Universities Council on Water Resources
Journal of Contemporary Water Research & Education
Issue 149, Pages 41-55, December 2012

Critiquing Cooperation: Transboundary Water Governance and Adaptive Capacity in the Orange-Senqu Basin

Elizabeth J. Kistin Keller

University of New Mexico, Albuquerque, NM

Abstract: This article analyzes the effects of the Orange-Senqu transboundary water governance regime on adaptive capacity by examining the influence of international water management institutions and interstate interactions on treaty flexibility, information management, actor networks, and financial resources. This study provides fresh insights into the dynamic effects of transboundary water governance. This is done by tracing changes in the components of adaptive capacity and the patterns of resource use and allocation over the regime's life and by determining the extent to which observed changes are caused by regime performance or other factors. Drawing on document analysis and in-depth interviews, this article examines the assumption that cooperation between riparian states will enhance the ability of parties to recognize and respond to changing circumstances. It also examines the factors enabling and constraining reflexivity and joint planning in the basin.

Keywords: *Transboundary, water, governance, adaptation, cooperation*

Continuously changing patterns of water flow and utilization in the Orange-Senqu basin are driven by climatic characteristics, population growth, economic development and changing resource management practices (Kistin and Ashton 2008). The general expectation is that cooperation between riparian states will bolster adaptive capacity by allowing them to recognize (through data collection, exchange, and utilization) and respond to (through joint planning and policy implementation) changing circumstances in the basin (Raadgever et al. 2008; Turton and Ohlsson 2000; Yohe and Tol 2002).

Drawing on a growing body of literature analyzing adaptive capacity at the national and basin levels (e.g., Goulden et al 2008; Smit and Wandel 2006; Yohe and Tol 2002), this study focuses on four core components of adaptive capacity in transboundary basins: institutional flexibility, information management, actor networks, and financial resources. Document analysis and in-depth interviews were used to trace changes in these four components between 1980 and 2008, determine the extent to which changes were caused by regime performance or other factors, and assess the underlying determinants affecting the regime's performance.

The analysis presented in this article differs from other known analyses of a similar subject, such as Kranz and Vidaurre (2008) and Raadgever et al. (2008), in two important ways. It extends the analysis beyond the performance of Orange-Senqu River Commission (ORASECOM) to consider contributions from all four international water management institutions comprising the regime. It also assesses not just the regime's effects, but also the causal factors contributing to the regime's influence on adaptive capacity.

Physical and Institutional Landscape of the Orange-Senqu Basin

The Orange-Senqu River is shared between four countries: Lesotho, Botswana, South Africa and Namibia. Rising in the Maluti Mountains of Lesotho, the Orange-Senqu River flows through central and western South Africa, receiving inflows from several important tributaries before flowing

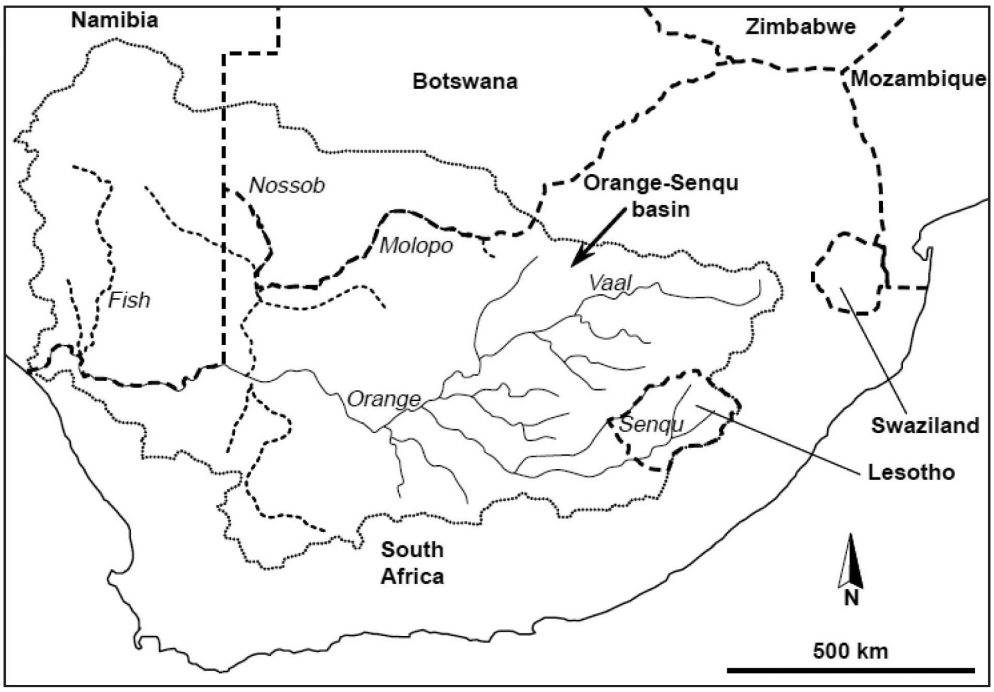

Figure 1. Map showing the location and extent of the Orange-Senqu River basin and the major tributaries in the basin. Source: Kistin and Ashton (2008).

along the border between Namibia and South Africa and entering the Atlantic Ocean (Figure 1).

The Orange-Senqu basin is characterized by a rich history of interstate interaction over water resources and a multiplicity of international water management institutions that have emerged and evolved over time (Kistin and Ashton 2008). In addition to the two regional South African Development Community water protocols signed in 1995 and 2000, the four riparian states have established six bilateral agreements and one basin-wide treaty (Kistin and Ashton 2008; Figure 2).

Four of these agreements are particularly relevant to the current management of the Orange-Senqu basin:

1. The 1986 treaty providing the framework for the Lesotho Highlands Water Project (LHWP);
2. The 1992 agreement establishing the Vioolsdrift and Noordoewer Joint Irrigation Scheme;
3. The 1992 agreement creating the Permanent Water Commission; and
4. The 2000 agreement establishing the basin-wide ORASECOM.

