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# Understanding and Overcoming Risks to Cooperation along Transboundary Rivers

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## ABSTRACT

This study reviews the experience of cooperation in five international river basins, focusing on the perceptions of risks and opportunities by country decision makers responding to a specific prospect of cooperation, and the effects of risk reduction and opportunity enhancement on the cooperation process. We explore the following five categories of risk: Capacity and Knowledge; Accountability and Voice; Sovereignty and Autonomy; Equity and Access; and Stability and Support. We surmise that risk perception plays a key and less understood role in decision making processes over shared rivers cooperation, and conclude that countries and third parties can best achieve sustainable cooperation when long-term investments are made in risk reduction. We also point to areas for further study to better understand the motivations for cooperation.

**Keywords:** Cooperation; Decision making; Freshwater agreements; International waters; Perceived risks; Political opportunity; Risk reduction; Shared rivers; Transboundary rivers

## 1. OVERVIEW

The purpose of this study is to foster dialogue among academics, policymakers, and practitioners on political considerations associated with cooperation over shared rivers. The political dimension, to date less explored than the economic dimension, may be at least as important in determining the likelihood of cooperation. The study's goal is to identify and better understand risks associated with country leaders' decisions to enter into a cooperative agreement over a shared

river. The findings will help interested parties – country decision makers, third parties, etc. – ascertain action steps to further cooperation.

This article is based on a comprehensive World Bank report<sup>1</sup> for which five case studies were commissioned: Eastern Nile, Ganges, Niger, Syr Darya, and Zambezi. Each of the case studies assessed a historic time period in the basin when decision makers were faced with the prospect of cooperating with one another over a shared river. Two to three countries per basin were selected for each case study in order to examine in detail the political economy from the perspective of decision makers in countries. Case study researchers/authors<sup>2</sup> were solicited for their expertise in the region and basin in question. Authors conducted their analyses by drawing upon reports, literature review, professional experience in the basin, and personal interviews with decision makers and other key individuals where possible.

## **2. INTRODUCTION**

Water management is, by definition, conflict management: it is based on reconciling co-existing and competing interests. Within a nation, these interests include domestic and industrial users, agriculturalists, hydropower generators, tourism and recreation beneficiaries, and environmentalists – any two of which may be regularly at odds (Wolf, 2007). The complexity of finding mutually acceptable solutions increases as more stakeholders are involved. Add international boundaries, and the difficulty grows substantially yet again.

This has led some to proclaim that water, not oil, is the next battleground. Such statements distort the reality in which small-scale disputes persist, but widespread, violent conflicts over water have rarely occurred (Wolf, 1998). In fact, water, which challenges us to think beyond political boundaries, has in several instances propelled broader, regional cooperation (Delli-Priscoli & Wolf, 2009). In other cases, as countries engaged in war with one another over politics and other issues, water agreements were still honored as in the case of the Indus River in South Asia (Salman & Uprety, 2002).

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<sup>1</sup> The Subramanian, Brown, and Wolf (2012) full report can be found at:  
<http://water.worldbank.org/sites/water.worldbank.org/files/publication/WaterWB-Reaching-Across-Waters.pdf>

<sup>2</sup> See Acknowledgements below.

Despite the absence of historic large-scale water conflicts, there is growing concern that the prevalence of water conflicts will increase as new stressors, for instance climate change, emerge or intensify, placing more pressure on already limited water resources. Because, historically, conflicts have occurred less often when institutional mechanisms facilitating dialogue and disputes were present (Wolf *et al.*, 2003), the potential for future conflicts ignited by an emergent stressor may be abated by instilling mechanisms that enhance institutional capacity, such as river basin organizations or treaties (De Stefano *et al.*, 2012). Cooperation over international waters is, therefore, seen as an important step in building and securing regional peace.

Cooperation promises substantial economic benefits, as well, including access to external markets, improved management and coordinated operation of water infrastructure, and optimal location of infrastructure, to name a few. Additionally, joint development of a shared river can increase the sustainability of the resource, and help the needs and interests of all countries involved. “Beyond the river benefits” can also be created, such as opportunities for regional cooperation over labor, markets, and infrastructure not directly related to the river (Sadoff & Grey, 2002). A growing literature documents the many benefits of cooperative action (e.g. Yu, 2008; Alam *et al.*, 2009).

Despite the evidence that such cooperation would be highly beneficial to countries when compared to unilateral development and management – and despite the fact that many countries have successfully negotiated treaties or other agreements with their riparians (e.g. on the Indus, Danube, and Columbia) – we still find many basins where formal cooperation between riparians is lacking, or even obstructed by one party or another. There are many cases of a country not joining its riparians in negotiating a basin agreement (e.g. on the Nile) or only selectively participating as an observer (e.g. China on the Mekong). One hundred and sixty-six of the world’s 276 international basins have no treaty provisions covering them whatsoever (Giordano & Wolf, 2003). Moreover, many basins are governed by bilateral treaties rather than comprehensive multilateral treaties (Transboundary Freshwater Dispute Database [TFDD], 2011), precluding the integrated basin management advocated by water policy experts.

If the economic benefits to cooperation were the primary consideration of decision makers, one would expect substantial regional cooperation over water. Since that is not the current reality, clearly other important factors are at play. Studies show that even when economic costs weigh into such decisions, *net benefits* tend to be positive, especially over the long term (Yu, 2008; Alam *et al.*, 2009). So why, then, are so many countries hesitant to cooperate?

This paper sets out to offer at least part of the answer to this difficult question. First, we introduce the risks that decision makers face as they consider regional cooperation, the opportunities they may see in cooperation, and a framework for considering risk and opportunity along with benefits and costs; we follow this with a brief overview of five case studies used for the analysis. Next, we offer a detailed discussion of five categories of risks associated with cooperation over shared rivers. In the third section, we discuss measures that enhance such cooperation – that is, risk reduction and opportunity creating actions. The final section discusses the dynamic nature of cooperation and the implications for existing and future deals.

### **3. APPROACH: CONSIDERING RISK AND OPPORTUNITY**

#### **3.1 Perceived risk**

Benefits are necessary, but they are not sufficient to induce widespread cooperation. One plausible explanation is that, in making decisions on cooperation, country leaders are thinking not only about accessing benefits, but also about exposure to risk. As such, their “perceived risks” of engagement may lead them to view cooperation as less enticing. Box 1 presents our definition of perceived risk. Throughout this paper, we use “risk” and “perceived risk” interchangeably; when we refer to either, we are referring to “perceived risk” as defined here.

