Basins at Risk in the Southern African Hydropolitical Complex?

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Introduction

The literature on international river basin management has recently undergone an upsurge in high quality empirical research, with a number of distinct schools emerging. Examples of this include the outputs of the team working on the Transboundary Freshwater Dispute Database (TFDD) under Aaron Wolf at Oregon State University[1]; the research into global water regimes by Ken Conca[2] and his team at Maryland University; the group working at the International Peace Research Institute in Oslo (PRIO) under the capable leadership of Nils Petter Gleditsch[3]; and the efforts by Peter Ashton[4] and his team working at the Council for Scientific and Industrial Research (CSIR) and the African Water Issues Research Unit (AWIRU) in South Africa. This chapter will focus on specific outputs of these four efforts by using the Southern African Hydropolitical Complex (SAHPC) as a case study example. The first output is the finding by Wolf *et al.*, (2003:29) that seventeen international river basins are at risk, eight of which are in Africa. The second is the conclusion by Conca and his team that there are some doubts on the emergence of an international regime for the management of transboundary river basins that is based on a converging set of core normative elements, *via* a global-framework or a basin-cumulative path (Conca & Wu., 2002; Conca *et al.*, 2003; Conca, 2006:106). The third is the finding by Gleditsch *et al.*, (2005) that where endemic water scarcity occurs in a shared river basin, there are substantial long-term incentives for the investment in water management measures to avoid conflictual outcomes. Finally, the work by Ashton *et al.*, (2005) and Turton *et al.*, (2004) will be used to show how these trends are manifesting themselves in Southern Africa, because of the existence of a Hydropolitical Complex in the region. In short, this chapter is a reality check for these three relatively independent empirical approaches, by testing their findings against the known situation as it is being manifest in the Southern African Development Community (SADC) region.

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[1] Referred to as the Oregon School for brevity.
[2] Referred to as the Maryland School for brevity.
[3] Referred to as the Oslo School for brevity.
[4] Referred to as the Tshwane School for brevity. Tshwane is the new official name for Pretoria, the capital of South Africa.

The Oregon School

Under the very capable leadership of Aaron Wolf, the Oregon School has evolved from two basic roots. The first was the unknown number of international river basins, when it was discovered that the *Register of International Rivers* was grossly inaccurate because of the rapid changes in the post-Cold War global political geography (UN, 1978; Wolf *et al.*, 1999). The second was the dominance of the Water Wars literature in the 1980's and early 1990's (see Box 1), an event that arose from the collapse of Cold War bipolarity, and closely associated with the emergence of a new field of study linking the environment and national security (see Box 2).

Box 1.
Selected Example of Water Wars Literature.

Bulloch & Darwish, 1993; Cooley, 1984; Cowell, 1990; de Villiers, 1999; Du Plessis, 2000; Gleick, 1993a; 1994a; 1994b; Graham-Leigh, 2000; Homer-Dixon, 1999a; Irani, 1991; Jenvey, 1997; Klare, 2001a; 2001b; Meissner, 2000; Mkone, 1997; Rake, 1997; Ramana, 1997; Star, 1991; Turton, 2000; Wolf, 1997; 1998; 1999a; 1999b; 2002a; 2002b; Wolf & Hamner, 2000.

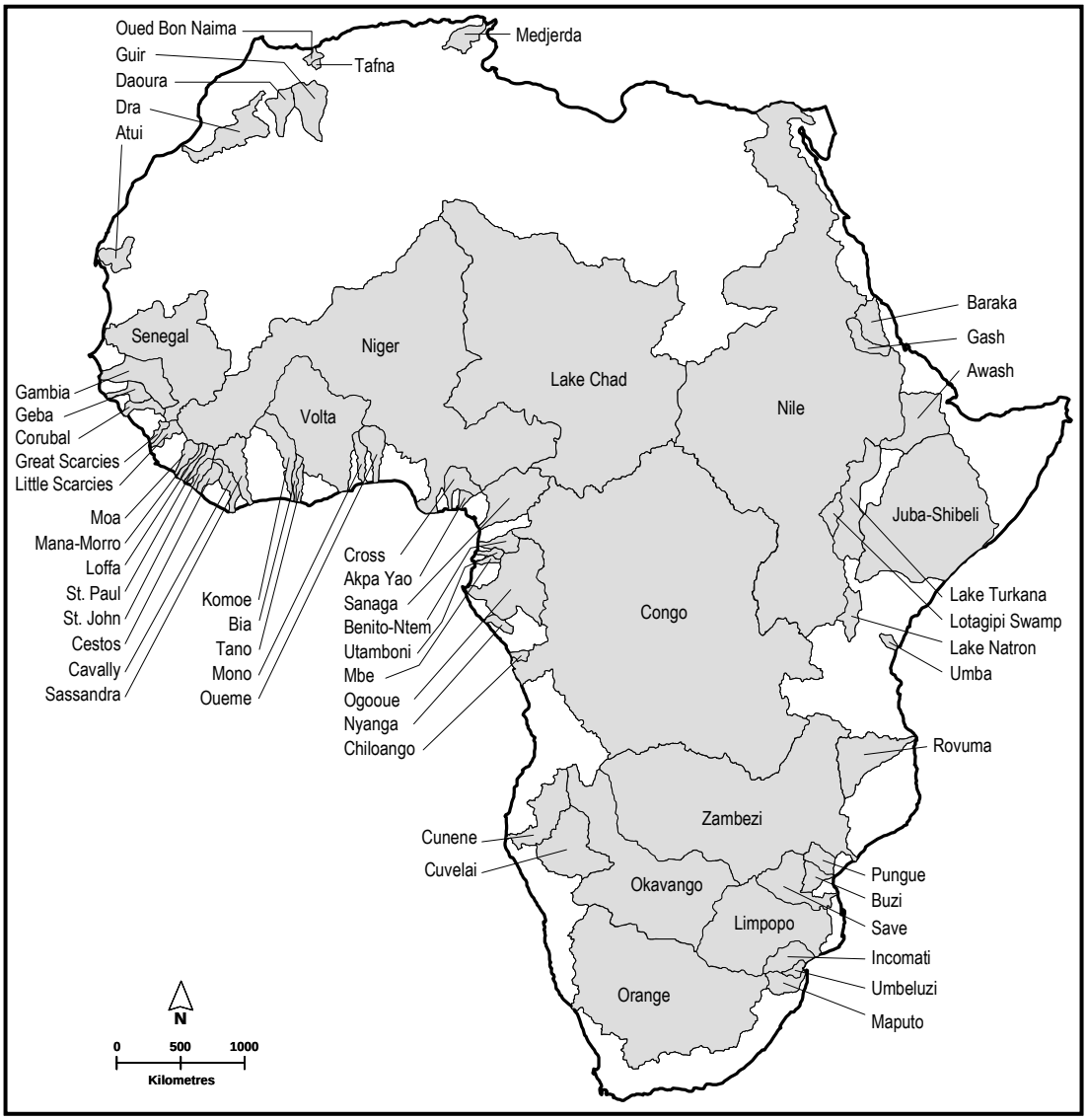
Box 2.
Selected Example of Environment and Security Literature.