The 1986 LHWP treaty and the 1992 Vioolsdrift and Noordoewer Joint Irrigation Scheme agreement address the planning, operation, and maintenance of joint projects in the basin, while agreements establishing the Permanent Water Commission and ORASECOM create joint institutions to advise parties on the development and utilization of shared waters. As the arrows in Figure 2 illustrate, the ORASECOM has no formal oversight, advisory, or coordinating powers with respect to the pre-existing bilateral commissions.

Impacts on Adaptive Capacity

Institutional Flexibility

Flexible water treaties that anticipate the possibility of gradual and sudden changes in shared basins and incorporate mechanisms to allow parties to adjust management practices to changing circumstances are important for adaptive water management (McCaffrey 2003). Countries may employ a variety of mechanisms for enhancing the flexibility of a water treaty including allocation strategies, drought response provisions, amendment and review mechanisms, revocation clauses, and adaptation responsibilities (Kistin and

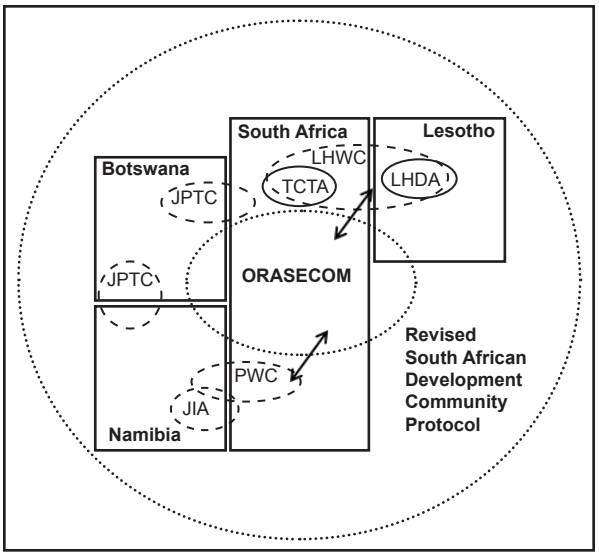

Figure 2. Schematic diagram illustrating the landscape of international water agreements and management institutions pertaining to the Orange-Senqu basin. Source: Kistin and Ashton (2008). JIA = Joint Irrigation Authority, JPTC = Joint Permanent Technical Committee, LHDA = Lesotho Highlands Development Authority, LHWC = Lesotho Highlands Water Commission, ORASECOM = Orange-Senqu River Commission, PWC = Permanent Water Commission, TCTA = Trans-Caledon Tunnel Authority.

Ashton 2008). Institutional flexibility also requires that adaptation opportunities embedded in formal governance structures be accompanied by the willingness of joint organizations to recognize and respond to changing circumstances.

The Orange-Senqu water regime contains a variety of flexibility mechanisms (Table 1). Project-oriented agreements (i.e., the LHWP and the Vioolsdrift and Noordoewer Joint Irrigation Scheme) tend to include more specific flexibility mechanisms, but overall, the parties rely heavily on joint organizations to guide the adaptation process. Discursive structures also play a significant role in shaping actual opportunities for recognizing and responding to changing circumstances.

As Kistin and Ashton (2008) describe in great detail, the existing agreements pertaining to the Orange-Senqu River basin contain several flexibility mechanisms, some of which have not yet been needed or used by the parties. Others, such as the progressive allocation and protocol amendment strategies adopted for the LHWP, provide specific guidelines that may help parties adapt to changing circumstances by requiring management policies and procedures to be reviewed, and if necessary, modified over time. The institutions that have been established to oversee basin projects and advise parties are enabled by the existing agreements to help drive the adaptive process. In particular, the broad mandates of the Permanent Water Commission and ORASECOM to advise parties on several specific issues, plus any other matter deemed important by the commissions, allow these institutions to recognise the need for change and advise the parties to take appropriate action.

Yet, while the agreements themselves do not restrict adaptive capacity, discursive structures within the basin prevent meaningful discussion of major infrastructure projects in the upper and lower basin at ORASECOM meetings, limiting opportunities for basin-wide planning and consequently constraining adaptive capacity. One manifestation of South Africa's efforts to restrict the extent of discussion occurred at a 2007 ORASECOM meeting attended by representatives of all four riparian states, as well as donor organizations and consulting firms active in ORASECOM activities. When a consultant asked the assembled audience when they expected the feasibility for Phase 2 studies of the LHWP to be completed, a member of the South African delegation quickly replied, "We don't discuss those matters here. This is the ORASECOM" (Kistin 2010).

While the reply gave slight pause to the consultant, it did not surprise the representatives from the riparian states who, according to Othusitse Katai, director of Botswana's international waters unit, have become accustomed to South Africa's reluctance to openly discuss the bilateral infrastructure projects (i.e., Phase 2 of the LHWP and the proposed re-regulating dam on the border between South Africa and Namibia) within the basin-wide forum (pers. comm. 2007). What this exchange illustrated is that, despite the ample flexibility afforded in the formal water governance structures, the South African delegations' broader efforts to restrict the boundaries of what can and cannot be discussed limits the ability of ORASECOM to engage in serious basin-level planning or recognize and respond to changing circumstances.

Table 1. Flexibility mechanisms embedded in the Orange-Senqu basin's water governance agreements.

Flexibility Mechanisms	Relevant annexes, articles, and protocols from Orange-Senqu agreements			
	2000	**1992**	**1992**	**1986**
Allocation				Art. 7 (2) Annex II
Drought Provisions		Art. 3	Art. 3 (5)	Art. 7 (2) Art. 9 (19) Art. 14 (1)
Amendments/Review	Art. 11	Art. 5	Art. 14	Art. 6
Revocation Clause	Art. 9	Art. 5	Art. 14	Art. 9 (7,8)
Institutional Responsibilities	Art. 1 [ORASECOM]	Art. 1 [PWC]	Art. 5 [JIA]	Art. 9 [JPTC] Protocol 6 [LHWC] Art. 7 [LHDA] Art. 8 [TCTA]

Source: Previously published in Kistin and Ashton (2008). Note: Section numbers given in parentheses. Water governance organisations created by treaties given in brackets. Art. = Article, JIA = Joint Irrigation Authority, JPTC = Joint Permanent Technical Committee, LHDA = Lesotho Highlands Development Authority, LHWC = Lesotho Highlands Water Commission, ORASECOM = Orange-Senqu River Commission, PWC = Permanent Water Commission, TCTA = Trans-Caledon Tunnel Authority, VNJIS = Vioolsdrift/Noordoewer Joint Irrigation Scheme.