Bilder (1981: 11) writes, “[the] decision to enter into an international agreement... will involve considerations of risk...” Countries may, therefore, discount benefits, based on perceived risks of engagement in cooperative solutions. The level and type of risks could vary depending on both the scope of cooperation being promoted and the hydropolitical context of the basin in question. Likewise, an individual leader can exaggerate a real risk or even perceive a risk that does not exist, as perception is influenced by many confounding factors, including political

environment, historical experiences, personal goals, and salience of the issue at hand. Thus, country leaders or policymakers may differ in how they perceive risks as well as how readily they will discount those risks (Bilder, 1981). If risk cannot be compensated for or controlled, a country leader or policymaker may choose not to enter into a cooperative agreement, instead opting to retain the status quo or pursue national interests, maximizing benefits to the extent possible without an agreement (LeMarquand, 1977). On the other hand, if the risk is reduced or removed, the potential for cooperation may increase (Bilder, 1981).

Through review of academic literature and World Bank reports, we determined there are five categories of perceived risks which can impede shared waters cooperation (Box 2).

### **3.2 Perceived opportunity**

On the flip side, though, there are examples of decision makers joining agreements to which they were previously opposed (e.g. Ganges) or which outsiders (or stakeholders) viewed as more costly than beneficial to a country (e.g. Niger). In such cases, decision makers appear to perceive a political opportunity that offsets risks or trumps economic costs. The gains from seizing such opportunities may have little to do with water. For example, they may seek or declare alliance/solidarity with a country or a group of countries or attempt to enhance their country's profile regionally or globally. Therefore, we must also consider the role of political opportunity in decisions regarding cooperation over international waters.

### **3.3 Conceptual framework**

The framework we developed for this study builds on the current paradigm for analyzing cooperation that focuses largely on economic costs and benefits. Many studies make comparisons between economic benefits of the status quo and economic benefits of engaging in cooperation. For example, a game theory analysis of the Ganges-Brahmaputra basin produced a cooperation scenario in which all involved countries would reap more economic benefits than if no cooperation occurred (Rogers, 1993); regional power pools are projected to reduce electricity costs by \$2B [AQ1] a year by tapping into cost-effective sources of energy in Africa.

Our framework recognizes that accessing new benefits is indeed a determining factor in a riparian's decision to cooperate, especially when those benefits outweigh associated costs. Our framework adds, though, that decision makers may also be negatively influenced by a high level of perceived risk and positively influenced when opportunities outweigh (or override) risks. This notion is supported by the examples previously discussed of countries 1) not entering an agreement even though anticipated benefits are abundant; and 2) committing to an agreement even though benefits are not obvious. In addition, our framework focuses on decision makers' *perception* of both benefits/costs and opportunities/risks rather than hard numbers. This is because, not only are political variables difficult to quantify, but it is also extremely difficult to quantify the *value* of a benefit to a country – for example, immediate benefits may be perceived as more valuable than long-term benefits, or water for energy use may be perceived as more valuable than water for agricultural use, etc.<sup>3</sup>

Figure 1 illustrates how decision makers may consider a prospect of cooperation: they assess their positions on the x-axis in terms of net benefits (benefits less costs) and on the y-axis in terms of net opportunities (opportunities less risks). The likelihood of cooperation is described in the text in each of the four quadrants. The upper right quadrant is where both benefits and opportunities are net positive, and thus where the greatest potential for cooperation likely lies. In this framework, actions that either reduce risk or build opportunity (gray arrows) will move a country's "position" in the framework upwards, thereby increasing the likelihood for cooperation. Of course, actions that create more benefits or reduce costs will move it to the right, which also improves its chances for cooperation; however, as mentioned, since benefits and costs have received the majority of attention to date, our discussion focuses on risks, opportunities, and enhancing cooperation along those lines.

### 3.4 Case studies

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<sup>3</sup> See Dombrowsky, I. (2010). The Role of Intra-Water Sector Issue Linkage in the Resolution of Transboundary Water Conflicts, *Water International*, 35(2), 132-149 for an interesting account of linked benefits.

The discussion here draws primarily upon the five case studies (Table 1) compiled for the World Bank report on risk and cooperation support mentioned above. Those unfamiliar with the context behind our examples should reference the full report. What follows is only a brief overview.

We selected the following five river basins as case studies: Eastern Nile, Ganges, Niger, Syr Darya and Zambezi. Cooperation mechanisms in these river basins are at varying stages of evolution. Some have basin-wide and rather formalized regional governance institutions (Niger, Syr Darya); others have more limited or informal basin-wide governance institutions (Eastern Nile, Ganges, Zambezi). The number of riparian countries in the case study basins range from four to ten. For the countries involved, these rivers are a source of actual or potential livelihood, growth and well-being. They are also a source of destruction through periodic floods and droughts. Thus the basins offer a broad range of cases to develop our understanding of cooperation.

These river basins cover a substantial drainage area in the aggregate, and the rivers travel extensive distances through many countries. In addition, each basin has faced (and still faces) formidable challenges related to development, politics, the environment, and climate. Cooperation has been seen as one of the means by which countries could meet some of their respective challenges. Each of the basins under review has also experienced a unique trajectory of movement toward cooperation. In each basin, either an agreement has been signed (bilateral or multilateral), or some or all of the countries have participated in a basin (or sub-basin) institution or program.<sup>4</sup>

#### *3.4.1 Eastern Nile: ENSAP*

The Eastern Nile is a sub-basin of the Nile, and includes the five riparians of Egypt, Eritrea, Ethiopia, South Sudan and Sudan. In the decades leading up to the 1990s, several attempts were made by the countries and by third parties to facilitate dialogue among all the riparians of the greater Nile basin. In 1999, the minutes establishing the Nile Basin Initiative (NBI) were signed. A major component of the NBI was its two Subsidiary Action Programs, of which one was established for the Eastern Nile. The launch of the Eastern Nile Subsidiary Action Program

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<sup>4</sup> The most up-to date agreements pertaining to cooperation for the study basins can be found by searching the TFDD (2011) Treaty Database @ <http://www.transboundarywaters.orst.edu/database/interfreshreatdata.html>



(ENSAP) was a major step forward for the Eastern Nile in the cooperation over water. Involving Egypt, Ethiopia and Sudan (pre-independence of South Sudan), its purpose was to foster development in the sub-basin, with an emphasis on investments. In 2000, the Ministers of Water Affairs approved a strategy paper that emphasized action with a focus on investment projects and win-win solutions.

The final portfolio for the first round of the Eastern Nile investment program, called the “Integrated Development of the Eastern Nile,” included a set of projects in irrigation, power interconnection, watershed management, modeling, flood preparedness, and some sub-regional studies. Expected benefits to each country differed. Overall economic benefits included the potential to increase food production, energy production and access, flood and sediment management, water augmentation, and access to information/data. Overall political gains centered on the potential for establishing a platform for exchange and communication and a better mutual understanding of national development plans and their regional implications. Our analysis for this paper focuses on the perspectives of Egypt and Ethiopia during the launch and first round of investments of ENSAP between 1999 and 2004.

