provide their share from Isfara – they do not complain" (informal interview, 2012).

Overall, the water protocols are very specific about water allocations, not just annually but even averages for 10-day periods. This raises questions about the water authorities' ability to determine the flow. As mentioned above, the flow-measuring units are at Tangi Vorukh (within the Tajik enclave) and Rovot (near the Uzbek–Tajik border). There is evidence from protocols and from the interviews that Tangi Vorukh has not been functioning properly, if at all, for more than 20 years (Protocol, 1980a, 1980b, 2010a). In addition, the current political situation and tensions about border demarcation make it impossible to have joint measurement. It had already been impossible for some time for Uzbek water authorities to go to Tangi Vorukh, but recently (since June 2011), due to the border demarcation issues, they have not been able to go to Rovot, which is now located in a buffer zone between the two riparian republics (Map 6).



MAP 5. RECENT CONSEQUENCES OF TAJIK – UZBEK BORDER DISPUTES.

After independence and therefore the fall of the hegemon, Moscow, the borderland water communities of the Isfara and the BFC continued their cooperation for some time, although the brokered agreement was not renewed and no hegemon enforced sharing. But the situation of unstable Toktogul water releases and therefore unstable water supply to the BFC, particularly in drought years, has caused the collapse of local cooperation and the need first for national-level brokered agreements (the inclusion of water allocation from the BFC for Tajikistan) and later on even the physical exclusion of Uzbekistan from the Isfara basin.

Again, the physical exclusion of Uzbekistan is a sign that national brokered agreements might not be implementable because of the lack of technical and organizational control mechanisms for enforcing them.

While the exclusion of Tajikistan from the BFC and the exclusion of Uzbekistan from the Isfara could be seen as a worst-case scenario in a conflict-and-cooperation matrix, in fact this scenario seems to be the most stable solution, given the dependence on alternative water resources from "third parties" (the operation of Toktogul Reservoir) and the political costs of brokering annual agreements.

Conclusion

First of all, the paper has highlighted the rich history of water agreements in the Isfara Basin and therefore provides a detailed overview of the long-term cooperation on water resources within Central Asia. The paper has highlighted that during the Soviet Union era, water resources were contested and there were intensive negotiations between the riparian states. Nevertheless, because of the hegemon, Moscow, and its budget provisions for implementing engineering solutions to get more water, agreements were reached within the Isfara Basin.

Of the three distinct periods of water sharing along the Isfara identified here, there were at least two periods in which water agreements were reached without the possibility of guaranteeing their implementation. This was due to either the inability to measure percentages of allocations or the absence of existing water-control infrastructure at the main system level (during the first period) or control over that infrastructure (the last period) to guarantee that the agreed amount of water could be delivered. While, in the early years, agreements on specific amounts were made without dams having been built (the Toktogul and Andijan Reservoirs for controlling delivery on the BFC), it is doubtful that the metering station in the upstream Kyrgyz SSR was even fully functional at that time and for longer durations so that predictions could have been made. In the third period, specifically, the disintegration of the Soviet Union triggered disagreement over the operation of Tortogul Reservoir, and therefore water supply to the BFC was not guaranteed. Hence, it appears that from the start water agreements were set up to fail; therefore, in the end, they may have led to an increase in tension. This finding could be particularly relevant regarding the agreement reached between the Uzbek and Kyrgyz SSRs (Protocol, 1980a) on water allocation of small rivers within the Ferghana Valley. Already during the time of the Soviet Union, the Uzbek SSR had complained that it was not receiving its allocated share (agreed 10-day flow) for many of the rivers (Rysbekov, 2008). In this respect, the case study reveals that looking at agreements alone is not sufficient; rather, it is important to analyze the feasibility of implementing the agreements and the wider context.

The second period is characterized by new infrastructure to compensate for the new user, the Kyrgyz SSR. This particular point is very interesting when looking at the current debate on upstream–downstream benefit sharing within the Syr Darya. Until now the focus has been mainly on the large reservoir, Toktogul, and its summer or winter operation regime, as well as reimbursement for lost land. Given the case of the Isfara River and the costly building up of lift infrastructure in Uzbekistan and Tajikistan, as well as its operation and maintenance, to compensate for the expansion of irrigated area in Kyrgyzstan, one could raise questions as to whether the focus on Toktogul alone is justified and perhaps could even bring this into the irrigation-versus-hydropower debate between Kyrgyzstan and Uzbekistan.

