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GETTING TO THE FIRST HANDSHAKE: ENHANCING SECURITY BY INITIATING COOPERATION IN TRANSBOUNDARY RIVER BASINS[1]

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ABSTRACT: How does transboundary water cooperation begin at the initial stages, and how can third parties help to foster said cooperation? Many nations with transboundary waters do not cooperate or have ceased cooperation. Yet cooperation often prevails, resulting in 688 water-related treaties signed from 1820 to 2007. We address the following: by which practices can development partners best design and implement cooperative projects at the state level to enhance basin water security in the earliest stages? This article identifies strategies for initiating cooperation and lessons drawn from reviewing select cases. We compiled from the Oregon State University Transboundary Freshwater Dispute Database all transboundary water resources projects over the last decade with multinational participation. We selected 10 case studies that enhance water security that fit the following filtering criteria: (1) Funding exclusively/primarily from outside sources, (2) Including nonofficial stakeholders in project design/implementation, (3) Absence of formal relations around water resources between or among the riparian nations before the project was discussed, (4) Project design possibly enhancing hydropolitical relations. Findings suggest that to enhance water security, project designs should respect participating riparians' autonomies, create basin-wide networks of scientists, allow for each partner to garner responsibility for project activities, and consult a diverse group of stakeholders.

(KEY TERMS: water cooperation; water security; hydropolitics; informal cooperation.)

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INTRODUCTION

Water security has been defined by UN-Water (2013) as the "capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability." Allan and Mirumachi (2010) asserted that water security is determined by the possession of a diversified and strong economy. This view is indirectly supported by Wolf *et al.* (2005), who stated that alleviating poverty is implicitly tied to easing security concerns. Wolf *et al.* (2005) also emphasized the importance of institutional capacity for water management to enhance water security. Providing water services is seen often as a "peace dividend" that can

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bolster state legitimacy while also serving the needs of the people after a conflict has occurred (Weinthal *et al.*, 2011).

It is possible for water security to be enhanced by formal cooperation. In this article, we define "cooperation" as actions considered to be +3 or above on the Basins at Risk scale (e.g., starting diplomatic relations; establishing technological or scientific communication; proposing or offering economic or military aid) (Yoffe and Larson, 2001). There are cases where cooperative adaptation between nations may not be possible under protracted conflicts (Fischhendler *et al.*, 2011). Yet for nations not at war, it is also important to note that the absence of war does not mean the absence of conflict (Zeitoun and Warner, 2006). When nations are not warring over water but a protracted conflict exists, alternative solutions may be sought, and, in such cases, "environmental unilateralism" may be preferred by one or more states to achieve certain environmental outcomes (Fischhendler *et al.*, 2011). Yet cooperation may be a suitable alternative for all parties in a river basin that enhances water security, even allowing for future cooperation over other international issues, as noted by past functionalist writings (Sewell, 1966; Mitrany, 1975; Jägerskog, 2001; Turton, 2003).

This is an article not about cooperation, but rather about how development partners (defined in this article as governmental organizations, intergovernmental organizations, or nongovernmental organizations that may lend political and/or financial support) may help nations possibly go from a lack of cooperation between states *toward* cooperation at its most initial stages, and, in the process, enhancing their own water security. Moving from a lack of cooperation toward cooperation may not enhance water security in all cases; for instance, not all cooperation is good for both parties (see Zeitoun and Warner, 2006). Individual policy makers in a nation making decisions about cooperation operate within the historical context of their nations, fed by a set of external and internal drivers of decision making. Before them is a possibility of cooperation for a set of negotiated benefits. At this point, these policy makers must choose, on behalf of their nations, whether or not to cooperate. How do they make this decision? They do not consider benefits alone, as there are many cases of nations not joining other riparians in negotiating a basin agreement (e.g., Egypt in the Nile) or only selectively participating as an observer (e.g., China in the Mekong). It appears that objective or "paper" benefits (as projected in the many studies on regional cooperation or integration, e.g., Feitelson and Haddad, 1998; Sadoff and Grey, 2002, 2005) are only the starting point. In other words, benefits are necessary, but they are not sufficient to induce cooperative action.

There is no one way to initiate cooperation — each transboundary basin is unique. It is difficult to write prescriptions for how the cooperative process may begin. Nor does cooperation follow a clear-cut, iterative process. However, there are underlying practices for how cooperation can be enhanced. In this article, we attempt to illuminate some techniques of initiating cooperation processes in a basin with little to no cooperation amongst development partners.

We attempt to answer the following questions:

1. By which practices might development partners best design and implement collaborative projects in their absolute earliest stages?
2. How well do the steps for initiating cooperation mentioned in literature (data exchange, scientific collaboration) help enhance formal cooperation?

We begin by discussing various barriers that nations may have that inhibit engagement in cooperative processes. We also discuss strategies that development partners may use to improve cooperation. We describe a case study selection process in which nations attempted to facilitate transboundary water cooperation and our results for analyzing these cases for lessons learned. We then discuss overall themes from the cases that we found that appeared to be effective in enhancing cooperation: jurisdiction, project design, stakeholders, and negotiating. We conclude that the principles for enhancing cooperation were supported in these case studies, and suggest that it is best to design projects that respect autonomies of participating riparians, create basin-wide networks of scientists, allow for each partner to garner responsibility for project activities, and consult a diverse group of stakeholders.

VARIABLES INFLUENCING COOPERATION

The purpose of this section is to review the various issues that nations weigh before committing to cooperation, to review concepts that have been suggested in peer-reviewed and gray literature as agents in fostering cooperation, and to define the role that development partners may play in the process. Before this, however, we present a review of issues that development partners have considered in past water cooperation endeavors. The factors include: perceived risk, enhancing cooperation, cooperation-inducing design,

nation drivers, pointers for partners, and Track I and Track II Diplomacy.

Perceived Risk and Barriers

Perceived risk has been defined as the perception that an act of cooperation will expose the nation to harm, will jeopardize something of value to the nation, or will threaten the political future of individual policy makers (Subramanian *et al.*, 2012). It is a core consideration for country decision makers; ideally, nations cooperate when there is more opportunity than risk and more benefit than cost. If a nation cannot find a way to compensate for or control risk, it may choose not to enter into a cooperative agreement. Nations may also unilaterally develop projects within their own territories to avoid the political intricacies posed by sharing resources (Wolf *et al.*, 2005).

Subramanian *et al.* (2012) developed five general categories of risk perceived by decision makers. The first category is the capacity and knowledge risk. This is where nations feared they would be at a disadvantage in negotiations, which manifested in two major ways: (1) Nations perceived they had less negotiating capacity than their co-riparians, and (2) Nations perceived they did not have adequate or accurate information about the basin.

Decision makers experienced the second category, the accountability and voice risk, with the following: (1) Fear the co-riparians, third parties, or regional institution may not deliver benefits; (2) Concern that the respective nation's interests would not be adequately considered in joint decision-making processes; and (3) Perception of a high probability that the regional institutional arrangement would not result in the flow of benefits.

To a greater or lesser extent, all the cases examined reflected the significant risk of sovereignty and autonomy. This risk occurs when a decision maker senses the danger of intrusion into the nation's authority to make sovereign decisions. It addresses both the desire to have control over national development goals and related development of resources and infrastructure, and the right to make decisions independently. Another risk identified was the risk of equity and access; which can be manifested as: (1) Fairness in any deal, regarding specified quantity or quality of water, benefit flows, or project costs, and/or (2) Entitlement to use the river. Some nations viewed entitlement as the right to continuing with historic uses; others as gaining access to a river running through (or originating in) its territory; and yet others viewed it as attaining benefits in proportion to a nation's relative size in (or percent contribution to) the basin.