#### *3.4.2 Ganges: the Ganges Water Sharing Treaty*

The Ganges basin is shared among Bangladesh, China, India and Nepal. This case study focuses specifically on the interactions between Bangladesh and India that led to the bilateral Treaty between India and Bangladesh on Sharing of the Ganges Waters at Farakka (“Ganges Water Sharing Treaty”) in 1996. The dispute over these waters dates back to 1951 when India first expressed plans to build a barrage at Farakka. No concrete progress was made in negotiations and in 1975 Farakka became operational. Bangladesh lodged a formal complaint against India with the United Nations a year later, which urged the parties to come to a quick settlement at the ministerial level. In 1977, India and Bangladesh signed their first bilateral Ganges agreement, valid for a period of five years. In 1982 and 1985 they signed three year memoranda, extending arrangements until 1988, when the dispute resumed.

In the mid-1990s, following elections in both countries, new governments assumed power and dialogue resumed. In 1996, after less than six months of negotiations, the two countries signed the Ganges Water Sharing Treaty. Physical benefits were primarily allocated to Bangladesh – it would be guaranteed minimum dry season flows, released by India at Farakka. Both countries would reap political benefits, as the treaty aimed to improve overall relations between the two countries. It also included an agreement to cooperate over all shared river basins between the two countries, thus broadening the scope of cooperation over water beyond the Ganges River.

#### *3.4.3 Niger: revitalization of the NBA*

The Niger basin includes the nine riparians of Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria. In the early 1960s, the countries began discussions for coordinated development of the basin, and in 1964 the Niger Basin Commission was established to execute a plan for integrated development. However, given several competing post-independence priorities, the Commission could not accomplish much on the ground. The Commission was converted into the Niger Basin Authority (NBA) in 1980 with the intent of bestowing on it stronger powers to advance the development of the shared Niger River. Yet again, a combination of a focus on nation building and a series of internal political and financial crises in the countries thwarted the countries' intentions in regional cooperation.

By 1998, the Heads of State of the Niger Basin and the Ministers of Water realized the urgent need for rapid development and the fact that NBA lacked the institutional capacity to accomplish its mission. It was clear to them that significant reforms were needed. This marked the beginning of the revitalization era, a critical turning point in cooperation in international waters in the Niger Basin. In 2004, the Heads of States of the riparian countries signed the Paris Declaration, through which they committed to sustainable development and enhanced coordination and information sharing on shared waterways. The NBA subsequently pursued a fast paced program to respond to its member needs and interests. Expected benefits to countries varied, but among them were: irrigation; hydropower; environmental management, including silt

control; and access to information on impacts of national activities on others. Capacity building was also an integral part of the program. The analysis for this paper focuses on the perspectives of the three riparians of Mali, Niger and Nigeria during this six-year revitalization era.

#### *3.4.4 Syr Darya: Framework Agreement on Water and Energy*

The Syr Darya is a relatively new international basin, achieving this status in 1991 with the collapse of the Soviet Union. There are four riparians on the Syr Darya River: Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. This analysis focuses on the perspectives of, and interactions between, Kyrgyzstan and Uzbekistan during 1996-2002, the time period in which the bilateral Framework Agreement on Water and Energy was signed. Issues on the Syr Darya began in the 1950s when the Soviet Union embarked on a vast land reclamation program involving massive irrigation schemes, and including dams and reservoirs, to increase the cotton harvest in the lower Syr Darya floodplains. Then, in the 1980s, the Soviet government established a centralized water management entity for the Syr Darya to operate and maintain large infrastructures and manage water allocations among the riparians. Water was released downstream in the spring for cotton irrigation in exchange for coal and gas transfers upstream for winter energy needs. With the dissolution of the Soviet Union in 1991, these institutional mechanisms broke down, leaving the countries to devise their own solutions to reconcile competing interests on the river.

To address these issues, in early 1992, immediately after independence, the riparian states negotiated an agreement to maintain the Soviet water management system. But energy deliveries to Kyrgyzstan during wintertime were not part of the agreement, leaving the country to rely on releases from Toktogul's water for hydropower generation in winter. In 1998, Kazakhstan, Kyrgyzstan and Uzbekistan signed a new agreement – the Agreement on Water and Energy – which Tajikistan also joined in 1999. It was for a five-year period. The 1998 agreement specified that Kyrgyzstan would release a specified flow down the river each month from the Toktogul dam, as well as supply electricity to Kazakhstan and Uzbekistan during the growing season, in exchange for gas and coal during the winter months to meet increased demand at home. The

exchanges were designed as a barter system mimicking the Soviet days, with the intention of supporting a water-energy management regime that would be mutually beneficial, balancing energy and agricultural needs. The agreement also provided for future cooperation over water and energy. Its implementation was to be facilitated through periodic meetings between the countries and through the use of models to optimize reservoir operations.

#### *3.4.5 Zambezi: ZAMCOM*

The Zambezi basin is shared among eight riparians – Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe. Shortly after Zambia and Zimbabwe gained independence (1967 and 1980, respectively), the two countries signed the Zambezi River Authority Agreement, creating an institutional structure to develop and utilize the Zambezi's waters in ways that were beneficial to the two countries. At the same time, two outside efforts were launched to coordinate sustainable development of the basin. Though none of these efforts advanced, discussions regarding some of the associated projects were successful in creating a multilateral forum. Through this forum, many of the riparians proposed developing a regional agreement to provide an enabling environment for cooperative development on the Zambezi. This was happening at the same time a broader regional agreement – the Southern Africa Development Community (SADC) Protocol on Shared Watercourses – was being formulated.

After the adoption of the SADC Protocol, discussions in the Zambezi basin refocused on developing a basin-wide agreement. For several years the Zambezi countries pursued an agreement, supported by a donor-funded program that included other capacity building activities and studies. A Secretariat set up in Lusaka coordinated these basin-wide efforts, which eventually resulted in the Agreement on the Establishment of the Zambezi Watercourse Commission (ZAMCOM). Economic benefits centered on joint development projects. The countries also viewed a basin-wide agreement as an instrument for strengthening political ties and attracting investments and donor support. ZAMCOM was signed in 2004 by all basin states except Zambia. The analysis for this paper focuses on the perspectives of Mozambique, Zambia, and Zimbabwe in the years leading up to the signing (and not signing) of the 2004 agreement.

#### **4. FIVE PERCEIVED RISKS TO COOPERATION OVER SHARED RIVERS**

The discussion below provides several examples in support of our hypothesis that perceived risks may impede cooperation over shared waters. For each risk, we draw upon multiple examples from the five case studies to demonstrate how that particular risk has manifested in the context of different cooperation processes.