Information Management

The process of adaptation in transboundary basins requires the collection, exchange, and utilization of information. For shared data to be used fully, issues of compatibility and credibility must be addressed. In addition to hydrological information, data on the full range of changing circumstances (climatic, economic, social, and political) are critical for developing a shared knowledge base and mutual understanding of the system and supporting decision making within shared basins (Goulden et al. 2008; Timmerman and Langaas 2005).

Over the last four decades, the collection, exchange, credibility, and compatibility of data and information related to water resources in the Orange-Senqu basin have increased (Table 2). The execution of joint studies, the adoption of and compliance with requirements for information exchange, and the development of interpersonal relationships have all contributed to this trend.

The bilateral, basin-wide, and regional agreements signed by riparian states in the Orange-Senqu basin require them to exchange data and information and provide prior notification of any activity having a significant impact on the quantity, quality, or flow of the basin (Kistin 2010). The bilateral agreements between Namibia and South Africa include fairly general expectations, while the bilateral agreement regarding the LWHP and the basin-wide treaty establishing ORASECOM outline more detailed requirements for riparian parties. In addition to the basin-specific agreements, all riparian states are also party to the South African Development Community Revised Protocol on Shared Watercourses, which reiterates the prior notification and information exchange requirements. Basin managers report a high level of compliance with formal requirements and increasing openness on information issues over time.

In addition to the contributions made by formal data-sharing requirements, several basin managers credited the increased interaction and improved interpersonal relationships with counterparts in neighboring countries as a key factor underpinning improvements in the level of information exchange. "Once you get to know these guys face

Table 2. Impacts on the collection, exchange, credibility, and compatibility of data and information.

	Observed Changes	Regime Contributions	External Factors	Remaining Barriers
Collection	Increased	Joint studies	Studies by national governments, parastatal organizations, private sector companies, and scientists	Financial resources, political priorities
Exchange	Increased	Treaty requirements, interpersonal relationships, joint studies	Change in regional political context, technological advances, regional monitoring initiatives	Political reluctance, staff capacity, competition within the private sector
Credibility & Compatibility	Moderately increased	Technology trainings, interpersonal relationships, joint studies	Change in regional political context, regional monitoring initiatives	Lack of data protocol or minimum standards guidelines, cost of new equipment and training, political reluctance

to face," explained Othusitse Katai, the director of the international waters unit in Botswana's Department of Water Affairs, "it's much easier to call them up with questions, if necessary, or make small requests for information that would otherwise get bogged down in bureaucratic formalities" (pers. comm. 2007).

The South African Department of Water Affairs also offered technology training to water ministries in neighboring countries as a means of increasing the transparency of the modeling methods it uses domestically to manage water resources. According to Dudley Biggs, the former head of Namibia's technical task team to ORASECOM, the week-long training sessions provided interesting information but served largely as a symbolic gesture of openness. "You would have to spend a year or two to understand the complexities of their systems," Biggs explained. "But we don't have that kind of expertise here or the resources to invest in that kind of technology . . . nevertheless, it demonstrated a willingness to share and contributed to levels of trust and credibility between our departments" (pers. comm. 2007).

The execution of joint studies in the basin has augmented the collection and compatibility of valuable data and information. Major joint studies include the Lower Orange River Management Study, the first phase of the ORASECOM Integrated Water Resources Management Plan, and the Phase 2 feasibility study for the LHWP. The Commission has also ordered studies on the wetlands at the river's source and the hydrology of the Molopo-Nossob system in Botswana.

Beyond the water regime, additional factors influencing improvements in information management include the data and information collected at the national level, political transformations in the region, technological advances, and regional-level efforts (Table 2).

Several basin managers described the high degree of tension, mistrust, and secrecy that developed between riparian states during the domestic and interstate conflicts of the 1980's. Parties viewed all shared data with great suspicion, diminishing the utility of information exchange. "The overwhelming sense of doubt caused us to check numbers constantly," recalled Neil van Wyk, a member of South Africa's technical task team. "The base assumption was that the other side was manipulating the figures to get a better deal" (pers. comm. 2007). The basin managers credited political transformations in the region for increasing the openness between governments and the information exchange level. Political transitions to democracy in both South Africa and Lesotho thus contributed to a decline in secrecy and suspicion regarding water resources data and increased openness between riparian states (Lesoma, pers. comm. 2007; Pyke, pers. comm. 2007).

Efforts to create a regional database of hydrological data and the ability to access and transfer data via the Internet have also contributed to improvements in information availability. The regional South African Development Community Hydrological Cycle Observing System is designed to serve as a central depository for regional water data. Though it faced technical and political roadblocks limiting its effectiveness in its early stages (see Ratashobya and Wellens-Mensah 2002), the South African Development Community water sector is currently in the process of planning for Phase 2 of the system (Ramoeli, pers. comm. 2007).

Despite these important advancements in data collection and exchange, limitations are evident on the willingness of upstream riparian states to share information openly. In 2007, the Namibian delegation to ORASECOM requested permission to participate as an observer in bilateral planning sessions regarding Phase 2 of the LHWP. Disappointed with the lack of meaningful discussion in ORASECOM regarding the development of major infrastructure in the upper basin, the Namibian delegation proposed the arrangement as an alternative avenue for communication. Although the exact wording of the appeal is unclear, retellings suggest the request was framed by Namibian representatives as a minor procedural modification to existing efforts to share information in the basin. According to Piet Heyns, the basic question posed to South Africa and Lesotho was, "Given that we are all committed to sharing information, what difference would it make if we were in the room while the planning was taking place?" (pers. comm. 2007).