The risk of stability and support had both direct national and personal implications. All nations in the study had to consider this, but it was a stronger consideration for nations with diversified and powerful stakeholders. The risk applied to both (1) the implementability of an agreement due to the presence or absence of key stakeholder support, and (2) a decision maker's positive or negative public image.

In a study of transboundary water governance in Western Canada and the United States, interviewees identified key barriers to cooperation, which included mismatches in governance structures and integration, as well as mismatches in intra-jurisdictional integration within nations. Other barriers included distinct and sometimes incompatible governance cultures and mandates; shortcomings in institutional capacity, financial resources, participation capacity, and data availability; social and spatial distance between parties; and psychosocial factors, including mistrust and a lack of leadership (Norman and Bakker, 2005). Blomquist and Ingram (2003) also detailed differences in water use across boundaries; distinctions in ethnicity, culture, and religion; and differences in economic, political, and/or military resources across boundaries as compounders of transboundary resource problems.

Enhancing Cooperation

Political opportunity also helped to enhance cooperation in many cases. In a workshop focused on sharing and managing transboundary aquifers, researchers emphasized how the beginning of the cooperation process needs to begin with confidence building measures, especially joint monitoring, data collection, data sharing, and the establishment of conflict resolution mechanisms (Feitelson and Haddad, 1998). Joint data collection and data sharing may relieve the risk Subramanian *et al.* (2012) noted, where nations feel at a disadvantage in negotiations, perceiving that they do not have accurate information about the basin. Subramanian *et al.* (2012) found examples of the perception of resulting national and regional political gains even trumped residual risk, in that some nations were willing to cooperate even with some risks given sufficient political opportunity. Third parties were also identified as those who could play important roles in supporting nations with risk reduction. Examples of this assistance included engaging with nations at an appropriate scale (e.g., the entire basin, subbasin, or national level); conducting detailed risk assessments; designing risk reduction strategies, including financing and guarantees to target dominant risks; and periodically reassessing the risk situation, employing new strategies as needed.

Nation Drivers

This is the critical question for explaining integrated water resources management at the level of a river basin: what drives nations to enter into an agreement?

Internal Drivers

The basic needs of food, water, and energy security for its people drives developing nations to search for solutions to achieve their goals through water development (Lautze *et al.*, 2005; Subramanian *et al.*, 2012). This process begins with nations crafting national plans, at times relying on knowledge and financial assistance from development partners; these plans can then be followed with regional plans and partnerships. This is done because regional production centers of food and energy as well as regional markets are seen as an attractive means of meeting national goals and are often less costly for nations (Subramanian *et al.*, 2012).

Subramanian *et al.* (2012) also stated that a sense of a nation's rights pervade the thinking on water management and cooperation in international waters. Because of this, nations stake claims on shared waters based on their respective sense of rights. Factors such as commonly held beliefs about the river flowing through one's nation and legacies of use and management under legal and constitutional instruments shape how people perceive these rights. Culture and tradition related to water also often instill values that influence how rights are perceived. Norman and Bakker (2005) also mentioned more informal drivers for cooperation, including leadership, contacts, personal relationships, and networks.

External Drivers

Regional institutions, shared culture and ethnicity, regional geopolitics, and regional thinking on norms, concepts, and best practices in sustainable development have been identified as regional influences (Lautze *et al.*, 2005; Subramanian *et al.*, 2012). Norman and Bakker (2005) included legal obligations and bureaucratic transparency as minor drivers of water cooperation. Global trends can also exert influence on cooperation, given the history of ideas and experience regarding international waters that nations and their partners contemplating cooperation can draw from.

The current status of regional and global geopolitics can either provide stimulus for or against cooperation. Examples discussed in the case studies include the breakup of Yugoslavia and dissolution of the Soviet Union for nations in the Aral Sea Basin. Norman and Bakker (2005) also mentioned how cooperation is facilitated by proximity.

Cooperation is not always brought forth in a peaceful manner. There have been cases where cooperation has been coercive, sometimes under the pressure of military force. An example of this occurred in the La Plata Basin, where Brazil, frustrated at the perceived slow pace of progress in negotiations with Paraguay over the development of the Itaipu dam site, opted for a unilateral show of force, invading and occupying the border area in 1962 (Elhance, 1999). Another form of coercive cooperation took place in the Tigris-Euphrates Basin, where Syria involved itself with Turkey's internal struggles with its Kurdish population, allowing Turkey's Kurdistan Workers' Party (PKK) to base themselves within bordering Syria, securing water in return (MacQuarrie, 2004).

A future driver of cooperation could be climate risks. However, the evidence for climate risk-cooperation is not forthright. De Stefano *et al.* (2010) examined the relationship between basins likely to experience change in variability due to climate change and the robustness of the basin institutions' capacity for dealing with variability. The results of the study found significant gaps in institutional capacities to deal with variability (especially in South America and Asia).

Cooperation-Inducing Design

In a review of several scholars, Blomquist and Ingram (2003) pointed to building institutional capital, achieving fairness and equity, and meeting needs that accord with cultural values on both sides of the border as important to success in transboundary water management. This is all well and good, but what can be done when none of these things exist? How is institutional capital built, for example? Wolf (1995) listed general guidelines for cooperation-inducing implementation, using the pre-peace treaty Jordan Basin as his case study:

1. Control of one's major water sources. It is necessary both to address past and present grievances as a prerequisite for market-driven solutions. As such, an initial "dis-integration" of the basin is recommended.
2. Opportunities for cooperation may be hidden in the details of each entity's bargaining mix.
3. Water basin development can then proceed from "small and doable" projects to ever-increasing cooperation and integration, remaining always on the cutting edge of political relations.

Perhaps the most applicable guideline for this article would be the second. As demonstrated in the next section, negotiations over each riparian's "share" of water resources have stalled. Creative solutions will be needed to foster the first steps of cooperation.

One step that is often proposed for riparians in the nascent stages of cooperation is data and information exchange between riparians. Uitto and Duda (2002) cited the development of a science-based diagnostic analysis as an essential tool for, among other components, breaking issues into manageable parts with the aim of developing a strategic action program.

Strategic joint fact-finding among nations engaging in a project can serve as an important catalytic tool for developing political buy-in and fostering participation (Feitelson and Haddad, 1998; Uitto and Duda, 2002; Blomquist and Ingram, 2003; Wolf *et al.*, 2005). Joint fact-finding also lowers the perceived risks of cooperation, as it has low sovereignty infringement and lower transaction costs. Factors cited as promoting data and information exchange include the presence of compatible needs, absence of legacies of mistrust, increasing water resources stress, perceptions of mutual benefit, external pressure and funding, comparable levels of institutional capacity, popular and political concern about water resources management, and functional formal or informal cooperative arrangements (Chenoweth and Feitelson, 2001). Chenoweth and Feitelson (2001) mentioned, however, that this may not be useful as a first step in establishing more comprehensive cooperation depending on the situation. Also, it is important that data collection for its own sake may not be particularly useful due to a large amount of data that has been collected but never used (Van der Gun, 2001).

Track I and Track II Diplomacy

While any project can be designed to be cooperation-inducing, it is necessary for nations involved to also go through diplomatic processes to agree upon a framework. Though it is not possible for third parties to create a conducive, political environment alone, they can provide incentives both directly and indirectly to cooperate through playing a brokerage role:

1. Providing technical competence and examples of best practices
2. Assisting in negotiation and mediation skills, including the provision of legal and other water experts
3. Facilitating investments in transboundary settings (Phillips *et al.*, 2006).