##### **4.1 Capacity and knowledge**

*Confidence in ability to negotiate a fair deal; having correct and adequate information and knowledge to do so.*

Leaders, particularly in less politically influential or economically developed countries, see capacity and knowledge as a great risk. Often, they believe they lack capacity compared to their negotiating partners, and consequently are apprehensive about coming out of the talks with a good deal. For example, in negotiating the Ganges Treaty with India, Bangladesh was unsure about achieving an optimal deal. During the first round of the Eastern Nile Subsidiary Action Program (ENSAP), Ethiopia requested help to upgrade the capacity of its transboundary department and of basin analysis skills, in an effort to bolster its capacity to negotiate with Egypt and Sudan. Prior to the revitalization of the Niger Basin Authority, many of the Niger basin countries had faced decades of internal crises and, as a result, felt the need to upgrade their skills and capacities before committing to a new joint authority or management plan, particularly in regard to new management paradigms such as IWRM (integrated water resources management). Leading up to the Zambezi Watercourse Commission Agreement (ZAMCOM), Zambia requested assistance with building skills in international waters and negotiations.

Closely related are concerns that inadequate information or poor quality data bring. For example, there could be a significant gap in knowledge and information about basin hydrology, ecology, markets and economics. Countries with outdated master plans that do not reflect current realities in terms of basin water supply and demand, or that do not address IWRM, may experience this, leading decision makers to feel they are not entering negotiations well equipped

to make a deal. One reason Zambia expressed for not signing the ZAMCOM agreement was that its water master plan did not include provisions for international cooperation at the time. Going to the negotiating table with dated information could be a challenge for the riparian countries. Countries may not then be able to raise pertinent questions about projections of costs and benefits. Such a situation may hinder the understanding of the various unilateral and cooperative development options available, leaving countries uncertain as to whether they had all the options in front of them. India and Bangladesh faced this challenge in drafting the Ganges Treaty, as they depended on old data to shape the agreement (Hossain, 1998; Wolf & Newton, 2009). Likewise, the Eastern Nile countries involved in ENSAP Round 1 had apprehensions about the adequacy of their knowledge of the sub-basins' river systems. Egypt was uneasy about its lack of access to upstream hydrological data, as upstream development could have implications for its already constructed and functioning dams. On the other hand, Ethiopia wanted a rapid update of the dated basin studies. In the absence of reliable and accurate information, some long held myths about water availability and water control can persist. In turn, such myths may reinforce the perceived risks of cooperation and the benefits of unilateralism (Blackmore, 2011).

#### **4.2 Accountability and voice**

*Deliverability of benefits by the regional entity and co-riparians, often related to trust; having a say in decision-making in the governing structures of the regional entity.*

Many countries/decision makers experience a lack of confidence in the intent or ability of co-riparians or third parties to deliver on commitments. Following the dissolution of the Soviet Union, the Syr Darya riparians, still in the early stages of state building, were unsure of how to devise appropriate and effective economic schemes for water and energy management to replace the Soviet system. As such, when negotiating the Framework Agreement on Water and Energy, Kyrgyzstan was worried the winter fuel supplies would not be delivered by its neighbors, while Uzbekistan was apprehensive that the spring flows it relied upon for cotton irrigation would not be reliably available. Concerns were legitimate as ultimately, many provisions of the agreement were not met by the countries for one reason or another. Bangladesh, as the

downstream riparian, was not confident that India would uphold its agreement in the Ganges Treaty to release winter flows from Farakka. And while ZAMCOM promised a suite of benefits, Zambia was unconvinced of implementation, as the 2004 agreement was not accompanied by an investment program with financing commitments. In the absence of a clear and well-sequenced investment program, Zambia's gains were uncertain enough in the short run to prevent it from joining the agreement.

Such concern can also extend to skepticism about the ability of regional mechanisms, such as river basin entities established by the participating countries, to deliver. The formation of the Eastern Nile Office – consisting of a representative from each of the riparian countries to implement ENSAP development goals – was beset by anxieties in the participating countries that the entity would neither deliver what each one of them wanted nor adequately respond to their priorities. Likewise in the Niger River basin, the riparians worried about the accountability of the Niger Basin Authority to deliver the fruits of cooperation – in other words that the funding and construction of infrastructure would happen in a timely way – since the NBA had previously failed to deliver; clarity was needed on the flow of benefits in terms of size, timing and sequence of benefits.

Having a voice in the decision-making processes at the regional level is also of paramount concern, especially for countries that have historically not had their interests seriously considered. Leaders may be concerned that the governance arrangements of the regional entity would not allow for adequate and inclusive levels and systems of decision making, approval, monitoring, dispute settlement, and enforcement of commitments. For instance, this concern was acute in the early years of the Eastern Nile program. Countries expected to play “equal” roles in any regional mechanism and did not want to be overwhelmed by the more powerful among them. For example, Ethiopia persistently sought clarity on the respective roles of national and regional agencies in any cooperative venture. Also, in the Niger basin, Mali, Niger, and other riparian countries expressed concern about the inclusion of their priorities and voices within the Niger Basin Authority.

In short, country concerns around accountability and voice relate to governance, decision-making structures and processes, and rules of engagement. Agreed approval processes, decision making steps, and operating procedures are often critical elements of a regional cooperative organization to build confidence among participating countries. In a joint institution, dominance by any one country offsets the balance and puts the other riparians ill at ease. At times, countries view participation in regional forums as a way of presenting their views to the outside world, thus gaining appreciation and recognition of their predicaments. The Aral Sea countries have been successful in this regard, using regional forums to present their post-Soviet context and environmental challenges, and attracting attention and funding to their many development needs (Weinthal, 2002).

#### **4.3 Sovereignty and autonomy**

*Ability to act in best interest of the country without constraints; making decisions independently.*

The issue of sovereignty appears to be a core concern for leaders as they consider shared or joint management of a river. The possibility of external intrusion on a decision maker's prerogative to make sovereign decisions about his/her country can trigger a sense of danger. Not only does this risk refer to the desire to have control over resources and infrastructure, but also to the sense of maintaining authority to make decisions independently. Sovereignty concerns have been discussed in the context of an array of international waters cases as well as cases involving other shared resources.

Control over resources and infrastructure is a particular concern where legacies of historic uses by one or more countries exist. In the Ganges basin, signing an agreement guaranteeing flows to Bangladesh presented risks to India, as it would lock India into a long-term commitment that recognized shared rights by both countries to access flows from Farakka (Hossain, 1998).<sup>5</sup> In the Eastern Nile, Egypt had similar hesitations – its historic development on the lower reaches – in particular at Aswan – could be called into question with a comprehensive basin-wide agreement. Kyrgyzstan, in any agreement involving water stored in and released from

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<sup>5</sup> Likewise, on the Ganges and also the Mekong, China, as the riparian furthest upstream, has refrained from participating in basin-wide agreements that could place limits on its future development plans on the rivers and their tributaries.



the Toktogul Reservoir, located just north of the border with Uzbekistan, would cede some control of flows to its downstream neighbors, and thus some ability to determine its own fate in regard to winter energy.

