

A SOUTHERN AFRICAN PERSPECTIVE ON TRANSBOUNDARY WATER RESOURCE MANAGEMENT

By **Anthony R. Turton**

Abstract

Southern Africa is characterized by a large number of international river basins, inherent climatic variability, and a natural maldistribution of perennial rivers. The region also has a history of political instability, driven by liberation struggles against the former colonial powers and the Cold War. Southern Africa's transboundary rivers and their associated ecosystems could become either drivers of peace and economic integration or sources of endemic conflict. Water scarcity has also placed limits on the future economic growth potential of the region's four most economically developed countries. This situation, combined with the regional development of international and increasingly complex interbasin water transfers, highlights the need to develop appropriate scientific methodologies that can explain and predict future patterns of conflict and cooperation.

Driven in part by the need to develop a new security paradigm in the wake of the Cold War's collapse, many policymakers in the United States and elsewhere have been grappling with the complexities and consequences of environmental security research. These efforts have resulted in a wealth of literature on environmental security, mostly emerging from the developed countries of the North.

Developing regions of the South have placed a different emphasis on environmental security issues. In Southern Africa, for example, there has been renewed thinking about the management of transboundary water resources, particularly with respect to sustaining economic growth and avoiding conflict. This article addresses some of the key issues emerging from some Southern research on these topics. These research developments are also relevant to assessing the viability of the New Partnership for Africa's Development (NEPAD) and the newly created African Union (AU). These organizations have at their very core issues of economic stability, poverty alleviation, and governance—all of which are central to the way that transboundary river basins are managed.

Key Strategic Drivers of Environmental Security in Southern Africa

Mainland Southern Africa comprises eleven countries, some of which are among

the poorest in the world (e.g., Mozambique, Malawi, Zambia) and many of which have suffered from protracted violence (e.g., Angola, Mozambique, Republic of South Africa, Zimbabwe, and the Democratic Republic of Congo¹). The region was an important theater of the Cold War: many of its civil wars during that period were localized manifestations of former superpower rivalries (Turton, 2003a). This history has left modern Southern Africa with a complex mosaic of conflict and tension—a legacy exacerbated by environmental scarcities in one form or another.

Indeed, Southern Africa is characterized by three environmentally and developmentally distinct features that act as fundamental drivers of potential conflict or cooperation:

1) *Climate variability is a key determinant of Southern Africa's ecological dynamics and environmental security.* Drought and flooding are normal events in the region's hydrological context. A number of natural cycles affect the region's rivers: for example, the Okavango River Basin has an 18-year cycle of climate variability, while records from the Zambezi Basin show the existence of an 80-year cycle (McCarthy et al., 2000). Flood pulsing—or the variability between periods of high flow and low or even non-flow periods—is also recognized as a key ecological driver (Junk et al., 1989; Davies et al., 1993; Davies & Day, 1998;

Gumbricht et al., 2002; McCarthy et al., 2000; Puckeridge et al., 1993; and Turton et al., 2003).

Climate variability also has a number of key environmental security ramifications: (a) the long-term impact of global climate change on both water availability and the incidence of extreme events; (b) the impact of growing populations on a relatively finite and variable water resource base; and (c) the existence of a large number of dams in order to store water during the unpredictable and often long dry periods. For example, South Africa and Zimbabwe have 752 large dams between them, while the region's other nine countries have only 55 among them (WCD, 2000). The region's wetter countries (such as Angola, Malawi, Mozambique, Tanzania, and Zambia) have among the lowest densities of dams in the world for non-karstic regions, with annual rainfall in the range of 600 to 2000 millimeters.

2) *International rivers dominate Southern Africa.* The region's eleven mainland countries are traversed by no less than fifteen international river basins (see Figure 1), including such major basins as the Zambezi (which is shared by eight states) and the Limpopo and Orange (which are shared by four states each). As a fundamental element of the environment, water has major strategic significance in Southern Africa.

3) *Development is inequitably distributed across Southern Africa and within separate countries in the region—a maldistribution influenced by environmental factors.* Water scarcity acts as a limiting factor for the economic growth potential of the region, making water and associated ecosystems a key component of sustainable development. Fed by an increasingly complex series of

pipelines and water transfer schemes (which has given rise to the so-called “pipelines of power” thesis²), the dams of the Republic of South Africa and Zimbabwe support a vast array of economic activities (Turton, 2000).