For South Africa and Lesotho, the difference was significant. Delegations from both countries rejected Namibia's appeal and remain reluctant to alter current protocols for communication and information sharing between riparian states and basin commissions (Heyns, pers. comm. 2007). The rejection stemmed from concerns by both upper riparian states that involvement of a third party during the planning process would jeopardize their interests in the negotiation and implementation of Phase 2. "The primary concern," explained Peter Nthathakane, "was that the inclusion of Namibia would stall the already delayed process. For us, that means a delay in payment, and for South Africa, a delay in water, and both resources our countries urgently need" (pers. comm. 2007).

Basin managers in South Africa and Lesotho provided a range of reasons to explain their rejection of Namibia's request including the efficiency of bilateral partnerships for project implementation (Mwakwalumbwa, pers. comm. 2007), the logistical complexities of including additional states (Lesoma, pers. comm. 2007), and the belief that the current levels of communication and interaction with ORASECOM provided sufficient opportunities for the involvement of downstream states (Dlamini, pers. comm. 2007). South African leaders also framed their position as benefiting Namibia by saving them from wasting their time at multiple meetings or getting too bogged down in inconsequential details (Heyns, pers. comm. 2007). But as Heyns put it, "We asked in the first place because we know that we will feel the consequences here of their decisions upstream" (pers. comm. 2007).

Additional barriers described by basin managers to the accumulation of accessible and compatible information to support adaptive capacity in the basin include the lack of human, financial, and technical resources; the lack of political will and data protocols; and competition among private consultants. Basin managers in Lesotho, Botswana, and Namibia noted the lack of funding for data gathering and processing as a significant barrier to information management. The high levels of staff turnover in each riparian country were also noted as a significant obstacle. The establishment of data protocols is a politically sensitive issue in the basin. Certain political representatives are reluctant to have someone else dictate their procedures. On a pragmatic level, leaders are also worried about the high costs of retraining personnel if significant changes are made. Finally, beyond the riparian states, private consultants also play an important role in water resources information collection and exchange. Because their wealth of data and information determines their ability to win public and private contracts in the region, consulting firms do not have strong incentives to share data and information openly, nor are they bound by the same governance rules mandating the exchange of information between states.

Actor Networks

Recognizing the need for change, gathering information on it, making decisions about what needs to be changed, how to do it, and implementing and monitoring strategies depends on numerous actors (Smit and Wandel 2006). The stronger the linkages between different actors involved in different aspects of governance, the more equipped the regime is for recognizing and responding to changing circumstances (Yohe and Tol 2002).

Because there are a variety of networks influencing transboundary basins' adaptive capacity, this article considers four types of networks identified by interviewees as crucial linkages for recognizing and responding to changing circumstances in the Orange-Senqu River basin. These networks interact through communication, data collection and dissemination, and policy development, implementation, and monitoring. They are:

- International basin managers who serve on joint water commissions and authorities that facilitate communication and planning across national boundaries;
- Technical and political representatives within joint commissions who influence the way in which data and information are translated into goals and strategies;
- Representatives who act intersectorially within the water ministries and related government sectors (e.g., agriculture, energy, and environment) and who influence how problems are framed, data are collected and disseminated, and policies are implemented; and
- Basin organizations and stakeholders who exchange information and implement policy.

Actor networks related to water governance in the Orange-Senqu basin have grown in strength and scope over the last four decades (Table 3). In particular, the networks between basin managers from each riparian state have grown stronger as the result of basin-specific governance initiatives and regular meetings of commissioners and technical task teams. Regional efforts to support dialogue and planning among water managers, international conferences, and donor-sponsored field trips also contribute to the development of these networks. In a few cases, basin managers developed relationships before assuming leadership roles in their respective countries.

Beyond the networks linking joint commission representatives, other types of actor networks expected to support adaptive capacity remain variable or weak within the Orange-Senqu basin. Discussion and decision making regarding water

Table 3. Actor networks impact on water governance in the Orange-Senqu basin.

Type of Network	Impact	Regime Contributions	External Factors	Remaining Barriers
Basin Managers	strong	Regular meetings	Conferences, field visits, prior relationships	Staff turnover
Technical and Political Representatives	mixed	Meetings	National departmental structures	Communication
Intersectoral	weak	-	Workshops	Time and resources
Basin Organizations & Stakeholders	weak	Roadmap (ORASECOM); NGO forum (LHDA)	NGO partnerships, donor funding, political context	Political reluctance, institutional design

Note: LHDA = Lesotho Highlands Development Authority, NGO = Nongovernmental Organization, ORASECOM = Orange-Senqu River Commission.

management is concentrated heavily within the departments of water and agricultural affairs in the four riparian states, with little engagement with other governmental departments. In some cases, the representatives to the joint commissions oversee broader ministries, but thus far there has been no formal participation from departments of mining, environment, or tourism.

In general, basin managers noted that the lack of intersectoral actor networks for transboundary water management reflects general levels of interdepartmental disconnect within the government systems. As Peter Pyke, a South African member of ORASECOM's technical task team noted, "Different departments will come together around a specific project. There is not a strong system yet for intersectoral planning and with everyone so busy on their own tasks, there is no time for dialogue for the sake of dialogue" (pers. comm. 2007). Interestingly enough, efforts to streamline water management in Lesotho by consolidating all water-related offices under a single umbrella organization, the Water Commission, has effectively isolated water issues from other departments and decreased cross departmental communication (Lesoma, pers. comm. 2007; Tibbets-Abbett-McCarthy-Stratton Consortium 1995).

Stakeholder engagement in the basin varies by joint institution. The Commission has made a nominal commitment to promoting public participation in decision making around basin resources, but there has been no implementation of it to date (ORASECOM 2007). In contrast, the Joint Irrigation Authority was designed to delegate water resources management in the binational irrigation scheme to direct stakeholders. As such, the authority is comprised of three farmers from each side of the border and one representative each from the South African and Namibian governments. Although the Joint Irrigation Authority has historically recognized farmers as its primary stakeholders in the region, discussions started in 2007 about expanding outreach (and membership on the Joint Irrigation Authority) to allow participation from a wider body of stakeholders including business owners and tourism operators (Liebenberg, pers. comm. 2007).