On the other hand, there is the concern that an agreement will surrender decision-making power to a regional, supranational entity. For example, Zambia worried about losing control over much-needed national development decisions when first considering the ZAMCOM agreement. In fact, concern for loss of autonomy is a major concern among the Zambezi riparians, as historically, unilateralism has been the paradigm. During the early years of the Eastern Nile Office, there were long and persistent debates on “national” and “regional” responsibilities following countries’ concern that the long hand of regional institutions would extend into decisions of national agencies. For Ethiopia, there was a particular concern in opening up its development plans for outsider scrutiny.

Globally, the paradigm shift from principles of unilateralism and “absolute sovereignty” to those of “reasonable and equitable utilization” and “no significant harm”<sup>6</sup> has been a slow and gradual process (Wouters, 2000; Salman, 2007). Countries may often begin with fairly narrow mandates for the regional organization at the basin level when trust is low and sovereignty concerns are acute. With increased confidence and trust, they later are more open to permitting a broader scope of action by the regional entity.

#### **4.4 Equity and access**

*Fairness of (relative) benefits to country, including timing of benefits and costs, and obtaining or retaining fair access to river.*

Like sovereignty, equity appears to be an integral concern of decision makers. They can be acutely concerned with both fairness of the agreement and entitlement to use the river. Fairness can manifest through specified quantity (or quality) of water or benefit flows or project costs. Entitlement to use fair shares of the river tends to be defined differently depending on the

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<sup>6</sup> As per the United Nations 1997 Convention on the Law of the Non-navigational Uses of International Watercourses.

country and context – some view it as the right to continuing with historic uses and others see it as gaining access to a river running through (or originating in) its territory.

Of course, nearly all countries entering negotiations over a shared resource will push for accessing economic and physical benefits from cooperation. For instance, Niger and Mali, in the revitalization period of the Niger Basin Authority, sought investments to address major poverty and growth constraints, and regional cooperation was partly a means to that end. In the Eastern Nile basin, Ethiopia sought to unlock the potential for basin development at the earliest. Zambia, with development planned on the Zambezi, was worried its growth would be retarded by cooperation, despite occupying a major part of the basin; the other Zambezi countries, conversely, were worried their national development priorities would not be incorporated equitably into the agreement.

There is also the larger question of equitable rights. The many debates around legal and environmental principles in the mid-1990s did not yet specify the bases for estimating such rights (Wouters, 2000). Countries define “equitable rights” as they see it, in the absence of a precise, agreed-upon set of criteria. For some, it is maintaining what they perceive as an existing right. For first-comers to a river’s development – such as India in the Ganges and Egypt in the Nile – equity is often seen as continuing with historic uses. Even with a relatively new historic precedent, for example Uzbekistan’s insistence to maintain the flows it depended on for cotton irrigation, there can be such concerns related to the notion of equity. On the other hand, for countries at a later development stage or with newer statehood or previously less political clout, accessing flows and a “fair” share of the river for development now or in the future is the issue. To counter the previous examples, Bangladesh wanted to secure dry season flows; Ethiopia was keen to develop Nile waters to address serious food and energy security challenges; and Kyrgyzstan was keen to serve its winter energy interests.

In some cases, the notion of equitable benefits extends beyond sharing water to sharing other benefits. Take the Syr Darya, for example – the water and energy exchange attempted to meet very different needs, winter heating and summer agriculture, complicating what a fair or equitable exchange would be, both timing and quantity-wise. Countries pay considerable

attention to analyzing expected benefit flows and assessing related risks. As mentioned, given the lack of precise criteria for equity, decisions regarding water and benefit sharing appear to be negotiated based on both economic and political criteria.

#### **4.5 Stability and support**

*Longevity of potential of agreement; in-country support of agreement, including ratification likelihood.*

The risk of stability and support has direct national and personal implications – it applies not only to the implementability of an agreement, but also to a decision-maker's positive or negative public image and re-election potential. In some cases, this risk is quite an important consideration by country leaders.

As countries are not unitary actors, there are almost always both supporters and critics of new national policies (Waterbury, 2002). Leaders who take initiative to act in what they view as their country's best interests are faced with potential negative publicity, which can be career damaging in extreme circumstances. In signing the Ganges Treaty, the leaders of both India and Bangladesh were criticized by their constituents for moving forward with an agreement not supported by all citizens (Hossain, 1998). The Nile 2002 conferences provided a platform for civil society organizations to participate in candid debates on the future of the Nile, bringing to light the many conflicting views among the countries. In addition, the national discourse in the countries remained oriented on continuing with unilateral management plans, making it difficult to generate options for cooperative management of the river and to debate these options in public. Zambia's reluctance to sign the Zambezi agreement was attributed, in part, to lack of domestic support.

Multiple interests within a country may thwart movement towards a deal. Sometimes, especially in federal states, it may be one region or province of a country that has a major stake in the sharing of the basin, thus their support may be critical in ratifying or implementing the agreement. This was the case in India with the signing of the Ganges agreement with Bangladesh – support from the state of West Bengal was critical to moving forward.

With the many sectors often involved in water management, multiple interests at the national level can exist, as well. In order to move forward on an agreement, various Ministries may have to align their views. This was evident in the establishment of the Eastern Nile Office, where the country representatives each had to contend with the highest authorities in their respective countries before making decisions, which greatly hampered progress. In the absence of vigorous public debates and with the many actors involved in national policy making, challenges to those engaged in the cooperative endeavors remain. Often, the variables that impact this category of risk may have nothing at all to do with water or with the deal under discussion, but rather with the broader swath of issues that make up local and regional politics.

## **5. ENHANCING COOPERATION**

### **5.1 Risk reduction**

When risks are perceived as too high, appropriate risk reduction actions may move countries to a point where they decide to cooperate. Risk reduction measures factor into cooperation decisions over water in that these actions reduce the level of perceived risk, which increases the attractiveness of the cooperation offer at hand – in our framework (Figure 1), risk reduction moves a country's position north in the diagram. Especially when risk is high to begin with, risk reduction appears to foster enhanced cooperation. Risk reduction is at times offered by riparians involved and at other times employed by external actors.

In the case of the Eastern Nile, the Council of Ministers set forth to clearly define the role of the Eastern Nile Office when it became apparent that the riparians were struggling with clarifying the respective national and regional roles in decision making. To address capacity gaps, donors supported basin-wide capacity and skills building programs, and also coordinated financing for institution building and preparation of investment plans. Their support for the countries' objective of using good practices in procurement and financial and human resource management provided the countries with some assurance that the expectations from the Eastern Nile Program were likely to be met.