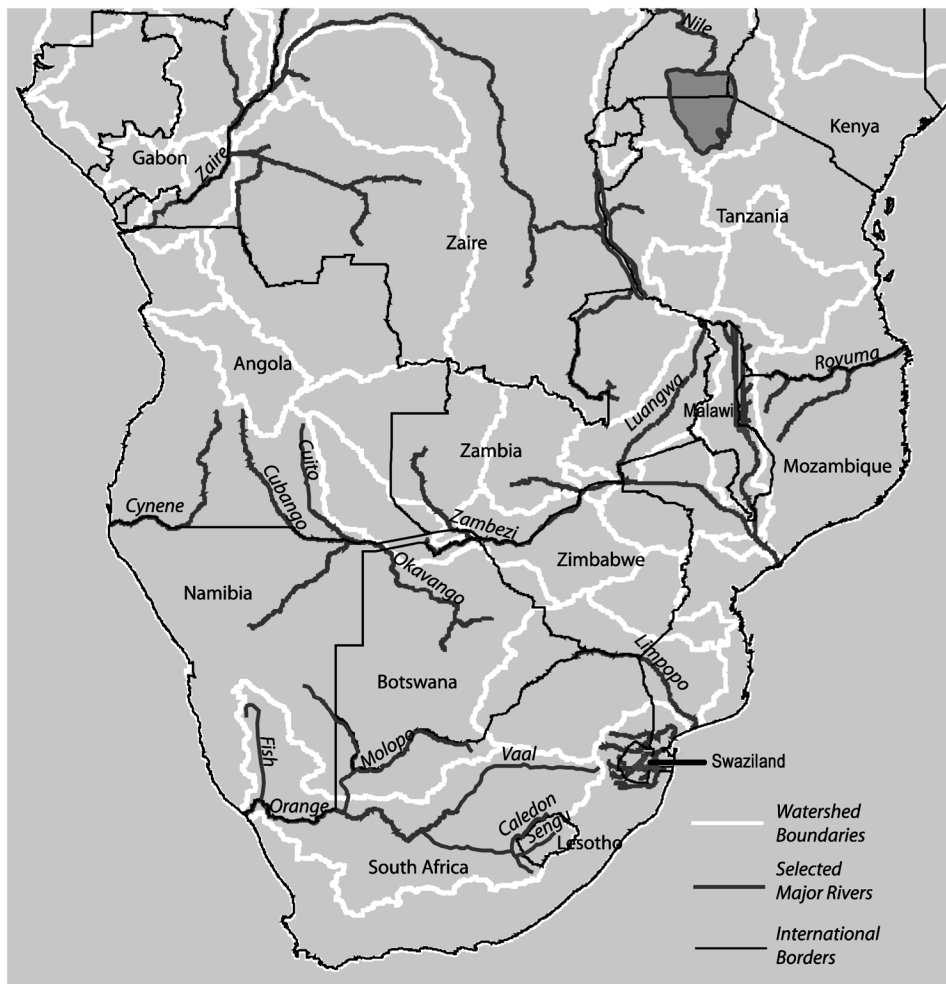
These three fundamental drivers prompt a number of strategic considerations. For example, the four most economically developed states in Southern Africa—the Republic of South Africa, Botswana, Namibia, and to a lesser extent Zimbabwe—also happen to be water-stressed. In fact, these four countries have already reached the limitations of their readily available water resources and now need to develop increasingly sophisticated interbasin transfers of water to sustain their economic growth potential. Below are just a few illustrative examples of such transfers:

- In the Republic of South Africa—the most economically developed state in the Southern African region—interbasin transfers of water across various natural, provincial, and even international borders sustain 100 percent of the Gross Geographic Product³ (GGP) in the Gauteng Province, and are responsible for more than 50 percent of the GGP in seven of the nine provinces (Basson et al., 1997; Turton, 2003). One of the key elements of these transfers is the Lesotho Highlands Water Project (LHWP), which transfers water by gravity to Johannesburg and Pretoria and could also supply water to Gaborone in Botswana if needed.
- Two strategic water transfers currently sustain the Botswana economy: (1) the transfer from the Molatedi Dam in South Africa (Conley, 1995; Heyns, 1995); and (2) the North-

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Figure 1. Map of Southern Africa, with Major Rivers and Watersheds



Source: ECSP

South Carrier in Botswana, which has a proposed future linkage to the Zambezi River (Heyns, 2002).