One major finding is that for a long period after independence, the set limits on the transboundary canals were taken for granted by Tajikistan. The problems of receiving the specified amount, before independence but even more importantly after, triggered the drive to include these transboundary canals in the agreement for the larger Kairakum Reservoir, therefore delinking Tajikistan's BFC allocation from Uzbekistan's Isfara allocation.

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Chapter Five: Conclusions

Case study: Syr Darya Basin

The analysis of water relations within the Syr Darya Basin shows that there are different approaches to the change in political regime in both large and small basins. Chapter II (Paper I) suggests that at the large (Syr Darya Basin) scale, with the collapse of the Soviet Union, the riparians faced two types of change: institutional and policy. The institutional void, e.g. the loss of Soviet administrating institutions, was quickly recreated by the NISs as they established International Fund for Saving the Aral Sea (IFAS) and Interstate Coordination Water Commission (ICWC) and decided to adhere to the Soviet agreements. Addressing the institutional change in terms of organizational structure was successful due to the pressure of day to day water management and also the absence of the long term commitments.

The NISs, however, were not successful in developing a shared basin vision. This became an issue due to several reasons including lack of trust, corruption tied to the basin organizations (is this discussed elsewhere in text? This appears to be first mention of this issue), failing agreements in dry years, and desire of each state to maintain its own sovereignty. Vanishing belief in successful cooperation in some of the riparian states was replaced by the ideology of building better alternatives on their own. Riparians saw alternatives as a way to build up their national sovereignty, decrease international dependence, and reduce water uncertainty. Thus, developing a shared basin vision was dropped off from the priority list in some riparian states.

The current developments show that at the present moment, all riparians to some degree are satisfied with the existing technical cooperation. Each state is slowly finding new ways to control the water resources independently from their neighbors. This implies that Uzbekistan and Kyrgyzstan do not need to adhere to the old Soviet barter agreements. Kyrgyzstan can keep its water and develop hydropower and Uzbekistan can keep and sell its hydrocarbons. Indeed, Kyrgyz Republic seeing hydropower as key to their national sovereignty, strives to construct hydropower facilities on the Naryn River. Similarly, Uzbekistan is building up its water independence, for example, by constructing Rezaksai and Markazi Reservoirs in the Ferghana Valley to collect winter water releases from Toktogul Reservoir in Kyrgyzstan. The gas that will not go for the exchange for water can be now sold to Russia. Tajikistan, in this scenario, does not have to develop any water control infrastructure as it already has Kairakum Reservoir located in a Tajik territory right between Uzbek upstream and Uzbek downstream, and granting Tajikistan strong bargaining power. More developed

Kazakhstan seems to be the only one at the very downstream and eager to pay or compensate for the water coming from upstream.

In Chapter III (Paper II), at the sub basin scale, there are four small tributaries focusing on negotiations on the reservoir construction and operations. Similarly to the large scale, here the NISs agreed to adhere to the Soviet agreements. The deviations were observed in two reservoirs out of four. First, the states were unsuccessful in keeping the existing agreement on the Isfara River because this river had unsettled disputes inherited from the Soviet times (details described later in the chapter). Second, Kasansai Reservoir, represents a case when the past agreements settled between Kyrgyzstan and Uzbekistan are disputed due to the fact that Kyrgyz SSR yielded reservoir ownership to Uzbek SSR under the pressure from Moscow; however since now Moscow is no longer a hydrohegemon in the basin, Kyrgyz Republic started re-negotiating the reservoir ownership. In Karkidon and Andijan Reservoirs, the existing agreements are kept in place. There are some management related disagreements; however these were present during the Soviet rule as well. It is successful largely because the negotiations on these reservoirs started at the local level; between the Uzbekistan and Kyrgyzstan and both recognized the need in such infrastructure and negotiated inputs and benefits shared from the reservoirs to be constructed.