Regarding the Ganges Water Sharing Treaty, India was lacking political support within the country, thus the involvement of West Bengal in the process reduced the political risk.<sup>7</sup> The agreement also offered some predictability to India, as the process of renegotiating every few years was rather onerous. The involvement at the highest level by Bangladesh's Prime Minister also offered assurance that the agreement would in fact be stable and predictable. For Bangladesh, risk reduction helped increase its confidence to sign the 1996 agreement. These measures centered primarily on the agreement itself – for example, written into the treaty was a guarantee of dry season flows for a thirty-year period (Ganges Treaty, 1996). The risk of not having full domestic support was not appreciably reduced prior to signing – both national governments moved forward regardless (Hossain, 1998).

Risk reduction was important for all the countries in the Niger basin, especially given the previous lack of substantive concrete action through the Niger Basin Commission and Authority. Most of the risk reduction efforts targeted shared concerns. For example, capacity building and knowledge expansion efforts helped prepare the countries in technical skills, negotiations, and institution building. Modeling helped in understanding the complexities of the basin. Institutional reforms strengthened confidence in the Niger Basin Authority's accountability. Finally, the agreement itself conveyed an understanding of the countries' priorities and it also proved to be an important communication tool for the countries as they approached various stakeholders with their programs.

While some important risks were reduced in the Syr Darya case, the 1998 Framework Agreement on Water and Energy moved forward despite critical remaining risks, which may be one explanation for its lack of success. During the negotiation process, the United States Agency for International Development (USAID) was a key player in risk reduction. For example, USAID used issue linkage techniques to give certain stakeholders a more prominent seat at the table, including Kyrgyzstan's energy sector (Weinthal, 2006), likely reducing perceived risks of equity by Kyrgyzstan leaders. USAID also supplied solid information on basin hydrology (McKinney, 1997), thereby reducing capacity and knowledge risks. However, many concerns over accountability and

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<sup>7</sup> Similarly, British Columbia's endorsement of the Columbia basin deal eventually allowed it to move forward (Le Marquand, 1977).

equity in benefits remained on both sides, which became clear as the agreement fell apart a few years later.<sup>8</sup>

Though risk reduction was employed in the Zambezi basin, Zambia did not sign the agreement. Continuing concerns about loss of sovereignty and about the accountability of regional mechanisms to deliver economic benefits appeared to outweigh the perceived benefits. As in the Niger, most risk reduction measures addressed concerns of all riparians. For example, information sharing provisions were built directly into the Agreement. This, and other risk reducing actions, appears to have helped motivate the other countries to commit to the agreement.

Some risks appear to be more susceptible to targeted risk reduction interventions than others, namely Capacity, Accountability, and Stability. For example, training and hydrological modeling can help reduce risks surrounding Capacity. An agreement that specifies the timing of benefits and investments or establishes a tribunal will address concerns for Accountability. Forums for public debates and civil society participation can bring down the risks related to Stability.

However, Sovereignty and Equity seem to be far more difficult to address. They are deeply embedded in the economy and culture of the countries. These risks may become more acute as more countries become involved in a cooperation deal, but these risks are apparent even in bilateral relationships. Design of the agreement and associated institution, may help abate these concerns. For example, agreements that are informal and allow riparians to maintain a degree of autonomous decision making may be more desirable as a first step than formal agreements that assign authority to a regional institution.

Sovereignty and Equity concerns do tend to resurface even after agreements have been sealed and delivered. In several of the examples discussed in the previous section, the return of sovereignty and equity concerns posed implementation challenges for the agreement signed or for the agreed cooperative arrangement. In other words, it seems safe to assume that an

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<sup>8</sup> Remaining concerns with equity in benefits related to fluctuations in wet/dry year flows; and discrepancies in price definitions for water and energy in the barter approach. See World Bank (2004). *Water and Energy Nexus in Central Asia: Improving Regional Cooperation in the Syr Darya Basin*. World Bank, Washington.

agreement or a deal allows for breathing space to address the next round of sovereignty/equity concerns.

## **5.2 Political opportunity**

Political opportunity plays an important role in moving countries to cooperate, and can at times be the driving force. Countries may see a political opportunity, seize it and move to risk reduction to finalize a cooperation agreement. Or, in the process of understanding the risks and exploring risk reduction measures, countries may see new political opportunities in engaging in cooperative deals.

Countries and political leaders may seek or declare alliance with a country or a group of countries, with the objective being to demonstrate support and solidarity with neighbors. For example, soon after independence, the Niger basin countries formed the Niger Basin Commission, partly as a declaration of regional solidarity and independence. Countries may also seek to raise their regional or global profile in an effort to change or strengthen the current image of the country in regional or global politics. India's motivation in the Ganges Treaty was triggered by its new foreign policy and was aimed at enhancing regional relations.

In such situations, a political opportunity can be seen as a "door opener" for cooperation decisions. Nevertheless, risk reduction measures may still be needed to convert the opportunity into a cooperative deal. In the previous examples where political opportunity motivated regional cooperation, specific risk reduction measures were still essential for shaping and adopting practical – and sustainable – agreements.

At times it appears that political opportunity trumps residual risk. For example, leaders in both India and Bangladesh moved forward with the Ganges Water Sharing Treaty despite domestic opposition. India and Egypt, both countries with deep-seated sovereignty concerns, signed their respective agreements nonetheless. In each of these examples, the decision makers saw new opportunity on the horizon, due to regional changes in geopolitics or global paradigm shifts.

While political opportunity can play a major role, the dilemma is that it is unpredictable and often depends on issues outside of the water arena. For example, a change in regime can shift a country's position regarding a particular agreement. Alterations in trade patterns can influence cooperation in water. As such, identifying and seizing political opportunities are activities that are largely in the domain of political leaders in the countries involved. However, outsiders *can* track and monitor political developments, and thus stand ready to extend support should leaders move to strike a deal.

### **5.3 Attaining and sustaining cooperation**

As demonstrated in several of our case studies, the decision to cooperate or not is typically not the result of a unanimous decision within a particular country. In other words, countries are not unitary actors, but rather a conglomeration of diverse voices and influences. Country politics will determine the process for incorporating support or dissent into cooperation decisions. At times, individual decision makers with particular drive will be able to push a cooperation deal through, with or without widespread public or political support.

As each country and decision maker differs, the "path" to cooperation will likewise differ for each country. For example, some countries may like to see more economic benefits before engaging in activities to reduce risks, while some would prefer the latter first; some countries may require many years of risk reduction, while others only a short time; still others may be waiting for a political opportunity to entice them to engage. Figure 2 illustrates the different "paths" countries may take to cooperation.