Finally, the turbulent relationship between the Lesotho Highlands Water Commision and communities affected by the construction of the joint project is well documented. The network between the Lesotho Highlands Development Authority and affected communities started off poorly with little communication between the two groups in the planning and early implementation of Phase 1A (Hoover 2001; Panel of Experts 2002). Yet after a network of local and international NGOs joined affected communities in launching protests, the parties negotiated new strategies for communication, consultation, and compensation (Lesotho Highlands Development Authority 2008). It has yet to be seen how the evolving network between the Lesotho Highlands Development Authority and various stakeholders will influence the implementation of Phase 2 of the LHWP.

Financial Resources

Finally, financial capital is widely regarded as a critical component of adaptive capacity (Allan 2001; Turton and Ohlsson 2000; Yohe and Tol 2002). Levels of economic development in the Orange-Senqu basin states vary greatly, affecting the distribution of wealth and the capacity of each country individually to recognize and respond to changing circumstances (Kistin and Ashton 2008). South Africa's relatively high GDP, for example, enables the country to invest in human, technological, and infrastructure resources to support advanced water management and adaptation at a level beyond that of its neighboring states. Cognisant of this interstate disparity, this article examines two additional facets of financial resources affecting adaptive capacity in the basin: the effect of the water regime on cost saving and revenue generation and access to financing for transboundary water governance initiatives.

Joint governance initiatives in the Orange-Senqu basin contribute variably to the financial resources available to the riparian states (Table 4). At the basin level, ORASECOM has yet to make major, on-the-ground impacts, but it has contributed to cost savings by engaging parties in joint studies (Tompkins 2007). At the project level, the joint governance of the Vioolsdrift and Noordoewer Joint Irrigation Scheme allowed farmers on both sides of the border to continue production after Namibia gained independence.

Table 4. Impact of joint water governance initiatives on cost savings and revenue generation in the Orange-Senqu basin.

Joint Initiative	Resource Generation	External Factors	Remaining Barriers
Studies	Cost saving	Donor funding	Eliminating overlap & redundancy
Vioolsdrift and Noordoewer Joint Irrigation Scheme	Continued water delivery/ agriculture production	Processing/marketing	Allocating water within the scheme
Lesotho Highlands Water Project	Royalties, hydropower and infrastructure to Lesotho; reliable water supply to South Africa	Additional water transfers	Phase 2; compensation/ distribution of wealth

Agricultural production and employment linked to the scheme contribute only marginally to national incomes in South Africa and Namibia, but they make a significant impact on the producers and laborers in the border region (Permanent Water Commission 2005). The LHWP, by contrast, contributes more substantially to resource generation for upper riparian states by enabling a reliable supply of water to support agricultural, mining, and industrial production in South Africa and generating hydropower and royalty payments for Lesotho (Lesotho Highlands Development Authority 2008). The allocation of water and related benefits at the national and subnational levels is discussed in Kistin (2010).

Over the last four decades, the Orange-Senqu water regime has played an important role in attracting investment and donor support in the basin and the region. In the early 1980's, the partnership between Lesotho and South Africa opened doors to financing from the World Bank and other international donors that otherwise might have been impossible given sanctions against the apartheid regime (Hoover 2001). Moreover, since 2000 and the establishment of ORASECOM, the Orange-Senqu basin has attracted substantial support for transboundary water governance initiatives from multiple international partners (Kistin 2010; South African Development Community 2008). Donor support in the basin bolsters the resources available to ORASECOM, in particular, and helps to facilitate adaptation by financing joint studies, meetings, training, and workshops. Yet basin managers also report duplication and overlap as a result of the influx of external donor partners with some suggesting that donor saturation diminishes adaptive capacity in the basin. Furthermore, as Kistin (2010) explains in greater detail, donor initiatives in the basin tend to focus on technocratic approaches to enhancing cooperation and overlook the political barriers constraining adaptive capacity in the basin.

Cumulative Effects on Adaptive Capacity

The previous four sections have shown that the Orange-Senqu water governance regime both enables and constrains different aspects of adaptive capacity. Table 5 provides a summary of the regime's positive and negative effects on institutional flexibility, information management, actor networks, and financial resources.

In terms of institutional flexibility, the analysis showed that the formal treaties do not restrict the ability of riparian states to recognize and respond to changing circumstances. They contain multiple flexibility mechanisms. Joint authorities were granted broad powers for adapting management strategies and joint commissions were granted broad mandates to advise on all matters deemed important to cooperating parties. However, discursive structures established by South Africa, which keep major bilateral infrastructure projects beyond the realm of acceptable discussion at ORASECOM meetings, limit the opportunities for meaningful basin-wide planning, and consequently, constrain the ability of riparian states to recognize and respond to changing circumstances. This finding also challenges the assumption held by many donor organization that ORASECOM serves as the overarching planning organization in the basin.

Table 5. Cumulative effects of the Orange-Senqu water regime on adaptive capacity in the basin.

Component	Regime Contributions	
	Positive	**Negative**
Institutional Flexibility	• Multiple flexibility mechanisms embedded in basin treaties • Joint authorities granted broad powers for adapting management strategies • Joint commissions granted mandate to advise on all matters deemed important to cooperating parties	• Discursive structures prevent basin-wide dialogue regarding major infrastructure in the basin, restricting ORASECOM's advisory ability
Information Management	• Procedural compliance with exchange requirements • Overall increase in openness	• South Africa and Lesotho rejected Namibia's request to participate in the LHWP's Phase 2 discussions
Actor Networks	• Strengthening of interstate networks of government water officials	• South Africa and Lesotho privilege bilateral networks, limiting strategic planning at the basin-wide level
Financial Resources	• Joint studies save money • Joint projects make major (i.e., LHWP) and minor (i.e., VNJIS) contributions to national wealth • Cooperative governance arrangements help states secure financing and donor support	• The LHWP, while mutually beneficial at the national level, is not necessarily a win–win scenario at the regional or subnational level • Donor saturation in the basin leads to overlap and duplication of efforts to support adaptive management • Donor initiatives tend to overlook the political barriers constraining adaptive capacity in the basin

Note: LHWP = Lesotho Highlands Water Project, ORASECOM = Orange-Senqu River Commission, VNJIS = Vioolsdrift/Noordower Joint Irrigation Scheme.