Four different strategies of third party support can be identified (Mostert, 2005): Track I Diplomacy (cooperation); Track II Diplomacy (collaboration); Track III Diplomacy (transformation); and Continuing Support. Track I Diplomacy involves supporting the conclusion of a formal agreement between riparian states, typically through mediation and facilitation. Track II Diplomacy tries to arrive at feasible development strategies on the ground through promoting informal dialogues, research and studies, and capacity building. Track III Diplomacy addresses policies at the national and local levels, which are typically at the root of transboundary water problems. Finally, financial support may be required to sustain cooperation, which third parties can provide for a river basin organization or loans for development projects.

None of these strategies are mutually exclusive; for example, Track II Diplomacy efforts may eventually lead to the initiation of more formal, Track I discussions (Qaddumi, 2008). This occurred during the Israeli-Palestinian negotiations for the Oslo Accords, where Norway played an active role in elevating the talks from an informal bridge-building exercise to formal negotiations (Waage, 2005).

Up to this point, most of the discussion has focused on governmental actors and interactions with external partners in regards to cooperation. Though how these actors cooperate is the focus of this article, it is worth noting how decision making in water cooperation is not necessarily conducted in a "top-down" manner. A number of scholars have demonstrated how international water cooperation can manifest across and beyond state actors (e.g., Mustafa, 2007; Milman and Scott, 2010; Norman *et al.*, 2012).

This article attempts to identify practices that may enhance the ability of development partners to design and implement collaborative projects in the earliest stages. Here, we have reviewed relevant literature to present what may lead a riparian nation toward, and away from, the cooperation process, as well as approaches in program design. In the following section, we detail our criteria for transboundary project and case study selection, in which we identify lessons and recommendations based upon reports regarding project successes and failures.

METHODS

In this section, we describe the initial identification and filtering process for the list of transboundary projects from which the case studies were selected, as well as the criteria we used for case study selection

and evaluation. The previous section reviewed variables that development partners weigh as they deliberate on entering cooperative processes. We now explain the methods we used to test our argument.

Transboundary Project Selection Criteria

The first task was identifying potential case studies. As previously noted, we culled information from Oregon State University's Transboundary Freshwater Dispute Database (TFDD) to create a database of all transboundary water resources projects (both surface and groundwater) that had multinational participation, either official or unofficial. The TFDD includes 315 projects identified as cooperative projects between two or more riparians on international waters.

To determine whether these 315 projects involved formal or nonformal cooperation, we investigated the involvement of governments in these projects. Of these projects, 80 had nonformal cooperation, 232 had formal cooperation, and 3 had both formal and nonformal cooperation. We catalogued details of the most relevant projects and organized each transboundary water project into a spreadsheet, listing the basin name, project name, participating nations, level of cooperation (formal or nonformal), type of cooperation, principal issues, date of the project, description of the project, project tasks, and the source of information.

The type of collaboration was designated based upon the desired outcome of the collaborative effort. Questions asked to determine the type of collaboration are as follows: What type of change in the river basin was targeted? Was the project primarily an effort to improve the economic capability of the region, or was the project an effort to preserve or conserve, some natural resource and therefore largely an environmental initiative?

The type of project was divided into IGO, NGO, or GOV depending on whether the initial agreement or project plan included official governmental agreements and/or participation. In the event that the project was largely funded and initiated by a nonprofit, the designation NGO was assigned. If intergovernmental organizations such as the United Nations was largely involved and some form of intergovernmental panel or group was formed, the designation IGO was assigned to the project. If a government funded the majority of the project, the project was given the designation GOV. There were 128 projects in the IGO category, 94 projects in the NGO category, and 68 projects in the GOV category. It should be noted that four projects were categorized as both NGO and IGO, four projects were categorized as GOV and IGO, and one project was categorized as GOV and NGO due to the fact there were entities from multiple categories funding these projects. Thirty-five projects did not have any information regarding its funding sources, and were therefore eliminated.

The tasks and/or goals of the projects were usually sourced from some type of project plan where possible. If the tasks were already completed, then we updated information on each project to reflect both current and original goals.

We then refined the database to select our 10 case studies, using the criteria described below.

Case Study Selection Criteria

We then selected 10 case studies (Table 1) that would have direct implications for a pilot project that has commenced project operations within the last 15 years with the cooperation of nations and intergovernmental or nongovernmental organizations. With this, we recognize that we are ignoring self-initiating cooperation. To make sure our cases were applicable, we based the selection on the following filtering criteria which operationalize our research questions.

Criterion #1. Funding exclusively or primarily from outside sources, for example, donor or NGO.

Criterion #2. The inclusion of stakeholders involved in nonofficial capacities, i.e., those who are aside from the formal practice of their governments (Joesoef, 1977), or Track II, stakeholders in project design and implementation. Track II refers to a type of diplomacy that tries to arrive at feasible development strategies on the ground through promoting informal (i.e., nonofficial) dialogues, research and studies, and capacity building, as opposed to Track I, formal (official) diplomacy (Mostert, 2005).

Criterion #3. Absence of formal diplomatic relations between or among riparians nationwide.

Criterion #4. Project design to include at least the possibility of enhancing hydropolitical relations.

These filtering criteria were used to find case studies from diverse locations where development partners were heavily involved in project design and implementation (Criterion #1). Criterion #2 was developed based on literature describing the difficulties of initiating cooperation through Track I Diplo-

TABLE 1. Case Study Selection Criteria Matrix.

	Case Studies									
Criteria	**1 AQ - South America**	**2 BIO - South America**	**3 North Africa**	**4 Southern Balkans**	**5 Central Middle East**	**6 East Africa**	**7 Caucasus**	**8 Basin-wide Middle East**	**9 WR Central Asia**	**10 TWC Central Asia**
1. Funding exclusively or primarily from outside sources?										
Yes		✓	✓		✓	✓	✓	✓	✓	✓
No	✓			✓						
2. Stakeholder involvement in project design and implementation?										
Yes	✓	✓				✓	✓	✓	✓	✓
No/other			✓	✓	✓					
3. Absence of formal diplomatic relations between/among riparians basin-wide?										
Low conflict — high cooperation	✓									
Low conflict — medium cooperation		✓		✓		✓				✓
Low conflict — low cooperation			✓							
Med/high conflict — low cooperation					✓		✓	✓	✓	
4. Project design to include at least the possibility of enhancing hydropolitical relations?										
Yes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
No/other										

Note: The 10 projects: 1. Aquifer Management in South America (2003-2007. Argentina, Brazil, Paraguay, and Uruguay); 2. Biodiversity Conservation in South America (2003-2004. Bolivia and Peru); 3. Aquifer Protection in North Africa (2003-2006. Algeria, Libya, and Tunisia); 4. Water Management System in the Southern Balkans (1998-2001. Greece and Bulgaria); 5. Regional Data Water Banks in the Central Middle East (2002-present. Israel, Jordan, and Palestinian Authority); 6. Climate Change Modeling and Stakeholder Preparedness in East Africa (2000-2006. Kenya and Tanzania); 7. Reducing Transboundary Degradation in the Caucasus (2009-present. Armenia, Azerbaijan, Georgia, and Iran); 8. Improving Basin-wide Relations in the Middle East (2008-2011. Iraq, Syria, and Turkey); 9. Improved Management of Water Resources in Central Asia (2008-present. Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan); 10. Creating a Transboundary Water Commission in Central Asia (2003-2004. Kazakhstan and Kyrgyzstan).

macy. Criterion #3 was used as a filter for defining the initial stages of cooperation. Criterion #4 was used to sort projects that were designed to enhance cooperation from technical projects.