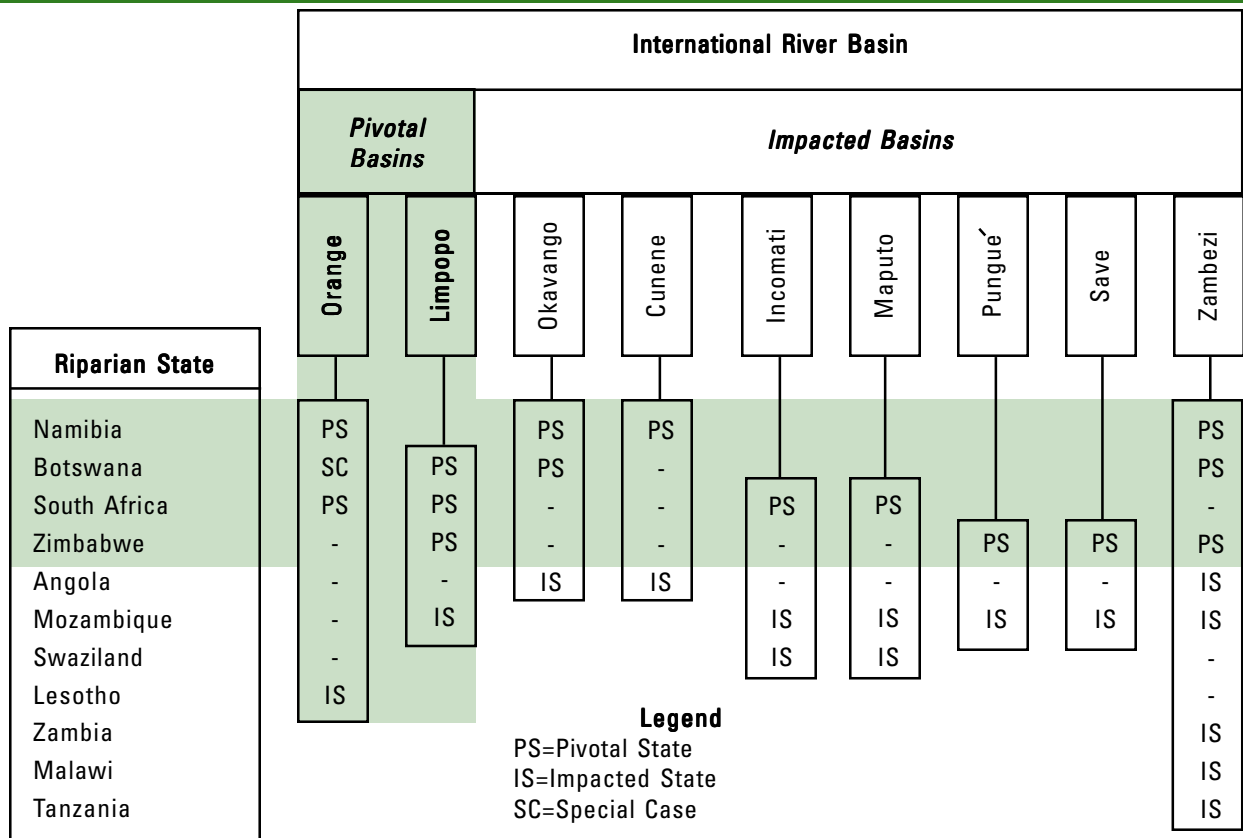
- A pipeline is planned to link the Okavango River in Caprivi Strip with Namibia's Eastern National Water Carrier, which feeds the economic heartland around Windhoek and therefore sustains the Namibian economy (Heyns, 2002; Pinheiro et al., 2003). This pipeline will become a strategic component of the overall water management strategy of Namibia, but is hotly contested by environmental groups in Botswana (Ramberg, 1997; Ashton & Neal, 2003).
- Another planned pipeline would tap the Zambezi River to supply the city of

Bulawayo in Zimbabwe; it could also link into the North-South Carrier in Botswana (Heyns, 2002).