Although the analysis carried out in Chapter III presented cases for applying cooperative and non-cooperative strategies during the negotiation processes, it did not fully address the issue of inequity between the negotiators in small scale basins. In any negotiation process there is a strong possibility of disparity between the stakeholders on opposing sides. Large scale water management can mitigate these disparities by providing guiding principles for the transboundary water management. At the very least, these principles should ensure public participation, ability to express all the interests involved, ability to implement these interests, and fair water allocation. The ground rules introduced by the large scale management into the small scale basins should be balanced between a very concrete set of rules and abstract principles. This is perhaps the most difficult yet a very important task, as overly constraining rules might impede the creativity of the negotiators in addressing specific setting and concerns, while abstract principles may prevent the negotiators from accomplishing specific goals. In cases where the negotiations in the small scale basins cannot reach an agreement and/or the agreement happened to be inequitable; the large scale water management can act as mediator and monitor the agreement negotiation and implementation process.

Lastly, Chapter IV (Paper III) assesses a small transboundary tributary, which happened to be among the first basins to be hit by the changes occurring in the late 1980's and the early 1990's. It was 1985 when this highly conflictive Soviet basin lost its water conflict mediator – Moscow. The first attempt to address the

change was again to use older agreements (1982 Protocol) and slowly change water supply for downstream Uzbekistan and the Kanibodom district of Tajikistan from Isfara River to Big Ferghana Canal. This attempt was unsuccessful because the agreement did not have a specific date when this transition should have been finalized, and the downstream states continued claiming that they were not able to finalize the transition. After 1991, each state started to develop independent water management strategies to provide water stability. According to Tajikistan, Uzbekistan cannot provide stable flow from Big Ferghana Canal as it stated in the agreement, therefore Tajikistan has to compensate this under-delivered water from Isfara River. Moreover, during dry periods, Tajikistan has to use its costly Mahram pump stations to deliver water to Big Ferhana Canal. In this scenario, Uzbekistan is left with Big Fergana Canal waters which are highly dependent on Toktogul and Andijan Reservoir operations; while Kyrgyzstan operates Tortgul Reservoir.

TABLE 5. ACTIONS TAKEN TO ADDRESS THE CHANGE IN REGIME AND REASONS BEHIND THEIR OUTCOMES.

River Basin \ Criteria	Change	Action	Result	Reason
Syr Darya River	loss of the administrative agencies in Moscow	establish ICWC and IFAS	successful	day to day water management pressure, absence of the long term commitments
	loss of the basin wide policies	keep old Soviet agreements; develop new policies	not successful	lack of trust, corruption, failing agreements, desire to maintain sovereignty
Isfara River	loss of mediator in 1985	temporary agreement	not successful	the agreement did not have specific date; connection to the Big Ferghana Canal
	loss of the administrative agencies in Moscow; closed borders; reduced funding	keep old Soviet agreements	not successful	Connection to the Big Ferghana Canal
Kasansai River			not successful	disputed reservoir ownesrhip; Kyrgyz SSR yielded reservoir ownership to Uzbek SSR under the pressure from Moscow
Kuvasai River			successful	local level negotiations; recognized the need; agreed on reservoir construction inputs and benefits shares
Karadarya River			successful	local level negotiations; recognized the need; agreed on reservoir construction inputs and benefits shares

The dissertation results call on the large scale Syr Darya management team to think about the basin development in the long run. The existing fragile technical cooperation in the Syr Darya Basin may not survive another radical change caused by rapid changes in climate and/or population growth and may lead to devastating outcomes. However, there is a benefit to solving the issue collaboratively now. Reviewing

the examples of Karkidon and Andijan Reservoir operation and construction negotiations may help the riparians to find a way for a mutually beneficial solution. Frankly speaking, a casual observer can see that the ever-growing Central Asia population can benefit both from locally produced agricultural crops and energy sources. It is up to the national governments to shape the strategies to achieve the optimal solution for all. Moreover, large scale conflictive engagement activities negatively impact water management in small scale tributary basins, where the latter have a chance to manage their waters cooperatively on their own.