It is important to note, however, all countries do not necessarily "go forward." Deals are dynamic. At times when cooperation occurs, whether due to substantial risk reduction measures, or through a combination of risk reduction and political opportunity, it is not necessarily sustained far into the future. At other times, cooperative arrangements grow and evolve into robust institutions that not only stand the test of time, but also evolve with the times. Often, progress is followed or accompanied by regression. Countries may take one step forward and two steps backward. Importantly, these backward steps can occur even after an agreement is reached,



highlighting the fragile nature of international agreements. Furthermore, the flux in geopolitics and uncertainties of hydrology add a further dimension of complexity to cooperation and is a caution against seeking “permanent fixes” in cooperation deals. Accounting for the fragility and for the many uncertainties demands adaptability and flexibility in the cooperative arrangements. This seems to be particularly important for the cases of cooperative agreements that involve detailed quantitative water sharing formulae that may not hold up due to climate shocks.

Even brief periods of cooperation can offer opportunities to implement projects or institutions that “scale up” cooperation to have lasting and long-term impacts. When hydropolitical relations are strained in a basin, evaluating potential interventions against political realities becomes imperative. Regardless of the current relations, activities designed to be both sensitive to existing realities and help move countries towards greater cooperation could be fruitful. Such “cooperation-inducing interventions” will need further careful reflection.

## **6. CONCLUSIONS**

This paper has offered a plausible approach to better understanding why decision makers choose to – or not to – cooperate over shared rivers. Our case studies revealed that, in addition to economic benefits and costs, political leaders are influenced by the associated risks and opportunities they perceive. The take home message here is for those who wish to promote cooperation – interventions that reduce risk may be as effective as those that enhance economic benefits to countries.

We recognize there are clear limitations to this study and hence offer this paper as a starting point for expanding the dialogue on the extremely complex topic of shared waters cooperation. Since we focused on historic instances for framework development and case study analyses, we recommend future studies track ongoing shared waters negotiations and processes to further test our framework, employing interviews with decision makers and third party facilitators whenever possible.

In conclusion, we offer ten key messages on risk, opportunity, and overall support for shared rivers cooperation:

- 1. Risks are less studied, but critical in decision making.** Several previous studies have focused on the economic benefits and costs to cooperation over water. Though some more recent work has explored expanded benefits that can result from cooperation, less attention has been paid to the role of political economy in decision-making and country perception of risks. Thus, this study addresses an important gap in knowledge on the topic of international waters.
- 2. Countries are not unitary actors. Instead, several stakeholders are likely involved.** Sometimes, use of the term “country decision-making” can imply that a country is a unitary actor, thus losing the diversity of interests within a country. It is important to recognize in studies and engagement in international waters that dynamics within each country influence the likelihood of cooperation. Stakeholder voices and the national discourse on cooperation are critical elements in the decision-making process.
- 3. Individual decision makers matter. Champions are key.** At times, it is the vision, will, charisma, or personal politics of a certain decision maker in a country that determines whether or not a deal is made. Hence motives of individual decision makers matter. By extension, the same can be said of partners and teams as they set out to facilitate and support the cooperation process.
- 4. Solutions must be devised for situations. These solutions should match country needs.** There is no blueprint or one-size-fits-all approach, especially in matters of regional programs, institutional arrangements, and agreements that will ensure success. For partners, it is imperative to invest the necessary time and resources to produce the most appropriate solution possible for the situation at hand. Fit for purpose remedies rather than “model” river basin solutions are needed.
- 5. Risks will most likely require a diversity of interventions.** It will typically take more than a single action to reduce a given risk. A creative and diverse approach is recommended, usually requiring a mix of interventions. This need is a sound rationale for coordination of partner actions, since no one party can extend support in multiple fronts.

6. **Opportunities can outweigh residual risks.** Even if risks remain, countries may cooperate if certain political opportunities or gains become apparent. Opportunity is, therefore, a powerful factor in determining the outcome of a cooperation offer. This is an area for further study.
7. **Politics are difficult to predict, so anticipation is critical.** Laying the foundation for cooperation by reducing risks will prepare countries for deals. For partners engaging countries in cooperation, staying abreast of regional geopolitics is important, so when the time is ripe for cooperation, action can be taken.
8. **National, regional, and global events all affect opportunity.** Changes at any scale can create or change opportunity.
9. **Long-term time commitment is needed.** Cooperation takes several years of planning, facilitation, and confidence building, often before formal negotiations even begin.
10. **Deals are dynamic.** Once a deal is reached, the situation does not become static. Deals can be fragile, and fall apart or evolve and grow into stronger and more sustainable arrangements. Accordingly, periodic assessments are needed to reflect a proper diagnosis of current realities, and respond with appropriate “solutions for situations”.

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## REFERENCES

Alam, U., Dione, O., & Jeffrey, P. (2009). The benefit-sharing principle: implementing sovereignty bargains on water. *Political Geography*, 28(2), 90-100.

- Bilder, R.B. (1981). *Managing the Risks of International Agreement*. University of Wisconsin Press, Madison.
- Blackmore, D. (2011). The water story: application to other areas. Presentation at the Australian Water Day, World Bank, Washington.
- Cadoff, C.W. & Grey, D. (2002). Beyond the river: the benefits of cooperation on international waters. *Water Policy*, 4, 389-403.
- De Stefano, L., Duncan, J., Dinar, S., Stahl, K., & Wolf, A.T. (2012). Mapping the resilience of international river basins to future climate change-induced water variability. *World Bank Water Sector Board Discussion Paper Series 15*.
- Delli-Priscoli, J. & Wolf, A.T. (2009). *Managing and Transforming Water Conflicts*. Cambridge University Press, Cambridge.
- Giordano, M.A. & Wolf, A.T. (2003). Sharing waters: post-Rio international water management. *Natural Resources Forum*, 27,163-171.
- Hossain, I. (1998). Bangladesh-India relations: the Ganges Water-Sharing Treaty and beyond. *Asian Affairs: An American Review*, 25(3), 131-150.
- LeMarquand, D.G. (1977). *International Rivers: The Politics of Cooperation*. Westwater Research Center, Vancouver.
- McKinney, D. (1997). Multi-objective water resource allocation model for Toktogul Reservoir. Working Paper. *Center for Research in Water Resources, University of Texas*.
- Rogers, P. (1993). The value of cooperation in resolving international river basin disputes. *Natural Resources Forum*, May, 117-131.
- Sadoff, C. & Grey, D. (2002). Beyond the river: the benefits of cooperation on international rivers. *Water Policy*, 4, 389-403.
- Salman, S.M.A. (2007). The Helsinki Rules, the UN Watercourses Convention and the Berlin Rules: perspectives on international water law. *Water Resources Development*, 23(4), 625-640.
- Salman, S.M.A. & Uprety, K. (2002). *Conflict and Cooperation on South Asia's International Rivers: A Legal Perspective*. The World Bank, Washington.