- The possible supply of Zambezi River water to Botswana, Zimbabwe, and Gauteng Province (Pretoria) in South Africa has been under investigation at various times in the past (Borchert & Kemp, 1985; Borchert, 1987; Heyns, 2002; Midgley, 1987; Scudder et al., 1993). However, South Africa is not a Zambezi riparian state and would have to negotiate access through a complex set of diplomatic exchanges before this link could become reality.

All proposals for the diversion of water from transboundary river basins in Southern

Figure 2. The Southern African Hydropolitical Complex



Source: Turton et al (2003).

Africa are subject to the consultation and decision-making processes provided under the 1995 Protocol on Shared Watercourses in the Southern African Development Community (SADC, of which all mainland regional countries are signatories), or the Revised Protocol of 2000 when it comes into force. If Botswana negotiates a Zambezi River supply that is under its direct control, then it will evolve from being a relatively weak riparian in the Orange and Limpopo Basin to a strong position vis-à-vis South Africa and indeed Zimbabwe.

In addition, the region's four most economically developed countries share two common river basins (the Orange and Limpopo), both of which have reached the limit of their reliably available supply. The Orange River is already in deficit, and further opportunities for its development are limited (Conley, 1996; Conley, 1995). The Limpopo is highly developed: it has 43 large dams and another three currently under investigation

(Heyns, 1995), pushing the basin close to deficit (Conley, 1995). In short, there is simply no more water available in these two river basins. Alternatives need to be found as a matter of strategic importance. This scarcity is compounded by the natural maldistribution of water in Southern Africa: the absence of perennial rivers in both Namibia and Botswana as well as in parts of the Republic of South Africa.

Transboundary Water Resource Management and Regional Security

The heavy reliance on water by Southern Africa's most economically developed states leads one to consider the strategic ramifications of transboundary water resource management. Indeed, water should be regarded as a critical element of the "Southern African Regional Security Complex" as originally defined by Buzan (1991). Buzan's formulation was further developed by Schultz (1995), who identified the existence of what

he called a “Hydropolitical Security Complex,” comprising the riparian states of the Tigris and Euphrates River Basin. Turton (2003c; 2003d) has subsequently used this concept (in a slightly modified form) to develop a hydropolitical model for Southern Africa.

Turton’s Southern African hydropolitical model consists of two key elements: (1) the Southern African Regional Security Complex, and (2) a sub-component called the Southern African Hydropolitical Complex. Turton has dropped the word “security” from the second formulation⁴ because water resource management can either be *securitized* or *desecuritized*. Water resource management can become *securitized*—as in the case of the Tigris and Euphrates—where national security concerns become linked to the management of transboundary river basins (Schultz, 1995). With securitization, low-politics issues such as water resource management become linked with the high-politics issues of national survival, potentially begetting a rapid spiral of conflict that would be difficult to predict or manage. (This cycle has not yet occurred in Southern Africa, so the management of transboundary water resources there cannot yet be considered to be part of a mature hydropolitical security complex.⁵) Under such conditions, water resource management structures remain stunted, and hydrological data becomes classified as secret and thereby removed from the public domain.

On the other hand, water resource management can become *desecuritized* (or politicized) when all interested parties are able to collect, store, and access basin-wide data. Desecuritization tends to place water resource management in a political domain—where it can be debated—rather than in a security domain where security specialists deal with it in a closed and non-transparent manner. The most likely outcome under these conditions is a positive-sum configuration, which is more favorable to regional peace.

Indications are that water resource management in Southern Africa is becoming desecuritized⁶ but remains strategically important to selected states in the region. Hence, it is most appropriate to situate a “hydropolitical complex” as a component of

the larger “regional security complex.” Figure 2, which deals with nine of the region’s fifteen international river basins, shows this conceptual nesting.

The Southern African Hydropolitical Complex has four key elements: Pivotal States, Pivotal Basins, Impacted States, and Impacted Basins:

Pivotal States: There are four Pivotal States within the Southern African Hydropolitical Complex—the Republic of South Africa, Botswana, Namibia, and Zimbabwe. Pivotal States meet the following criteria:

- They have a high level of economic development⁷;
- They are highly reliant on shared river basins for economically strategic sources of water supply.