The recommendations for the small scale basins address the bilateral/trilateral aspirations for transboundary collaboration within the small transboundary tributaries and propose concrete actions to support local water authorities in their endeavors. It is found to be of the utmost importance to support transboundary cooperation in these small rivers as there have been historical records on conflict in the small basins of Ferghana Valley (Megoran, 2004) and it was previously found that geographic scale and intensity of conflict are inversely related (Yoffe and Wolf, 1999). First, to enhance the transboundary collaboration it is recommended to fund tangible projects. Tangible projects mainly include infrastructure such as gauging stations, canals, distributors, pumping stations, reservoir and dams. The crucial point here is that most of this infrastructure already exists, therefore it doesn't require extensive investments for project development and implementation, however investments are needed to repair the existing infrastructure. The Isfara and Khojabakirgan River gauging station examples show that there is infrastructure in the Ferghana Valley that has not been functioning properly for more than 20 years. This is an unacceptable oversight from the water management standpoint, as the Syr Darya Basin (including the small tributaries) agreements use percent water sharing agreements and therefore heavily relies on the readings from the gauging stations. Inability to measure the actual discharge that is subject to water allocation between the riparians is one of the main obstacles in international agreement implementation.

Second, it is of vital importance to grant access to water infrastructure to all of the riparians. As common practice shows, internationally important gauging stations are usually located near the headwaters of rivers and further downstream around border areas to measure the discharge and diversion. The geographical location of the gauging stations makes border crossing an important component in water management, as in all five case studies (and rest of the small basins of the Ferghana Valley) border crossing was identified as primary issue since water managers often cannot cross borders. By granting border crossing permits to designated water officials from each riparian state and therefore allowing them access to the gauging stations it is possible to enhance transparency and trust, the vital components for transboundary cooperation.

Moreover, free border crossing will allow the water community dissolve the political boundaries and create a basin wide water community prioritizing satisfactory daily water management of a shared basin.

Third, it is recommended to continue local and international dialogue on transboundary cooperation in terms of improving the existing water management institutions by empowering small scale basins. Creating discussion forums such as River Basin Organizations where water issues can be brought into a dialogue. Also, empowering the local basin authorities and the local communities to address the immediate issues they have in their basins. Small scale, patchy collaborative actions across multiple small basins within the greater Syr Darya Basin will jump scale up, and incrementally lead to more positive experiences across the basins and prepare grounds for developing collaborative shared Syr Darya Basin vision in the future.

Although groundwater aquifer management was not discussed in this dissertation, it is worth pointing out that there are internationally driven large scale groundwater management efforts. The Pretashkent aquifer, located on the territory of Uzbekistan and Kazakhstan, is closely studied by an international team under the Groundwater Resources Governance in Transboundary Aquifers (GGRETA) Project. The Project aims to build recognition of the shared nature of the resource, and develop mutual trust through joint fact finding and science based diagnostics to ultimately reach consensus on transboundary governance mechanisms through the consultative process. Additionally, in the Ferghana Valley, the groundwater scientists are analyzing the area to develop possible groundwater banking options (Gracheva, 2009; Karimov, 2012). Transboundary aquifer management should be considered as one of the options for water conflict management in Central Asia.

Policy contribution: interdependency, game rules and cooperation

Understanding mutual riparian interdependence is one of the most important components for transboundary cooperation. For the most part, the political boundaries between the states were established while ignoring the foregoing watershed boundaries, thus letting rivers meander across the states, crossing the boundaries or run along the national borderlines. Rivers go through the independent states and create links between them; interdependencies in terms of economic development, security, environmental issues, etc. In a situation of growing water scarcity, more and more states will face the choice between transboundary competition and cooperation. Therefore, it is worth highlighting that cooperative strategies give the riparians an opportunity to develop long term oriented mutually beneficial water sharing institutions.

Hydro-political interdependency is opposite to the national strive for sovereignty. Finding a balance in addressing these two contradicting political stands is often found to be a challenging task for governments across the globe. Parana-La Plata, Nile, Ganges Basins are examples when the search for this balance is taking decades. This dissertation agrees with the previous research (Elhance, 1999, p 19) and suggests that recently emerged sovereign states have a "great resistance to any dilution of sovereignty that cooperation with other states necessarily requires." New Independent States are very sensitive to issues of sovereignty and territorial integrity. However, the economic need in these, usually poorer countries, seeks for external financial aid and therefore brings partial loss of sovereignty.