The analysis of information management showed that the water governance regime made important contributions to data collection and exchange. Parties have largely complied with procedural requirements for data sharing and prior notification of projects in the basin. Yet there is a reluctance to engage the basin-wide commission in discussions about bilateral infrastructure projects and refusal to allow Namibia to participate as an observer in Phase 2 deliberations regarding the LHWP. The recalcitrance signals limitations to the willingness of upstream riparians to share information openly.

A similar trend emerged in the analysis of actor networks. Overall, the water governance regime has contributed to the strengthening of relationships and communication between basin managers in all four riparian governments. Efforts to avoid undue interference with the LHWP, however, meant that Lesotho and South Africa privileged bilateral networks as the primary means for water resources planning.

In terms of wealth and financial resources, collaboration between riparian states has contributed to various levels of cost savings and revenue generation. The costs and benefits of transboundary water cooperation, however, have not always been distributed evenly at the subnational scale (Kistin 2010). The ORASECOM's formation has also attracted significant financial support from bilateral and multilateral donors. However, donor initiatives tend to focus on technocratic approaches to enhancing cooperation and overlook the political barriers constraining adaptive capacity in the basin (Kistin 2010).

Overall, the hypothesis that ongoing hydro-political cooperation enhances adaptive capacity

by enabling information exchange and use while facilitating joint planning cannot be fully corroborated. Although the regime contributes to both too a certain degree, discursive governance structures limiting the scope of discussions within ORASECOM constrain the parties' abilities to recognize and respond to changing circumstances and engage in joint planning at the basin scale.

Causal Factors

Multiple factors contribute to the Orange-Senqu water governance regime's influence on adaptive capacity components. This section takes a closer look at the influences of power asymmetry, problem structure, expert networks, and political context on the ability of riparian states to recognize and respond to changing circumstances in the basin (Table 6).

Power Asymmetry

Power asymmetry in the Orange-Senqu basin plays a significant role in shaping the water regime's effects on adaptive capacity. This section takes a deeper look at the political nature of flexibility mechanisms, information management, actor networks, and financial resources while examining how South Africa's dominance in the basin influences each core component of adaptive capacity. It illustrates the South African government's behavior as both a pusher and a laggard with respect to different aspects of information sharing and joint planning, and discusses the implication of this behavior for the prospects of recognizing and responding to changing circumstances in the basin.

First, the formal governance structures comprising the Orange-Senqu water regime contain ample flexibility mechanisms that provide riparian states with opportunities to recognise and respond to changing circumstances over time. However, the ability to invoke and operationalize these mechanisms is dependent on power endowments and political negotiation. South Africa's dominance in the basin has allowed the country to invoke certain flexibility mechanisms embedded in the institutional structure while obstructing others. For example, South Africa delayed discussions of Phase 2 of the LHWP after recalculating projected water demands and determining that additional supplies would not be necessary until 2020 (Hedricks 2008). Using a combination of tactics including silence and sanctioned discourse, however, South Africa also obstructs the ability of ORASECOM to advise riparian governments on "any matter deemed important" by restricting the scope of discussion in the basin-wide forum. These covert efforts to shape the decision-making process are often overlooked by donors and analysts who assume that ORASECOM serves as the overarching planning organization in the basin (Malzbender and Earle 2009; Veelen 2009).

Second, decisions about whether and how to collect and exchange information related to shared water resources are fundamentally political and driven by the power and interests of riparian parties. South Africa can be seen as both a pusher and a laggard in this area. Given the importance of transboundary water resources in sustaining its economy, the South African government has long prioritized the collection of data and information

Table 6. Factors enabling and constraining adaptive capacity in the Orange-Senqu basin.

Component	Enabling Factors	Constraining Factors
Institutional Flexibility	Uncertainty	Power/Interests
Information Management	Riparian Resources Enternal Support Political Context	Riparian Resources Power/Interests
Actor Networks	Institutional Design External Support	Institutional Design Riparian Resources Power/Interests
Financial Resources	Institutional Design External Support	Institutional Design Riparian Resources Power/Interests

related to water resources and continues to lead globally in the development of highly sophisticated tools for adaptive water management in arid and semiarid climates (Tompkins 2007). Since the transition to democracy in 1994, South Africa has complied with its commitments to transparency and regional cooperation by sharing existing data, leading joint studies, and offering free personnel training and technology transfers to other water ministries within the South African Development Community (Biggs, pers. comm. 2007; van Niekerk, pers. comm. 2007). Together, these efforts have had a substantial impact on the breadth, depth, and compatibility of water resources information in the region. Yet, the refusal to engage in project discussions at the basin-wide level and the reluctance to include Namibia at the table for discussions regarding Phase 2 of the LHWP signals limitations to South Africa's willingness to share information openly.

Third, South Africa's relative power endowments and the use of utilitarian tactics allow the country to choose what kind of actor networks to pursue and privilege. South Africa's strong bilateral alliance with Lesotho and the benefits provided by South Africa to the upstream riparian state have made Lesotho a significant ally to South Africa in the perpetuation of the bilateral planning model. The potential provision of water supplies from the LHWP through a bilateral deal with South Africa has also rendered Botswana unlikely to push for more substantive engagement at the basin scale. South Africa also uses discursive tactics to downplay the significance of Namibia's request for observer status while emphasizing its procedural compliance with notification and exchange requirements, and the basin-wide benefits generated by the LHWP.

Finally, in terms of attracting and securing international financing and donor assistance, South Africa plays an interesting role. Following its transition to democracy in 1994, international donors sought to engage in a wide range of national and regional issues. In addition to democratization, donors viewed water resources management as a critical action area linked to issues of growth, poverty, health, redistribution, and capacity building. As such, officials within the South African Department of Water Affairs have been able to leverage strong relationships with international donors to secure financial support for transboundary water governance initiatives.