Pivotal Basins: There are two pivotal river basins within the Southern African Hydropolitical Complex—the Orange and the Limpopo. Pivotal Basins meet the following criteria:

- They have economically strategic importance to any one (or all) of the four pivotal states;
- They are “closed.” River basins that are closed have no utilizable outflow of water (Seckler, 1996) or no more water that can be allocated to productive activities (Svendsen et al., 2001).

Both Pivotal States and Pivotal Basins can be considered independent variables, acting as fundamental drivers of hydropolitical interaction (1) among the riparian states, and (2) between each riparian state and the Regional Security Complex.

Impacted States: There are at least seven Impacted States in the Southern African Hydropolitical Complex—Angola, Mozambique, Swaziland, Lesotho, Zambia, Malawi, and Tanzania. Impacted States meet the following criteria:

- Their economic development is founded on water from either a Pivotal Basin or an

Impacted Basin;

- Their current (or future) economic development has been or is likely to be limited by a Pivotal State with which they are co-riparians.

Impacted Basins: There are at least seven Impacted Basins in the Southern African Hydropolitical Complex—Zambezi, Kunene, Okavango, Incomati, Maputo, Pungué, and Save. An Impacted Basin meets two criteria:

Interbasin transfers of water are responsible for more than 50 percent of the GGP in seven of South Africa's nine provinces.

- A Pivotal State relies on the water from the Impacted Basin for current (or future) economic development;
- The development options of the Impacted State within the Impacted Basin have been or are likely to be limited by the actions or plans of the Pivotal State.

The interconnectedness of these concepts is self-evident when one assesses the implications of existing and planned interbasin transfers of water in Southern Africa.

Conflict or Cooperation Within International River Basins?

What are the possible strategic ramifications of the South African Hydropolitical Complex model and its fundamental drivers? Specifically, what are key areas in which policy interventions would be appropriate regarding these dynamics?

Since the economic growth potential of any state impacts deeply on the welfare of its citizens, economic growth acts as a powerful political driver in its own right. This driver is even more important when the state in question has (a) a high need for economic development as the result of rapid population growth, and (b) limited options for mobilizing secure water supplies. Such is the situation in Southern Africa, particularly for its Pivotal States and Pivotal Basins.

Under these conditions, one would

intuitively expect a high level of conflict potential as each state competes for a dwindling share of what is at best a variable water resource. The situation's level of complexity increases substantially, however, when one factors in the unknown effects of global climate change, which could either result in (a) more precipitation in the form of extreme events, or (b) a greater oscillation between very wet and very dry climatic cycles.

The author's current research shows that *institutional development* is a key mitigating factor in the potential for conflict over water, at least in the Southern African case.⁸ Central to an understanding of the processes of institutional development are certain critical concepts:

First-Order/Second-Order Resource: A first-order resource is a *natural* resource (such as land or water); it can either be abundant or relatively scarce. A second-order resource is a *social* resource—specifically, the ability of societies, administrative organizations, and managers responsible for dealing with first-order (natural-resource) scarcities to find the appropriate tools for dealing with the consequences of that scarcity (Ohlsson, 1999). Current research has tentatively shown that the relative availability of second-order resources in developing countries generally dictates their hydropolitical outcome (Turton, 2002a; Turton & Warner, 2002).

For example, Botswana and Namibia are both water scarce, yet their capacity to negotiate with neighbors (even with the more powerful South Africa) and the relative sophistication of their institutional arrangements have enabled the countries' economies to grow in spite of their endemic water scarcity. South Africa provides another example of the importance of second-order resources: sweeping water-sector reform there has resulted in the development of sophisticated policy instruments that are improving incentives for the more efficient use of water nationally.

Ingenuity: Homer-Dixon (1994; 2000) has developed a conceptual distinction between what he calls "technical ingenuity" and "social ingenuity." The former is needed to develop coping strategies, such as a new set of agricultural and forestry techniques in order

to compensate for environmental scarcity (Homer-Dixon, 1994). As such, technical ingenuity seems to focus on first-order resources because it deals specifically with the manipulation of the environment in order to mobilize more water (Turton, 2002b).