The horrific fear of sovereignty loss comes from the colonial rule, when colonies served the imperial state, and the provinces within the colonies served the colonial center. Thus regions that were further removed from the center were more exploited and received less benefit. It was true in the Nile Basin, where the Sudan and Egypt served the Britain as cotton supplier for textile mills in England; and most of the Nile riparians did not have the right to use water without the British and Egyptian consent (Waterbury, 2002; Elhance, 1999). Some of these similarities can be observed in the Soviet Aral Sea Basin management case. Waters of Amu Darya and Syr Darya Rivers were primarily allocated for irrigation purposes downstream. Upstream states were deprived from using water for hydropower during non-growing season because it had to be collected for the irrigation season.

After 1991, as the Soviet Union collapsed, the NISs tried hard to amalgamate their independence. In upstream Kyrgyzstan's and Tajikistan's Sangtuda, Kambarata, and Rogun dam projects are seen as giant symbols of national security and economic prosperity. On the other end of the Amu Darya and Syr Darya Rivers are Kazakhstan, Turkmenistan and Uzbekistan, interested in delaying upstream capacity of construction of large water projects and maintaining the status quo. Currently, Central Asian states see their sovereignty as mutually exclusive efforts. They conduct negotiations with third party nations and use their power to pressure the other riparians and/or to continue unilateral developments. Thus, in pursuit of regional sovereignty the NISs become indebted to out of region states.

The solution to the Central Asian quest for stability and sovereignty actually lies within the Aral Sea basin itself. NISs should conduct the negotiations not only with third party nations, but within the basin states themselves; as the previous Kyrgyz-Uzbek negotiations experience shows, there is history and capacity for creative problem solving and equitable benefits allocation practices. Cooperative strategy based agreements, which were inclusive, bottom up driven and fairly shared the benefits have shown resilience

over time and in the face of regime change. The construction and operation of the Karkidon and Andijan Reservoirs was initiated at the local level and later proposed to Moscow officials. The details on benefit sharing, construction funding and maintenance were negotiated and agreed before engaging Moscow. This allowed local republics voice out their interests within the international agreements and led to long term resilient water sharing legal mechanisms.

This dissertation calls for regional cooperation because hydro-political competition in the basin may lead only to short term benefits, on the long run though, it is proven lead to heavy economic, social, political, and environmental costs. Unpredictable water availability creates domestic instability due to outrage among farmers with no water and anger among homeowners and businesses suffering through regular power blackouts. Given unresolved borderline issues and water sharing principles, these negatively disposed groups collide along national borderlines resulting in ethnic conflicts (Megoran, 2004; Bichsel, 2009; Pak et al., 2014). In a situation with ever growing population and need for water, governments have to find the way to satisfy the needs and collaboratively provide long term stability. Also, projects downstream, such as shallow reservoirs and therefore high evaporation rates, increase the water loss in the system. Collaborative water projects could, on the other hand, mitigate the environmental and social impacts of the Aral Sea tragedy.

The paradox of the Aral Sea disaster is that the perfect basin planners, the Soviets, ruined the ecological well-being of the Aral Sea, and the malfunctioning basin planners, the NISs, are trying to ameliorate the ecological situation by establishing IFAS. At the heart of this paradox are the Soviet equitable water allocation principles. Currently, there is a positive attitude towards principles of equity and fairness in water allocation. In fact, the 1997 UN Convention calls to imbed these principles in the international water law. There is also a bulk of literature on how to achieve equity and fairness in the water sector. The general understanding is that equity and fairness have a direct relationship with sustainability. However the Soviet case showed that equitable water allocations can lead to major environmental catastrophes. In the Soviet Union, principles of equity utilized water in unsustainable way. This is because the equity principle was utilized to implement national development policies that prioritized development, not sustainability. In conclusion, although the Soviets used the principle of equity, their irrigation expansion oriented policy goals, their definition of watershed, and socialist competition policies led to equalized water allocation, but it also resulted in resource depletion. In the short term, the Soviets achieved their irrigation expansion goals, but they also drained the Aral Sea.

It is important to remember that water allocation rules and principles are just tools to achieve nationwide policy goals. National policy goals are what really define whether the outcomes will be positive, sustainable, and long term oriented. The Generic Basin Planning Framework used in this dissertation shows that basin planning usually takes place in four steps and at two levels. The analysis shows that during the Soviet era, the High Policy basin plan was production oriented with tragic environmental and social consequences. The Generic Basin Planning Framework can be applied in any other basin across the globe, and it is in the hands of the national governments to set a sustainability driven basin wide vision by balancing current needs with future uses.

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