The first criterion used to trim the list of 315 transboundary projects was whether the project involved official funding and sponsorship or was largely the effort of a nonprofit, intergovernmental organization or other NGO (Criterion #1). Removing the projects involving outside government funding and sponsorship culled the list to 222 possible projects. This was deemed most important, due to the purpose of this study of finding best practices applicable for development partners. Similarly, the entries were then narrowed to those projects where the tasks and activities of the project involved stakeholders in the region and were meant to promote change at a local or regional level (Criterion #2). For example, development of the Zamorano project (officially, The Zamorano Pan-American Agricultural School) between Honduras and Nicaragua in the Choluteca River Basin in 1948 resulted in a collaborative institution of higher education with the intention of enacting social, economic, and environmental changes.

The project list was then narrowed down by Criterion #3: riparians that had no relations. All projects selected sought to improve the hydropolitical relations within the transboundary region, meaning, the project design has to actually consider what the current hydropolitics are, and how the project influences hydropolitics (Criterion #4).

As all of the criteria could not be met by most projects (e.g., only six of the ten cases had both sources of funding that were primarily or exclusively from outside sources AND stakeholder involvement), we selected cases that came the closest to meeting all four criteria, placing emphasis on Criteria #1 and #2. We consulted only official project documents as the best measure of official cooperation is with official documentation.

Classification of Transboundary Water Cooperation

The riparian relationships presented in each case study were classified according to the Transboundary Waters Interaction Nexus (TWINS), as described by Zeitoun and Mirumachi (2008). This classification has four groups: Low Conflict-High Cooperation, Low Conflict-Medium Cooperation, Low Conflict-Low Cooperation, and Medium/High Conflict-Low Cooperation (see Table 2 for more details). The characterizations reveal three types of interactions: positive, neutral, and negative. Positive interaction is defined

TABLE 2. Types and Faces of Transboundary Water Interaction (A First Approximation).

Characterization of Interaction Nexus (TWINS)	**Types of Interaction**	**Examples of Interaction**	**Potential Driving Forces (nonexhaustive)**
Low conflict — high cooperation	[positive interaction] Cooperation on equal terms; Cooperation across a broad range of issues; Tensions reduced through deliberative processes	Putting in place and exercising principles (i.e.,equitable use, no harm); Creation of transboundary regimes; Negotiation of a treaty based on IWL; Conclusion of an effective treaty (Kistin)	Benefit sharing/ expanding the pie Reduction of environmental uncertainty Economic/ developmental goals Issue linkage Mutual distrust Improvement of international reputation Sharing of resources Changes in power symmetry Control of resources
Low conflict — medium cooperation	[neutral interaction] Narrow cooperation (cooperation on select issues); Token cooperation; Mild verbal expressions of conflict	Joint pollution management; Joint infrastructure; Benefit-sharing based on agreements; Creation of RBOs	
Low conflict — low cooperation	[neutral interaction] Minimal or no interaction; Self-interested cooperation; Tactical functional cooperation; Unstable cooperation	Minor information exchange; Technical commissions or meetings	
Med/high conflict — low cooperation	[negative interaction] Securitized conflict; Coercive cooperation; Dominative cooperation; Violent conflict	Contained conflict; Negotiation of treaties not based on IWL; Resource capture; Unilateral environmentalism (Fischhendler)	

Notes: IWL, international water law (1997 UN Convention on the Non-navigational Uses of Transboundary Watercourses); RBO, river basin organization.
Dashed lines indicate fuzzy frontiers (i.e., there is overlap between each and every category).
Source: Zeitoun and Mirumachi (2008).

as interstate interaction that generally tends to meet the other actors' interests, and contributes to improvement or sustained relations at the broader political level; neutral interaction is defined as interactions which may have no inherent effect on the broader political context; and negative interaction is defined as interactions inducing a significant degree of resentment with one or more actors, thereby negatively affecting the broader political context (Zeitoun and Mirumachi, 2008). Classifying each case study using the TWINS framework helps to define the state of the cooperative process, which correlates with Criterion #3.

Case Study Evaluation

Each of the case studies selected had in-depth project reports that described its objectives, successes, challenges, and lessons learned. From this information, we identified elements of the projects that were deemed successful by the project reports and organized them into four categories: jurisdiction, project design, stakeholders, and negotiating. These lessons and recommendations gathered from the project descriptions are described in greater detail in the Discussion and Conclusion sections, respectively.

CASE STUDIES

This section presents a brief summary of each case study. Table 2 provides an explanation for how each case matches the criteria outlined above. Each case study describes the history of water relations between riparian nations, the problem at hand, the description of the project, and the project's results. See Table 3 for a matrix of themes that emerged from the cases.

Aquifer Management in South America

History of Water Relations/The Problem. Throughout history, Brazil has been the hegemon in the region, asserting its right to develop the waters of the La Plata without prior consultation with the riparians of the La Plata Basin (which include Argentina, Paraguay, and Uruguay), particularly through Brazil's unilateral development of hydropower (Dinar, 2009). Argentina has had a rivalry with Brazil since colonial times (Santos, 2002). That said, Gilman *et al.* (2008) have argued that the current treaty arrangements for cooperation among the five riparian states (this includes Bolivia, which does not have a share of the Guarani Aquifer) have been relatively successful, leading to significant economic gains, but at the expense of severe environmental degradation.

Before the 1980s, the Guarani Aquifer System had not been recognized as a transboundary aquifer system; before this project, there has been no formal cooperation between countries on this aquifer system. It should be noted, however, that countries have a history of formal cooperation regarding the La Plata River Basin, whose area considerably overlaps the Guarani Aquifer System's. The four countries treated parts of the system as national entities; in Uruguay and Argentina it was known as the Tacuarembó Aquifer, in Paraguay, the Misiones Aquifer, and in Brazil, the Botutacu Aquifer.

Within this region, groundwater is increasingly becoming a source of drinking water due to demographic growth, economic expansion, and increasing pollution of surface water sources (Kemper *et al.*, 2003). However, legal and regulatory mechanisms for groundwater management are lacking throughout these four nations, and the consequences of this dearth of coordinated management are already being felt. For example, substantial pollution of shallow groundwater resources is occurring in Argentina and Brazil, although it should be noted that the Guarani Aquifer System is not significantly affected due to its considerable average depth (Kemper *et al.*, 2003).

Given that each nation is expected to expand its use of the Guarani Aquifer for public water supply, hydrogeothermal applications, and irrigation, the project was designed to be preventative in character. Because of each nation's projected use, potential conflict could occur due to excessive pumping in certain areas and a lack of aquifer protection for pollution in aquifer recharge areas.

Project Description. The Guarani Aquifer Project completed a full inventory of production boreholes in the Guarani Aquifer System and also made significant efforts to improve deficiencies in groundwater regulations and/or tools in all four countries. Seven Brazilian states and three Argentinean provinces also made specific Guarani Aquifer management provisions. At the international level, another outcome of the Guarani Aquifer Project was the agreement for continuing regional cooperation on the Guarani Aquifer management and protection.

Project Results. Significant concerns about the institutional capacity for enforcement of groundwater regulations still remain. There also has been reluctance or difficulty in retaining the services of the Pilot Project Facilitators, which Foster *et al.* (2009)

TABLE 3. Case Study Best Practices Matrix.