- Transboundary Freshwater Dispute Database (TFDD). (2011). Available at <http://www.transboundarywaters.orst.edu/>
- Treaty Between the government of the Republic of India and the Government of the People's Republic of Bangladesh on Sharing of the Ganga/Ganges Waters at Farakka (Ganges Treaty)*. (1996). Available from The Transboundary Freshwater Dispute Database at <http://ocid.nacse.org/tfdd/treaties.php?page=full&origin=river&tn=568>
- United Nations. (1997). *Convention on the Law of the Non-navigational Uses of International Watercourses*. [AQ2]
- Waterbury, J. (2002). *The Nile Basin: National Determinants of Collective Action*. Yale University Press, New Haven.
- Weinthal, E. (2002). *State Making and Environmental Cooperation: Linking Domestic and International Politics in Central Asia*. MIT Press, Cambridge.
- Weinthal, E. (2006). Water conflict and cooperation in Central Asia. *Background Paper for the UNDP Human Development Report*. [AQ3]
- Wolf, A.T. (1998). Conflict and cooperation along international waterways. *Water Policy*, 1(2), 251-265.
- Wolf, A.T. (2007). Shared waters: conflict and cooperation. *Annual Review of Environmental Resources*, 32, 241-269.
- Wolf, A.T. & Newton, J.T. (2009). Case studies of transboundary dispute resolution. In J.D. Priscoli & A.T. Wolf (eds.), *Managing and Transforming Water Conflicts*. Cambridge University Press, Cambridge, 181-187.
- Wolf, A.T., Yoffe, S., & Giordano, M. (2003). International waters: identifying basins at risk. *Water Policy*, 5(1), 31-62.
- Wouters, P. (2000). The relevance and role of water law in the sustainable development of freshwater: from "hydrosovereignty" to "hydrosolidarity." *Water International*, 25(2), 202-207.
- Yu, W. (2008). *Benefit Sharing in International Rivers: Findings from the Senegal River Basin, the Columbia River Basin and the Lesotho Highlands Water Project*. The World Bank, Washington.

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## Boxes, Figures, Tables

### Box 1. Perceived Risk Defined

Perception that an act of cooperation will expose the country to harm, will jeopardize something of value to the country, or will threaten the political future of individual policymakers.

### Box 2. Five Perceived Risks to Cooperation over Shared Rivers

#### Capacity and Knowledge

Confidence in ability to negotiate a fair deal; having enough and the correct information and knowledge to do so.

#### Accountability and Voice

Deliverability of benefits by the regional entity and co-riparians, often related to trust; having a say in decision-making in the governing structures of the regional entity.

#### Sovereignty and Autonomy

Ability to act in best interest of the country without constraints; making decisions independently.

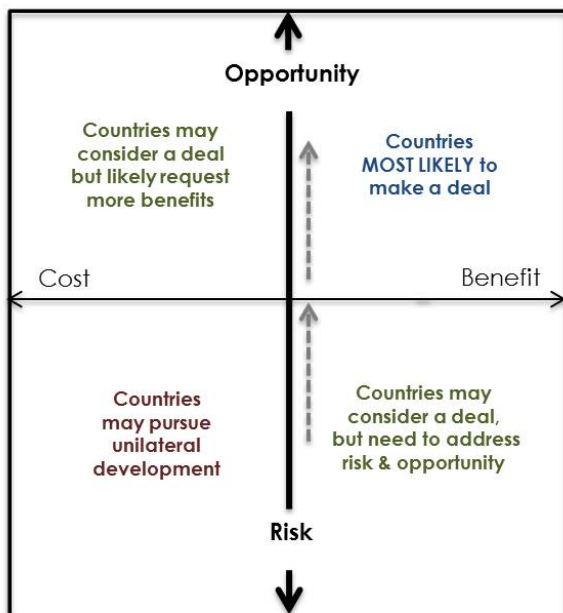
#### Equity and Access

Fairness of (relative) benefits to country, including timing of benefits and costs and obtaining/retaining fair access to river.

#### Stability and Support

Longevity of potential of agreement; in-country support of agreement, including ratification likelihood.

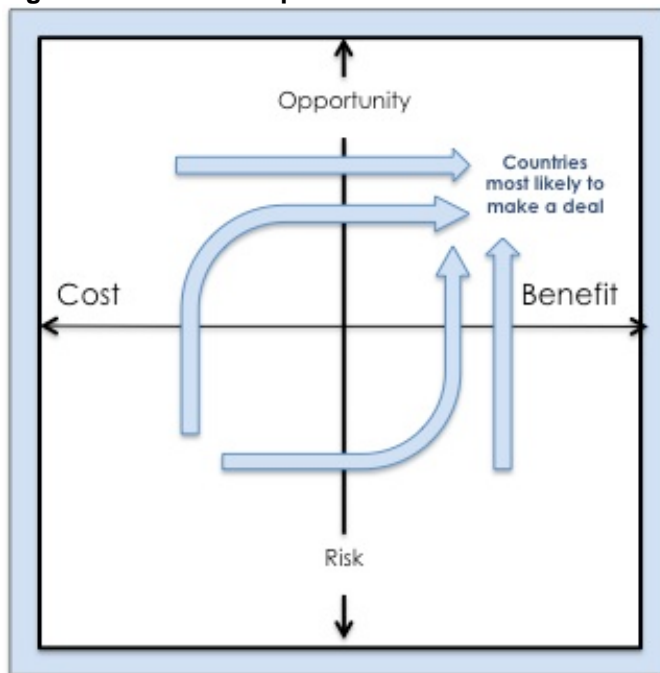
Figure 1. Risks and opportunities to cooperation framework



**Table 1. The five case studies**

Basin	Selected Countries	Time Period	Cooperation Process Studied
Eastern Nile	Egypt and Ethiopia	1999 - 2004	Launch of the Eastern Nile Subsidiary Action Program (ENSAP)
Ganges	Bangladesh and India	1994 - 1998	Signing of the Ganges Water Sharing Treaty
Niger	Mali, Niger, and Nigeria	1998 - 2004	Revitalization of the Niger Basin Authority (NBA), originally established in 1980
Syr Darya	Kyrgyzstan and Tajikistan	1996 - 2002	Signing of the Framework Agreement on Water and Energy
Zambezi	Botswana, Zambia, and Zimbabwe	2000 - 2004	Signing of the Zambezi Watercourse Commission Agreement (ZAMCOM)

*Notes: The case studies analyzed a subset of the riparians, rather than every country involved, to produce detailed discussions of perceptions related to risk, risk reduction and opportunity. Historical points were selected rather than ongoing situations so that outcomes could be considered in the analysis; in addition, we wanted to avoid interfering in current (often controversial) situations.*

**Figure 2. Paths to cooperation**

Query No.	Query Details
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