Social ingenuity is needed to create institutions and organizations that buffer people from the effects of (first-order) natural-resource scarcity and provide the right incentives for technological entrepreneurs to develop appropriate solutions (Homer-Dixon, 1994). As such, social ingenuity focuses on second-order resources because it deals with appropriate development, reform, or adaptation of water management institutions (Turton, 2002b).

Applying these new concepts to environmental security discourses reveals a previously hidden dimension of analysis. For example, the concepts make evident that the development of appropriate institutions is a key intervening variable in whether transboundary river basins are marked by conflict or cooperation. Central to this is the notion of adaptive institutions that has been developed by Molden et al. (2001) and Molden & Merrey (2002). Stated simplistically, as water resources are developed within a given river basin, the institutional arrangements needed to manage those developments also change over time. Initially, these arrangements are relatively simple and focus only on engineering issues—a first-order resource focus (Turton, 2002b).

But as the basin becomes more developed, riparian states encounter increasing levels of complexity, and their focus shifts to institutional development and transformation—a second-order focus (Turton, 2002b). This complexity includes the need to manage intersectoral allocation of water and, in the case of international river basins, to negotiate the allocation of water or benefits between riparian states—an activity that has an inherently high degree of conflict potential.

The role of *data* is central to understanding conflict mitigation. Conflict is often linked to the securitization of water resource management, a process in which data are classified and removed from the public domain. Within a hydropolitical complex, Pivotal States will use their control over data as a tool to ensure their strategic access to the

river basin in question. Impacted States that are economically underdeveloped will lack the capacity to generate independent data and thus must rely on data provided by the Pivotal State. This data imbalance increases the power disparity within the river basin, acting over time as a fundamental driver of conflict potential.

A current example is in the Incomati and Maputo River Basin, where the South African monopoly over the capacity to generate data created such discomfort with downstream Mozambique that what was known as the Piggs Peak Agreement broke down. Mozambique used this period of negotiation impasse to start developing its own data. Significantly, the recently signed Incomaputo

There is simply no more water available in the Limpopo and Orange River basins. Alternatives need to be found as a matter of strategic importance.

Agreement (Treaty, 2002a, 2002b) contains joint data-management as a key element. Conversely, situations in which data have been collected jointly (such as the Orange River and Upper Limpopo Basin) have always demonstrated a low potential for conflict.

The author's recent research (Turton, 2002a; 2002b) has isolated two key factors with respect to data's influence on hydropolitical dynamics. First, disparities among states' capacity to generate data seem to be dependent on states' disparate levels of technical ingenuity. Pivotal States have a higher capacity to generate data than Impacted States. This disparity becomes a key factor in the hydropolitical dynamics of these states' shared river basins.

Second, disparities among states' (a) capacities to legitimize data, (b) methodologies used to collect and interpret those data, and (c) use of those interpreted data to develop management strategies seem to be dependent on the states' disparate levels of social ingenuity. Pivotal States have a higher capacity to mobilize the appropriate form of social ingenuity with regards to water resource data; these states use this social ingenuity in negotiations over water resources to favor

their own interests. Conversely, Impacted States have a lower capacity to mobilize the appropriate form of social ingenuity, which is one of the reasons why these states remain in a hydropolitically vulnerable position.

Data imbalances increase power disparities within river basins, acting as fundamental drivers of conflict potential.

Policy Implications

This research has a number of policy implications. First, dominant environmental security discourses generally tend to ignore the importance of what Ohlsson (1999) calls second-order resources and what Homer-Dixon (1994; 2000) calls ingenuity. But current research in Southern Africa suggests that second-order resources are the critical independent variable in mitigating resource conflict in industrialized economies—in particular, those second-order resources found in formal water management institutions (Turton, 2002a).

The identification of second-order resources also leads to two other subtle but important policy implications. First, *the capacity of a riparian state to generate hydrological data is critical*. Where uncontested basin-wide data is missing (as in the cases of the Okavango River Basin) or incomplete (as in the case of the Incomati, Maputo, and—to a lesser extent—the Limpopo River), transnational institutional development is likely to remain stunted.⁹ This institutional underdevelopment leads to high potential for conflict in those river basins, particularly during times of regional drought—a natural recurring phenomenon likely to become more acute as global climate change takes effect.