	Case Studies									
Theme	**1 AQ - South America**	**2 BIO - South America**	**3 North Africa**	**4 Southern Balkans**	**5 Central Middle East**	**6 East Africa**	**7 Caucasus**	**8 Basin-wide Middle East**	**9 WR Central Asia**	**10 TWC Central Asia**
Jurisdiction										
Balance of autonomy and cooperation	✔+				✔+		✔+	✔+		
Creating a longer term, stable and mutually beneficial cooperative framework	✔–		✔+	✔+					✔+	✔+
Project design										
Giving each project partner responsibility for certain activities	✔+				✔+			✔+		
Building a scientific team from different partner nations	✔+	✔+		✔+	✔+		✔+	✔+		
Basin-wide integrated flow assessment/data sharing	✔+	✔+	✔+	✔?	✔?	✔?	✔?	✔?	✔+	
Stakeholders										
Consultation with wide swath of stakeholders	✔+	✔+	✔?			✔?	✔+	✔?	✔?	
Stakeholder commitment, ownership, and engagement	✔+	✔+	✔?			✔?	✔+	✔?	✔?	✔?
Negotiating										
Neutral issue discussions					✔+				✔+	
Track II dialogues	✔+	✔+			✔?	✔+	✔–	✔+	✔+	✔+

Note: Cases same as in Table 1. A "✔" indicates that the best practice was present in the case study. A "+" indicates that the practice was successful, a "?" indicates that it was either unclear whether the practice was successful or that only part of the practice was successful, whereas a "–" indicates that there were difficulties in implementing this practice.

explain is "critical to continuity and effectiveness" of the projects. Foster *et al.* (2009) also mention that continuing the further development and operation of SISAG (the shared aquifer information system) and regular exchanges of scientific data and management experiences should be future priorities.

The riparians preferred creating a Steering Council instead of a semi-independent "Transboundary Guarani Aquifer Commission." This was due to its implied high transaction costs and the risk of the Commission being out of touch with national and state groundwater issues, capabilities and procedures (Foster *et al.*, 2009). This alternative could imply a reluctance to give up some autonomy on managing the Guarani Aquifer System, but could also indicate an improvement of hydropolitical relations between these countries.

Biodiversity Conservation in South America

History of Water Relations/The Problem. Binational cooperation regarding management of the Lake Titicaca-Poopó System began in 1955 when Bolivia and Peru agreed to carry out a diagnosis of the basin. This was followed in 1957 with an "Agreement for the Preliminary Economic Study on the Use of the Lake Titicaca Water Resources" (*Convenio para el Estudio Económico Preliminar del Aprovechamiento de las Aguas del Lago Titicaca* (*ALT*)). This focus on considering joint cooperation on economic development in the Titicaca Basin continued throughout the 1960s and 1970s (Martínez Gonzales *et al.*, 2004).

Bolivia and Peru continued to cooperate further on Lake Titicaca, examples including the sharing bathymetric data beginning in 1976, jointly conducting a fishery survey from 1980 to 1983, and jointly conducting a hydrometeorological study of Lake Titicaca in 1985. Peru and Bolivia signed agreements on achieving execution of the Peru-Bolivia Hydrological System Master Plan in 1987 and 1988, respectively. This Master Plan established two programs, one for work undertaken nationally in each country, and the other for work to be executed by Peru and Bolivia jointly. The Master Plan called for a series of studies and planning for future management of the Lake Titicaca-Poopó Basin (Martínez Gonzales *et al.*, 2004). Nevertheless, biodiversity and endemic species losses continued to be a problem within this basin.

Project Description. In 1992, Bolivia and Peru approved the Lake Titicaca, Desaguadero River, Poopó Lake and Coipasa "Salar" (TDPS) Binational Master Plan. This agreement led to the creation of a binational entity in charge of executing this plan. In 1994 Bolivia and Peru applied for a joint petition to the United Nations Global Environment Fund for the development of a Biodiversity Conservation Project in the TDPS Basin, which was signed in 1998 by the Bolivian and Peruvian governments and the United Nations.

Project Results. While relations had already existed between Bolivia and Peru regarding the TDPS, this plan further strengthened them. According to Revollo *et al.* (2006), efforts made during the process of negotiations and studies between the two countries have led to many joint accomplishments, including: defining the juridical situation of the basin; making technical studies between the two countries; and establishing common technical organization. This process also established a number of avenues for citizen and stakeholder participation through informing through different media, socialization, and capacity building, at both national and more local levels.

Aquifer Protection in North Africa

History of Water Relations/The Problem. At the time of the project's inception, Saharan groundwater had been intensively exploited by Algeria and Tunisia for 50 years, and more recently, with increased use from Libya. Over 85% of the water drawn from the North West Saharan Aquifer System (NWSAS) is used for agriculture; each government anticipated an expansion of agriculture in coming years, yet wanted to develop it sustainably "if the relevant information for decision making is available" (GEF, 1999, p. 16). There was also no record of formal cooperation between these countries over this shared resource.

Transboundary impacts have already been reported in the NWSAS. Algeria utilizes the waters of the aquifer system greatly, followed by Tunisia and Libya (Scheumann and Alker, 2009). Besbes *et al.* (2004) have observed the first signs of aquifer degradation, including in the Algero-Tunesian chotts (Saharan depressions) the Gulf of Syrte, and major spring flows in Tunisia.

During the last 30 years, drilling of NWSAS waters has increased fourfold, from 0.6 to 2.5 billion m^3/yr. Because of this increase, the aquifer is at risk of water salinity, artesianism reduction, natural discharge depletion, piezometric level fall, and interferences between countries (OSS, 2008). Water quality has also deteriorated in some areas (GEF, 1999).

Project Description. The project for the Transboundary Aquifer System of the Northern Sahara (Algeria, Libya, and Tunisia), Protection of the NWSAS and Related Humid Zones and Ecosystems, had as its objective the protection of this critical resource, and

in particular of the recharge areas and humid zones and ecosystems related to the aquifer. It includes two complementary components: (1) improving the knowledge of the aquifer and related ecosystems through updating the evaluation of NWSAS water resources and (2) implementing a consultation mechanism at the hydrogeological basin level (GEF, 1999).

Project Results. Perhaps most significantly, the three ministers of water signed a formalized agreement that creates a permanent Consultation Mechanism for the NWSAS. The studies related to understanding the exchanges between the Chotts/Sebkhas and the underlying aquifers "have been initiated but not completed" (Puyoô, 2007, p. 2). At the time the report was issued, though, the water quality monitoring network had not been realized, nor had the analysis of the phenomena of water level rises in the surface aquifers been conducted. In addition, the link modes between the GIS database and local databases had not been clearly established.

Water Management System in the Southern Balkans

History of Water Relations/The Problem. Before this project's implementation, there were no bilateral agreements that were operational between Greece and Bulgaria regarding the Struma River Basin. Bilateral water cooperation between Greece and Bulgaria started in 1964; from 1964 to 1991, Greece and Bulgaria signed seven bilateral transboundary water agreements, including agreements on scientific and technical cooperation and an agreement for flood control of the Struma River in 1980 (TWIENEE, 2012). However, no international river commission has been formed, nor is any bilateral agreement for Struma River water management currently operational. The basic agreement between the two countries concerning the management of transboundary waters is also obsolete (TWIENEE, 2012).

Project Description. The System for Water Monitoring and Sustainable Management Based on Ground Stations and Satellite Images (WATERMAN) Project was implemented in the Struma River Basin, which consists of Bulgaria, Greece, and Macedonia. The project's aim was to improve monitoring the Struma River Basin, to control and forecast water quantity and quality, and to create a decision support system to make objective management decisions on the river.

Project Results. Cooperation between the partner teams "was very fruitful," as collaboration and transfer of knowledge took place between teams and was slated to continue in future projects (WATERMAN, 2012). Some of the project's successes include developments of various models and databases for the Struma River Basin as well as many other technological advances. The main problem of the WATERMAN project was the collection, detection, and pre-processing of data (WATERMAN, 2012).