However, South Africa's relative wealth in the region also makes them more of a laggard when it comes to the general pursuit of international donor funds. As a result, when donor saturation emerged as an issue in the Orange-Senqu basin, members of the South African delegation felt more comfortable speaking up on the issue. As one official noted anonymously, "They are less dependent on donor assistance than we are so it's easier for them to recognize the point when too much help becomes counterproductive." Indeed, while the smaller states in the basin perceive themselves to need donors to cover the cost of both domestic and international water projects, the perception among many South African representatives is that the dependence runs the other way (i.e., that the donors actually need recipients of funds to endorse and legitimize their projects). This dynamic has allowed South Africa to take the lead in demanding better coordination among donor partners to avoid the duplication and overlap of transboundary water governance initiatives. This dynamic is discussed in more detail in Kistin (2010). Overall, analyzing the influence of power asymmetries on adaptive capacity in the Orange-Senqu basin illuminates South Africa's significant ability to control the agenda and shape boundaries for discussion and planning.

Problem Structure

Intertwined with the influence of power asymmetry, the combination of interest asymmetry, uncertainty, and commitment requirements also play an important role in shaping the influence of the Orange-Senqu water regime on adaptive capacity.

The analysis of the Orange-Senqu water governance regime's effects on adaptive capacity demonstrated that the competing interests that characterized the formation of ORASECOM (i.e., Namibia's desire for basin-wide planning and South African interest in maintaining bilateral organizations as the core planning mechanisms) continue to influence the implementation of governance arrangements. As Kistin (2010) describes, South Africa acted as a catalyst in establishing bilateral institutions in the basin

(e.g., the Lesotho Highlands Water Commision and Permanent Water Commission), but engaged in ORASECOM's formation as a more reluctant participant due to its lack of interest in planning or allocating water at the basin-wide level. Since the basin-wide Commission emerged in 2000, South African delegates to ORASCOM have been active participants in meetings and activities, and they contribute significantly to strengthening the professional relationships between political and technical representatives in all four riparian states. In terms of strategic planning, however, the South African government continues to privilege the bilateral network upstream.

Unpacking the components of problem structure reveals that South Africa's preference for bilateral planning is linked to both commitment requirements and uncertainty associated with the prospect of basin-wide planning. As my section on information management demonstrated, parties have performed well in collecting and exchanging information when commitment requirements are perceived to be low (e.g., the execution of joint studies or the compilation of existing information). However, when commitment requirements are perceived as more substantial (e.g., establishing a basin-wide data protocol, opening Phase 2 discussions, or engaging in planning at the basin level) progress has been blocked, stalled, or slower to materialize. Combined with the high levels of normative uncertainty and the intangibility of what basin-wide planning might entail, the perception of high commitment requirements contributes to South Africa's zero-sum mentality. They are concerned that efforts to engage in significant planning or water allocation at the basin scale will threaten their current and future access to water resources.

Recognizing the existence of interest asymmetry within the wider context of riparian cooperation draws attention to the fact that problem structures are not always resolved in the formation of agreements and organizations. Consequently, efforts to motivate a powerful country's engagement in certain issues may require the structuring of incentives and the adjustment of commitment requirements in a way that entices powerful actors to take part in envisioning a more regional approach.

Expert Networks

Adaptive capacity in the Orange-Senqu basin has been influenced by two primary clusters of expert networks: private consultants and donor organizations. Both of these networks have played a significant role in enabling the collection, exchange, and utilization of information in the basin. Experience from the Orange-Senqu basin, however, cautions against broad assumptions that involvement by expert networks will necessarily bolster the implementation of transboundary water governance arrangements.

Like the riparian states, the quasi-internal network of consultants operating in the Orange-Senqu basin also demonstrated reluctance to share information openly with competitors in their field. This can diminish the ability of riparian states to recognize and respond to changing circumstances. Although the data and information collected through joint studies technically belongs to the joint commissions and contracting states, the capacity to interpret, utilize, and integrate the data frequently lies outside of riparian governments and within the consulting firms.

Donor organizations within the basin have also played a substantial role in decreasing informational uncertainty through the financing of joint studies. However, less attention is paid to the political barriers obstructing issues like basin-wide planning. Without acknowledging or addressing these important obstacles, interventions by this network may simply reinforce the status quo.

Political Context

The shift in politics following South Africa's transition from apartheid to democracy contributed significantly to the levels of openness between riparian states and their opportunities and willingness to exchange information. This has increased adaptive capacity in the basin by allowing states to construct a more complete picture of basin resources and changing circumstances. Increasing levels of regional integration have not, however, significantly increased South Africa's willingness to engage in planning at the basin level, which limits the extent to which adaptive capacity can be achieved.

Conclusion

This article set out to analyze the effects of the Orange-Senqu transboundary water governance regime on adaptive capacity by examining the influence of international water management institutions and interstate interactions on treaty flexibility, information management, actor networks, and financial resources. It showed that the water governance regime has both enabled and constrained adaptive capacity in the basin. While international water management institutions and riparian interactions have made valuable contributions to information exchange and joint planning, discursive structures limiting the scope of discussions within ORASECOM constrain the parties' abilities to recognize and respond to changing circumstances and engage in joint planning at the basin scale.

The analysis further illustrated how power asymmetry, problem structure, expert networks, and political context all influenced adaptive capacity in the basin. What this analysis suggests is that efforts to envision alternatives to the current planning model in the Orange-Senqu basin and influence change will require a firm understanding of the multilayered and power-laden processes that influence the negotiation and implementation of transboundary water governance regimes.

Acknowledgements

The author thanks the many policy makers, academics and practitioners who generously shared their experiences and opinions with regard to the complexities and effects of transboundary water cooperation in southern Africa. This work was conducted as part of wider Ph.D. research and supported by the University of Oxford and South Africa's Council for Scientific and Industrial Research.

Author Bio and Contact Information

Elizabeth Kistin Keller was born and raised along the banks of the Rio Grande River in New Mexico. She received her BA in Political Science and Latin American Studies from the University of North Carolina-Chapel Hill. Upon receiving a Rhodes Scholarship, Elizabeth continued her studies at the University of Oxford where she received her Masters and Ph.D. in International Studies. She has spent time working on transboundary water resource issues in Southern Africa, South East Asia and North America. She teaches as an adjunct professor in the University of New Mexico's masters program on water resources management. She can be reached by email at ekistin@unm.edu and by mail at 11023 Vistazo PL SE, Albuquerque, NM 87123.