Second, *the capacity of a riparian state to legitimize data via negotiations is also crucial*. Where a riparian state is unable to perform such legitimization, it will probably always remain vulnerable to the manipulation of data by more powerful co-riparians. Even in the absence of manipulation, these Impacted States may feel suspicious that manipulation and/or deception has taken place, and thus be unwilling to enter into an agreement that

may actually be advantageous to them. The latter suspicion is often expressed in Southern Africa, and may derive from the root word in Latin for “rival”—*rivalus*, which literally means “to share a river.”

Seen in this light, data becomes knowledge by means of the process of legitimization. Knowledge in turn is institutionalized, and allows for the respective water management institutions to adapt over time. Institutional adaptation is merely an empirically verifiable manifestation of institutional learning, which in turn is a manifestation of the healthy interaction between technical and social ingenuity, both of which are forms of second-order resources.

From a policy perspective, developed countries such as the United States should take these processes into greater consideration when designing foreign-policy interventions in the developing world. While technical ingenuity is relatively easy to mobilize (because engineers and scientists can be trained and assisted by developed countries), social ingenuity cannot as easily be artificially stimulated, as it is to a large extent culture-bound.

For example, the social ingenuity inherent in the Khoi San culture manifests itself in oral histories, traditional knowledge, and cultural practices—aspects that are highly suited to life in the variable climatic conditions of Southern Africa’s semi-arid regions. Such ingenuity is not easily transplanted into industrial or post-industrial society. Conversely, the Dutch—as a people that grew up in the shadow of flooding—have developed social adaptations to this eventuality in the form of *waterschappen* (or local water boards), which eventually became the very foundation of modern Dutch democracy. Such ingenuity is also not easily transplanted into any other cultural setting where those fundamental drivers do not exist. In sum, policy prescriptions that work well in one national setting may not necessarily work well elsewhere. This complication has profound relevance to foreign-policy interventions in arid countries.¹⁰


The difference between technical and social ingenuity also has significant implications for the initially mooted International Shared Water Facility (ISWF), which was proposed by Nicol et al. (2001)

for consideration by the Swedish Foreign Ministry and which now exists as the Water Cooperation Facility embracing the World Water Council, the International Court of Arbitration, and the Universities Partnership for Transboundary Waters under the overall management of UNESCO. The ISWF runs the risk of being dominated by Northern, developed-country technocrats with a bias towards technical solutions, which would deemphasize indigenous forms of knowledge that are alive and well in some social settings in the developing South. One example of such indigenous knowledge is the *natural capacity* that water has as an element of cooperation in the semi-arid regions of Southern Africa. In Botswana, for instance, the local currency is called the “Pula,” which literally means “rain” but culturally means “may you have the abundance associated with rain.” The ISWF must be able to take these local nuances on board if it is to remain a true partnership amongst equals. But if the ISWF evolves into just another Northern-dominated institution, then it runs the grave risk of becoming delegitimized in the developing South.

Impacted States also need process financing in order to negotiate equitable water sharing agreements in Pivotal or Impacted Basins. In this regard, it is now possible to develop a more nuanced approach to understanding the hydropolitical dynamics in contested developing-world river basins in the developing world—the very basins that are the target for foreign-policy intervention by developed countries.

Conclusion

Categorizing resources as first and second-order contributes a new and nuanced analytical tool to environmental security debates. If further research validates the concept of a Southern African Hydropolitical Complex, then the concept could help develop a more detailed understanding of the strategic drivers of environmental scarcity, particularly as they pertain to Southern Africa.

Such an understanding would also impact the efforts of NEPAD, which seeks to promote economic development and to strengthen the fledgling democracies in Africa. NEPAD aims to fast-track African development at the continental or regional level by coordinating actions and strategies among governments, the private sector, and civil society. At its very core, NEPAD is about alleviating poverty, inculcating a political culture of responsibility and accountability, and stimulating good governance as a norm. Yet the architects of the NEPAD process have not yet incorporated consideration of water resource development—inarguably a key component of its goals. Similarly, the AU’s architects seem to have ignored the importance of trans-boundary river basins as possible drivers of regional economic integration, instead focusing on symbolic rather than substantive issues. Additional research is needed on these questions, with cooperation between developed and developing countries likely to be highly fruitful.¹¹ 

Notes

¹ While the Democratic Republic of Congo (DRC) is not usually included among the eleven countries that comprise Southern Africa (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe), the DRC is relevant to this discussion for three reasons. First, the DRC is a member of the Southern African Development Community (SADC). Second, it has been a longstanding source of regional instability, having drawn in armed forces from various states in Africa. Finally, the DRC has been suggested as a possible donor in various ambitious water transfer schemes. See Heyns (2002) for more details.