Regional Water Data Banks in the Central Middle East

History of Water Relations/The Problem. By 1991, several events combined to shift the emphasis from the potential for "hydro-conflict" in the Middle East to the potential for "hydro-cooperation." The first event was natural, but limited to the Jordan Basin. Three years of below-average rainfall caused a dramatic tightening in the water management practices of each of the riparians — Israel, Jordan, Lebanon, the Palestinian Authority and Syria — including rationing, cut-backs to agriculture by as much as 30%, and restructuring of water pricing and allocations. Although these steps placed short-term hardships on those affected, they also showed that, for years of normal rainfall, there was still some flexibility in the system. Most water decision makers agree that these steps, particularly regarding pricing practices and allocations to agriculture, were long overdue.

The Jordan River Basin has a varied history of both cooperation and conflict. More recently, the basin has seen more peaceful relations related to water. As part of the Israel-Jordan peace treaty of 1994, each riparian agreed to "rightful allocations" of transboundary water resources in the Jordan River Basin. In the water resources-focused Article 6, each party states that it will develop its water resources without harming the other, while also acknowledging water scarcity in the region and committing to find and develop new sources partly through cooperative projects (Jägerskog, 2001).

Israel and Palestine negotiated an Interim Agreement in 1995, where Israel first recognized Palestinian water rights (Wolf, 1999). Joint Water Committees were called for in the water clauses of both the Israeli-Palestinan Interim Agreement of 1995 and the Israeli-Jordanian Peace Treaty of 1994 (Jägerskog, 2001).

Project Description. The Regional Water Data Banks Project (Project EXACT), a project of the Multilateral Working Group on Water Resources, is composed of two representatives from each of the Core Parties (Israelis, Jordanians, and Palestinians) and from each of the Donor Parties (currently composed of the United States, European Union, and The

Netherlands). The Project consists of a series of actions to be taken by the Core Parties to foster the adoption of common, standardized data collection and storage techniques, improve the quality of water resources data collected in the region, and to improve communication among the scientific community in the region.

Project Results. The project has included some successes in improving hydropolitical relations between Israel, Jordan, and Palestine; most notably, the agreement to jointly share and collect data. Also, in 2006, Jordanian and Israeli mayors signed a memorandum of understanding to cooperate on shared water issues (+4 on the BAR scale) (TFDD, 2015). Yet, the project goal had not been fully achieved by the end of 2010, as the project components of water treatment plants and artificial recharge trials were still in progress (EXACT, 2011). There was also frustration on the part of many of the participants that the project was not, by design, a vehicle for actually resolving any of the issues at conflict, such as water rights and allocations and water quality issues. Also, Syria and Lebanon refused to participate in any of the multilateral working groups, meaning that a comprehensive settlement of the conflicts related to the Jordan or Yarmouk Rivers is precluded from discussions (Wolf and Newton 2008).

Climate Change Modeling and Stakeholder Preparedness in East Africa

History of Water Relations/The Problem. The majority of the Pangani River Basin lies within the borders of Tanzania. It is arguably the most water-stressed basin in the country, with population growth and migration intensifying local water conflicts (Mbonile, 2006). In 1991 the Tanzania-based Pangani Water Basin Authority was established, transferring ownership of water to the Tanzanian government (MWEM, 1995). In Kenya, water resources have been placed under a Water Resources Management Authority charged with the responsibility of integrating river basin management and including stakeholder groups in the management structure (IUCN, 2003). A "sectoral" approach to management is present in both countries, in that departments are managing resources in parallel to one another, complicating the possibilities for integrated approaches to basin management. Tanzania's Pangani Basin Water Office has, however, sent representatives to the Pangani Basin Water Board to ensure the communication of various departments with one another (IUCN, 2003). As of 2003, no mechanism existed for Kenya and Tanzania to coordinate their management of the Pangani River Basin (IUCN, 2003).

Project Description. The Pangani River Basin Management Project (PRBMP) is generating technical information and developing participatory forums to strengthen Integrated Water Resources Management in the Pangani River Basin of Kenya and Tanzania, including mainstreaming climate change, to support the equitable provision and wise governance of freshwater for livelihoods and environment for current and future generations.

Project Results. From reading the Pangani Basin Water Board/International Union for Conservation of Nature *Future of the Basin* report, it appears that this project was a successful first step in gathering and disseminating knowledge about the present and future conditions of the basin across both countries. But, this project was delayed multiple times due to attempts to obtain acceptable climate change and other data. This caused the project to extend over several years with gaps in time between activities. The *Summary Report* writers state that a preferable plan would have been to have a sequence of shorter projects with well-defined end points (PBWO/IUCN, 2009).

Reducing Transboundary Degradation in the Caucasus

History of Water Relations/The Problem. As of 2008, no water treaties have existed among the former Soviet republics, though they are willing to cooperate on water-related issues (Vener and Campana, 2008). Because of the issues involving the disputed territory of Nagorno Karabakh, the countries are unwilling to sign any type of agreement but are willing to find a solution (Vener and Campana, 2008). The water users in all three countries have various water quality and quantity problems; generally speaking, Georgia has an oversupply of water, Armenia has some shortages based on poor management, and Azerbaijan has a water deficit (TACIS, 2003).

There are many major regional projects related to transboundary water resources management; many are related to each other, but there is little to no cooperation or data sharing among the organizations and agencies coordinating the projects (Vener and Campana, 2008).

The Kura-Aras Rivers have been seriously degraded in certain places, both in water quality and quantity. Basin residents have impaired the water quality of the rivers by high sedimentation loads

resulting from upstream deforestation and the dumping of municipal, industrial, medical, and agricultural wastes. Water quantity has been constrained by agricultural use and hydropower (UNDP/BRC, 2009).

Project Description. The immediate objectives of the project "Reducing Transboundary Degradation in the Kura-Aras Basin" are: (1) to foster regional cooperation; (2) to increase national and regional capacity to address water quality and quantity problems; (3) to make noticeable improvements to water quality/quantity at some points along the river; (4) to develop sustainable financial and institutional arrangements for long-term management and protection of the rivers; (5) and to promote changes in the economic sectors which cause pollution, water shortages, and habitat degradation. This project has had four countries signed up to the project: Armenia, Azerbaijan, Georgia, and the Islamic Republic of Iran (UNDP/BRC, 2009).

Project Results. Successes drawn from the project by March 2007 include the strengthening of the regional network of technical experts working on groundwater issues, completing national and regional reports, and producing initial project documents. Challenges included a lack and/or absence of valid and reliable data, no capacity to undertake integrated management of water resources at the basin level, and a lack of participation from all riparians in the basin. It is also unclear whether the project is implementable in the short to medium term (UNDP/BRC, 2009).

Improving Basin-wide Relations in the Middle East

History of Water Relations/The Problem. In the early 1980s Iraq took the initiative for the formation of a permanent Joint Technical Committee (JTC) with Turkey and Syria to discuss issues involved in water development along the Tigris and Euphrates. However, the Committee became deadlocked after 16 meetings — examples of issues that led to this deadlock include defining whether discussions should be exclusively limited to the Euphrates and the wording of the final objective of the JTC (Kibaroglu, 2004).

More recently, tensions have been exacerbated between riparians with increased, excessive demand for more water and construction of major development projects. Iraq has maintained that it has required water rights relating to its ancestral irrigation using the Euphrates and Tigris Rivers, with Syrian official arguments more or less overlapping with the Iraqi ones (Kibaroglu and Unver, 2000). Iraq, unlike Syria and Turkey, has not expressed plans to develop the Tigris or Euphrates Rivers for hydroelectricity. Thus, Iraq's concerns mainly lie with water quality and quantity.