References

Allan, J.A. 2001. *The Middle East Water Question: Hydropolitics and the Global Economy*. London: I. B. Tauris.

Biggs, D. (Former Deputy Director of Planning for the Nambian Department of Water Affairs), in discussion with author, September 2007.

Dlamini, Z. (South African Delegate to the Lesotho Highlands Water Commission), in discussion with author, April 2007.

Fischhendler, I. 2004. Legal and Institutional Adaptation to Climate Uncertainty: A Study of International Rivers. *Water Policy* 6: 281-302.

Goulden, M., D. Conway, and A. Persechino. 2008. Adaptation to Climate Change in International River basins in Africa: A review. *Tyndall Working Paper, No. 127*. Norwich, UK: University of East Anglia.

Hendricks, L.B. "Policy Review Debate on Budget Vote 34 of 2008/09." Speech, Cape Town, Western Cape, June 18, 2008.

Heyns, P.S.V.H. (Former Head of the Namibian Department of Water Affairs and a Commissioner in the Permanent Water Commission and the ORASECOM), in discussion with author, September 2007.

Hiddema, U. (Legal Counsel to the Trans-Caledon Tunnel Authority), in discussion with author, March 2007.

Hoover R. 2001. Pipe Dreams: The World Bank's Failed Efforts to Resolve Lives and Livelihoods of Dam-Affected People in Lesotho. Maseru: Transformation Resources Centre.

Katai, O. (Director of Botwana's International Water Division within the Department of Water Affairs), in discussion with author, November 2007.

Kistin, E.J. 2010. *Critiquing Cooperation: The Dynamic Effects of Transboundary Water Regimes*. Ph.D. Thesis. University of Oxford: UK.

Kistin, E.J. and P.J. Ashton. 2008. Adapting to Change in Transboundary Rivers: An Analysis of Treaty Flexibility on the Orange-Senqu River Basin. *International Journal of Water Resources Development* 24(3): 385–400.

Kranz, N. and R. Vidaurre. 2008. *Institution-Based Water Regime Analysis, Orange-Senqu Basin: Emerging river basin organisation for adaptive water management.* Ecologic–Institute for International and European Environmental Policy.

Lesoma, M. (Director of the Lesotho Water Commission), in discussion with author, April 2007.

Lesotho Highlands Development Authority. 2008. *Annual Report 2007/2008*. Maseru: Lesotho Highlands Development Authority.

Liebenberg, P. (Chief Engineer, Namibian Department of Agriculture Water and Forestry), in discussion with author, September 2007

Malzbender, D. and A. Earle. 2009. Water Resources of South African Development Community: Demands, dependencies, and governance responses. In M. Pressend and T. Othieno, (Eds.) *Rethinking Natural Resources in Southern Africa*. Midrand, South Africa: Institute for Global Dialogue.

McCaffrey, S. 2003. The need for flexibility in freshwater treaty regimes. *Natural Resources Forum* 27:156-62.

Mwakalumbwa, C. (Lesotho delegate to the Lesotho Highlands Water Commision), in discussion with author, April 2007.

Nthathakane, P. (Chief Technical Officer, Lesotho Water Commission), in discussion with author, February 2007.

Panel of Experts. 2002. Report prepared for the Lesotho Highlands Development Authority. Maseru: Lesotho Highlands Development Authority.

Permanent Water Commission. 2005. Pre-feasibility study into measures to improve the management of the lower Orange River and to provide for future developments along the border between Namibia and South Africa. *DWA Namibia Report No: 400/8/1/P-13*. Windhoek: Department of Water Affairs.

Pyke, P. (Chief Engineer, South African Department of Water Affairs and member of the ORASECOM technical task team), discussion with author, February 2007.

Raadgever, G.T., E. Mostert, N. Kranz, E. Interwies, and J.G. Timmerman. 2008. Assessing Management Regimes in Transboundary River Basins: Do They Support Adaptive Management? *Ecology and Society* 13(1): 14–23.

Ramoeli, P. (Senior Water Program Manager at South African Development Community), in discussion with author, November 2007.

Ratashobya, D.G. and J. Wellens-Mensah. 2002. SADC-HYCOS Evaluation Mission Report. Gaborone: South African Development Community.

Setloboko, T. (Principal Hydrologist for Botswana's Department of Water Affairs and Member of ORASECOM's technical task team), in discussion with author, November 2007.

Smit, B. and J. Wandel. 2006. Adaptation, adaptive capacity and vulnerability. *Global Environmental Change* 16(3): 282-92.

Southern African Development Community. 2008. Activities of International Cooperating Partners (ICPs) in Transboundary Water Cooperation in the South African Development Community Region. Southern African Development Community Water Division.

TAMS (Tibbets-Abbett-McCarthy-Stratton Consortium). 1996. Water Resources Management: Policy and Strategies, final report. Maseru: Ministry of Natural Resources.

Timmerman, J.G. and S. Langaas. 2005. Water information: What is it good for? The use of information in transboundary water management. *Regional Environmental Change* 5(4): 177-87.

Tompkins, R. 2007. *Institutional Structures in the Four Orange Basin States*. Orange-Senqu River Commission. Pretoria.

Turton A.R. and L. Ohlsson. 2000. Water Scarcity and Social Stability: Towards a Deeper Understanding of the Key Concepts Needed to Manage Water Scarcity in Developing Countries. *SOAS Occasional Paper 17.* London: SOAS Water Issues Group.

van Niekerk, P. (Chief Director of Integrated Water Resources Planning at South Africa's Department of Water Affairs and Delegate to the ORASECOM and Permanent Water Commission), in discussion with author, March 2007.

van Wyk, N. (Chief Engineer, South African Department of Water Affairs), in discussion with author, February 2007.

Veelen, M.V., K. Pema, D. Esterhuizen, T. Baker, H. Thompson. 2009. *ORASECOM: Capacity Building Programme*. ILISO Consulting.

Yohe, G. and R.S.J. Tol. 2002. Indicators for social and economic coping capacity: Moving toward a working definition of adaptive capacity. *Global Environmental Change* 12(1): 25-40.