² The “pipelines of power” thesis holds that there is a spatial and temporal variation in Southern Africa between areas where water is naturally available and areas where it is needed for economic development. These areas have been linked by water transfer schemes, which in turn translate into economic and political power. This process has resulted in skewed development in Southern Africa, particularly inside South Africa. South Africa’s 1998 National Water Act seeks to redress this historic imbalance. (To read the text of the Act, go to http://www.thewaterpage.com/south_africa.htm.)

³ The GGP is equivalent to Gross Domestic Product but applies to a specific geographic area that is sub-national in size, usually a province.

⁴ Earlier research by the author used the term “hydropolitical security complex” (Turton, 2001; 2003a; 2003b). However, water per se is insufficient to be the sole focus of the security complex—an important factor for Southern African regional security, but not the major driver.

⁵ On the other hand, South Africa has historically securitized its water resources, particularly under apartheid rule. After the 1976 Soweto riots, linked to the contemporary liberation of neighboring Mozambique and Angola, the South African government published its White Paper on Defence—a document that became the founding rationale for the South African State Security Council and for a mobilizing ideology called the “Total National Strategy.” This ideology involved a two-pronged approach to all regional political affairs: (1) the “carrot” of economic development, offered to neighboring states as an inducement for cooperation; and (2) the “stick” of military action as a disincentive for non-cooperation with Pretoria. Every existing international treaty involving South Africa and water resource management can be traced back to this period. See Turton (2003a) and Turton (forthcoming) for more details.

⁶ This process of desecuritization has occurred in the post-Cold War and post-apartheid eras. The SADC Protocol on Shared Watercourses is an example of desecuritization.

⁷ One reviewer of this article has helpfully suggested that military power should also be a criterion for the label “Pivotal State.” Indeed, all four pivotal states have demonstrated such military capacity. Both Namibia and Zimbabwe are militarily involved in the current DRC conflict, while South Africa and Botswana have both become embroiled in what became known as Operation Boleas in Lesotho. See Turton (2003a) and Turton (forthcoming) for more details.

⁸ One of the ironic outcomes of the securitization of water resources outlined in Note 5 is that these transboundary river basins now have a high level of institutional development. See Turton (forthcoming) for more details of this development. This development is a positive outcome from what was actually a dark period of tension and uncertainty. The institutions were created to reduce the range of options open to each state at the time, thereby decreasing the level of uncertainty for both states. Significantly, co-riparian states seemed to have benefited from this arrangement, provided that two conditions were met: (1) that the non-hegemonic state couched their perception of the problem in non-ideological terms, and (2) that the non-hegemonic state viewed the possible advantages strictly in terms of national self-interest (Turton, 2003d). A positive outcome developed under these conditions. But a negative condition developed when the non-hegemon viewed the problem in terms of ideology and consequently failed to think of the possible advantages of institutional development in terms of national self-interest.

⁹ The popular media refers to “contested” hydrological data in the Okavango River Basin. This definition is not strictly true, as data for the basin do exist and the riparian states agree on these data. The data have large gaps, however, particularly from Angola and attributable in part to that country’s civil war. Some NGOs also contest the Okavango data. Whether data are “contested” or not depends on one’s perspective (see Turton et al., 2003).

¹⁰ The global discourse on transboundary river management commits this mistake by holding up so-called success stories (such as the Danube and Mekong) as examples of how all developing countries should approach water resource management. Such a “one-size-fits-all” message fails to take into consideration the historic experiences and the cultural settings of those specific cases.

¹¹ The recently founded Universities Partnership on Transboundary Waters (see http://transboundary_waters_partners.geo.orst.edu/) will play a key role in this new research direction.

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