Project Description. In May 2005, nine founders created the Euphrates Tigris Initiative for Cooperation (ETIC) as a new approach for sustainable cooperation on regional development. The goal of ETIC is to establish cooperation for economic, technical, and social sustainable development within the Euphrates and Tigris region through mobilizing collective expertise, catalyzing processes and developing appropriate partnerships to encourage riparian cooperation and development through Track II Diplomacy.

Project Results. Since its inception, ETIC has held several meetings, workshops, and seminars (PSD, 2007, n.p.). However, current civil unrest in Syria undoubtedly complicates further basin-wide cooperation. It appears that creating opportunities for dialogue and workshops among the three riparians has been successful, though there seems to be no mention of pilot projects, stakeholder involvement, or improving public awareness taking place.

Improved Management of Water Resources in Central Asia

History of Water Cooperation/The Problem. This project takes place in one of the world's most infamously mismanaged, water-stressed areas — the Aral Sea Basin. Aware of the deteriorating situation, the Soviet government approved the "State program on Priaralye" in 1986, created Basin Water Organizations, and allocated large investments into projects, particularly those focusing on water supply and social improvements (Dukhovny and Sokolov, 2003). After the Soviet collapse, two new organizations were established: the Interstate Council for the Aral Sea (for program coordination) and the International Fund for Saving the Aral Sea (for raising and controlling funds) in 1993. These two organizations later merged into one (Dukhovny and Sokolov, 2003). The first Aral Sea Basin Program was finalized in 1997. This program included regional water strategies, information systems, water quality management, integrated land and water resources management, and capacity building. A second Aral Sea Basin Program occurred during 2003-2010, but progress has been limited (ADB, 2009).

In 1998, Kazakhstan, the Kyrgyz Republic, and Uzbekistan signed a Framework Agreement on the use of water and energy resources in the Syr Darya

River Basin, entitled the Syrdarya Agreement. Tajikistan joined this agreement in 1999. Since 2002, however, the enforcement of the agreement has been suspended due to dissent over exchange of irrigation water for fuel between the downstream countries of Kazakhstan and Uzbekistan and the upstream countries of the Kyrgyz Republic and Tajikistan (ADB, 2009).

Project Description. The project had three components: (1) an improved knowledge base for the Amu Darya, (2) strengthening the institutional framework and institutionalization of regional cooperation for water resources, and (3) support to the Chu-Talas Joint Rivers Commission.

Project Results. This project purportedly had a number of successes in advancing cooperation between riparians. The Technical Assistance provided in this project is claimed by the Asian Development Bank (ADB) as its first regional initiative in Central Asia that helped to depoliticize regional water discussions and achieve positive results (ADB, 2009). Representatives of all the Central Asia states resumed water discussions suspended since 2002 under the second component. Seventeen working group meetings were also held to draft a new Syr Darya Agreement, and stakeholders also started working on two new interstate agreements; one on the use of water and energy resources in the Amu Darya Basin, and one on database and information exchange (ADB, 2009). Three training programs were conducted to satisfy the third component, which were rated satisfactory (ADB, 2009). Some challenges included delays in implementation of the Technical Assistance, due to poor performance of an international consultant. There also was "less than adequate" ADB staff involvement due to the Technical Assistance requiring day-to-day coordination with stakeholders in the region, which proved difficult to achieve from ADB headquarters.

Creating a Transboundary Water Commission in Central Asia

History of Water Relations/The Problem. Kyrgyzstan is located upstream of Kazakhstan, and has worked to maximize hydropower generation, which contributed to downstream water shortages in the summer and floods in the winter (Nichol, 2010). While the two countries are neighbors, multi-ethnic states in Central Asia, and former Soviet republics, they differ significantly. Kazakhstan is significantly larger in area and has significant natural wealth. Kyrgyzstan has only significant gold reserves and hydroelectric power potential. Due to its natural wealth, Kazakhstan had become the primary post-Soviet recipient of per capita foreign investment, whereas Kyrgyzstan became the leading post-Soviet recipient of per capita international aid during the 1990s (Gleason, 2001).

Project Description. This project centered on managing the Chu and Talas River Basins lying between Kazakhstan and Kyrgyzstan. The Chu Basin is part of the Aral Sea Basin, whereas the Talas is not. This project marked the first official act of cooperation over water between these two countries. The project, entitled "UNECE, UNESCAP, and OSCE Project: Support for the creation of a transboundary water commission on Chu and Talas Rivers between Kazakhstan and Kyrgyzstan," is aimed to assist Kazakhstan and Kyrgyzstan in making the "Agreement on Utilization of the Water Facilities of Interstate Use on the Chu and Talas Rivers between the Government of the Republic of Kazakhstan and the Government of the Kyrgyz Republic of 21 January 2000" operational.

Project Results. In the Final Project Report, the authors state that "there existed no comparable cooperative projects in Central Asia at the start-up of the project and this cooperation can therefore be seen as a nascent initiative in that direction" (p. 6). This project was also seen as progress toward coordinating water resources management between these two countries "in a methodological and stable manner" (OSCE, 2006, p. 6). No significant challenges in implementing the project were mentioned in the Final Project Report.

DISCUSSION

The following discussion is built mostly on what has been learned from our in-depth qualitative analysis of the chosen case studies. The review has highlighted the need for further discussion around four distinct themes: jurisdiction, project design, stakeholders, and negotiating. See Table 3 for a breakdown of which case studies had these themes.

Jurisdiction

A balance of autonomy and cooperation within a project design can foster success where each riparian is allowed to assume responsibility for the continuation of

one of a project's primary activities, as was seen in the Aquifer Management in South America case. While each nation's interdependence on a shared resource must be acknowledged, each nation's autonomy must be respected. To respect this, it was advised that riparians should not be pushed toward ceding authority to a basin-wide (or aquifer-wide) agency for the Aquifer Management in South America and Improved Management of Water Resources in Central Asia cases. These lessons culled from the case studies align with Subramanian *et al.*'s (2012) writings about the risk of sovereignty and autonomy when nations consider initiating cooperation. The autonomous nature of the riparian teams in carrying out activity tasks can help bridge gaps in the collaboration process. As government officials in the riparian nations are the decision makers in any action, however, they should be informed about watershed activities and recommendations, which was also stressed by Norman and Bakker (2005).

When it comes to timing, it is never too early to get started with the cooperation process. No matter when the process begins, there is always some existing knowledge of the river and its people, and this knowledge can inform stakeholders and decision makers. Plus, implementation of an agreed desired river state and environmental flow is a long and complex task. Time is needed to help alleviate what Subramanian *et al.* (2012) coined as the capacity and knowledge risk. Governments, scientists, and stakeholders (including local subsistence users of the river) must work together as a team to achieve truly sustainable use of the river; this speaks to Blomquist and Ingram's (2003) highlighting of building institutional capital as a key element in transboundary water management.

The creation of a longer term, stable, and mutually beneficial framework for cooperation, such as a bilateral commission between two riparians, can foster more prudent mechanisms for regional governance. Specifically, the establishment of a basin commission is cited as a motivator for other international organizations to provide assistance to the basin water authorities in the Creating a Transboundary Water Commission in Central Asia case.

Project Design

Along with respecting each nation's autonomy in jurisdictional matters, giving each project partner responsibility for certain activities allows for more ownership within each of a project's tasks. Building a scientific team from different partner nations appears to be a very successful activity, as noted in the Water Management System in the Southern Balkans and Improving Basin-wide Relations in the Middle East cases, allowing for knowledge transfers between teams and creating a building block for cooperation in future projects. This was one of the elements of the cooperation process cited by Feitelson and Haddad (1998) that were recommended for successful cooperative efforts.

For initial cooperative activities, a basin-wide integrated flow assessment should be done at the earliest possible stage of water resources planning, so that a fair tradeoff between development and river protection can be agreed upon, as noted in the Climate Change Modeling and Stakeholder Preparedness in East Africa case. This can then guide all future water management decisions for the river. Data sharing also appears to be a good starting point for fostering cooperation among riparians. These initial cooperative activities correlate with Feitelson and Haddad's (1998) and Uitto and Duda's (2002) writings.

This act of building a basin-wide network of senior and young scientists may be used in future activities, as noted in the Water Management Systems in the Southern Balkans case. Again, this is an example of building institutional capital, mentioned by Blomquist and Ingram (2003) as important to success in transboundary water management. Once this network is established, using this spirit of cooperation among the riparian experts is an effective means of producing a valuable source of data.

Effectively managing change to physical components of a river system requires equal consideration of the social system. If the flow regime of a river changes then the river ecosystem will change in response. People might feel positive and/or negative impacts. To manage the change ecological and social issues in a structured and agreed way need to be automatically included into water-resource management plans so that the future implications can be understood and an acceptable future chosen. Having these socioeconomic and environmental syntheses, as well as having related workshops and the setting up of national steering committees, was cited as instrumental in broadening the scope of the project stakeholders by involving ministries which were not part of the Aquifer Protection in North Africa project's initial decision-making process. This was also recommended in the Climate Change Modeling and Stakeholder Preparedness in East Africa case.

Stakeholders

Consultation with a "wide array of stakeholders" could reveal further scenarios of interest to the basin population at large, as was found in the Aquifer Protection in North Africa and Climate Change Modeling, Stakeholder Preparedness in East Africa, and Reducing Transboundary Degradation in the Caucasus cases. It was found that a qualitative stakeholder

assessment may be a key to the project's success. It may enable the project to obtain an initial assessment of stakeholder concerns, especially those who are underrepresented or not represented in official capacities. Performing a qualitative stakeholder assessment, especially with traditionally underrepresented groups, provides a significant amount of support for transboundary diagnostic assessment development in the Reducing Transboundary Degradation in the Caucasus case. Local stakeholder involvement has the potential to be a strong guiding force in the project's development and implementation. Of course, it may be advisable to clarify with governments and hosting organizations the nature of a qualitative stakeholders' assessment, so as to avoid misunderstandings and different expectations for this component.

In designing certain projects due consideration should be given to (1) stakeholders' commitment and ownership to avoid implementation delays, (2) engagement of mature international consultants with good record of regional experience to avoid promotion of blue-print solutions; and (3) development of a longer term vision to ensure consistent support, as was noted in the Improved Management of Water Resources in Central Asia case.

Negotiating

The first task of water negotiations between particularly hostile riparians may be simply to get individuals together talking about relatively neutral issues, which could be part of what Wolf (1995) refers to as the "bargaining mix." Successful negotiations might include an eventual simultaneous narrowing and broadening of focus, to move from the neutral topics necessary in early stages of negotiation to dealing with the contentious issues at the heart of a water conflict. This was also cited by Waage (2005), when this occurred during the Israeli-Palestinian negotiation of the Oslo Accords. Concepts of integrated water management may also be included.

In attempts at resolving particularly contentious disputes, solving problems of politics and resource use is best accomplished in two mutually reinforcing tracks, cited in examples by Waage (2005) and Qaddumi (2008). Of course, Track II dialogues lose much of their utility if there is no mechanism for feeding ideas generated into the main negotiating track.

In cases where there is no external support, perhaps one of the bigger limitations might be data availability and collection. Lack of external funding makes defining jurisdiction, building trust, and activities such as performing an integrated flow assessment and consultations with stakeholders much more difficult. In these cases, it makes sense for riparians to focus on projects of a smaller scale that involves scientific collaboration.

CONCLUSION

Our discussion has highlighted practices where development partners may play a role in designing and implementing collaborative projects in the earliest stages. Here, we examine the recommendations made by the literature and discuss how the literature matches the four themes that emerged in the discussion. This section closes by posing suggestions for best practices for development partners to design and implement collaborative projects in their absolute earliest stages, drawn from lessons learned and project recommendations from the case studies.

We identified many design elements that likely added to the success of projects in the case studies reviewed herein, including: respecting autonomy of each participating riparian; creating and supporting basin-wide networks of scientists; considering both the physical and social components of basin management; consulting with (and including ideas by) stakeholders in project design and implementation; and creating Track Two dialogues. We have also found that our findings from this selection of case studies have aligned with previous scholarly thinking on what constitutes successful transboundary water management. However, we must qualify our results in saying that each river basin offers unique challenges and problems and no one combination of product design strategies may fit the needs of all riparians. Also, we must note that this article's focus does not extend to analyzing the events after these initial cooperative projects may be completed.

We discussed in our jurisdiction sub-section how respecting riparians' autonomy during cooperative processes can foster success. Our discussion described how in designing the projects, allowing each partner to garner responsibility for project activities allows for more ownership and allays the risks of accountability and voice and sovereignty and autonomy. Other elements of designing a project that we suggest include basin-wide integrated flow assessments and building a basin-wide network of senior and young scientists.

We identified that consulting a diverse group of stakeholders may also serve as a useful tool in project design and implementation. Finally, in negotiating,

we pointed toward getting individuals together to speak about relatively neutral issues and negotiating in two mutually reinforcing tracks. These two points allow for opinions to be heard and added into project design. What should be noted in our article is the reliance on official project documents for sources on the case studies. These reports could be inherently biased, as it is more likely that project results will be presented in a positive light when authored by project designers. With that said, the project documents were still quite useful, especially as we are examining official positions of the projects.

We close with offering some recommendations with how development partners may assist riparians in project design. These recommendations are not meant to be prescriptive in nature; as we said earlier, every basin is unique and these recommendations must be taken into the basin's context. However, these practices can be used in most collaborative situations.

1. *Define the juridical situation of the basin* (Revollo *et al.*, 2006). Determining who has jurisdiction and over what areas must be made clear. This recommendation is drawn from the Biodiversity Conservation in South America case, but the recommendation also appears to be salient in the Improved Management of Water Resources in Central Asia case.
2. *Undertake joint fact-finding or collaborative modeling*. It is also important to carry out basic studies of the basin in a joint basis with other riparians (Revollo *et al.*, 2006). Keeping riparians involved allows for all parties to validate the information and creates buy-in among cooperative partners. It would be advantageous to choose national team members who could take part in some way in any specialist studies, even if only in an advisory capability. This recommendation is also drawn from the Biodiversity Conservation in South America case, but this concept was also implemented with success in the Water Management System in the Southern Balkans, Climate Change Modeling and Stakeholder Preparedness in East Africa, and Improving Basin-wide Relations in the Middle East cases.
3. *If necessary, riparians can turn to international assistance from partners to help ensure a smooth process.* This is particularly useful in areas where there are high political tensions, as was applicable in the Regional Data Water Banks in the Central Middle East, Reducing Transboundary Degradation in the Caucasus, Improving Basin-wide Relations in the Middle East, and Improved Management of Water Resources in Central Asia cases.
4. *After the basic studies are completed, elaboration of a Master Plan to determine the handling of the water resources and its use should be the next step.* This was recommended by Revollo *et al.* (2006) in the Biodiversity Conservation in South America case. Riparians are more likely to buy into the cooperative process after completing in a collaborative basic study of the basin together. This increases the chances of riparians creating a plan to manage shared waters, like in the Creating a Transboundary Water Commission in Central Asia case.

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