Alcamo, 2000; Ashton & Turton, in press; Bächler, 1994; Bächler & Spillman, 1995; Böge, 1992; Boronkay & Abbott, 1997; Caldwell, 1988; Conca & Dabelko, 2002; Dessler, 1994; Deudney, 1991; Diehl & Gleditsch, 2001; Döös, 1994; Doyle & McEachern, 1998; Ehrlich & Ehrlich, 1988; Ehrlich *et al.*, 1989; Falkenmark, 1994; 1995a; 1995b; 1997; Gebramendhin, 1991; Gleick, 1988; 1989a; 1989b; 1989c; 1990a; 1990b; 1990c; 1991a; 1991b; 1992a; 1992b; 1992c; 1992d; 1992e; 1993a; 1993b; 1993c; 1993d; Haas *et al.*, 1995; Harf & Trout, 1986; Hjort af Ornas & Salih, 1989; Homer-Dixon, 1990; 1991; 1991; 1994a; 1994b; 1995; 1996c; 1999b; Homer-Dixon *et al.*, 1993; Homer-Dixon and Percival, 1996; Jacobson, 1988; Jaeger, 2001; Leroy, 1986; Libiszewski, 1992; 1995; Lonergan, 1999; Lonergan & Kavanagh, 1991; Lowi, 1992, 1993a; 1993b; Mascarenhas, 1989; Mathews, 1989; Molvaer, 1989; Myers, 1986; 1987a; 1987b; 1989; 1992; 1993a; 1993b; Okidi, 1992; Percival & Homer-Dixon, 1998; 2001; Porter, 1998; Postel, 1984; 1989a; 1989b; 1992; 1993a; 1993b; 1994; 1999; Postel *et al.*, 1996; Redclift, 1985; 1994; Renner, 1989a; 1989b; Renner *et al.*, undated; Rubenson, 1991; Smil, 1992; Suhrke, 1992; Trolldalen, 1992; Turton, 2003; UN, undated; Warner, 2000; Westing, 1986; 1991.

These two elements became the core drivers for the establishment of the TFDD (Wolf, 1999a), which is the earliest known centralized repository of data pertaining to both conflict and cooperation in the transboundary river basins of the world. The idea for this database came from the work being done by Peter Gleick, where a chronology of conflict[5] over water, covering the period 3000 BC to the present, had been established at the Pacific Institute (Gleick, 1998:125-127). Using various databases, including the *Foreign Broadcast Information Service* (FBIS), a structure within the Central Intelligence Agency (CIA); the Conflict and Peace Data Bank (COPDAP); the

[5] See www.worldwater.org/conflict.htm for more details.

Global Event Data System (GEDS); the TFDD; and a literature review, a set of 1,831 water-related events was extracted (Yoffe *et al.*, 2003; Wolf *et al.*, 2003). Of this total number, 507 were conflictual, 1228 were cooperative and 96 were neutral. These events were graded on a scale of 15 points, much like a pH scale, showing the intensity of the event based on the COPAB scale, with -7 being the most intense conflict (war), 0 being neutral and +7 being the most cooperative (voluntary merging of countries). This was called the Basins at Risk (BAR) scale. This was fed into a Geographic Information System (GIS) platform that included approximately 100 layers of spatial data covering three specific categories: biophysical (topography, runoff, climate etc); socio-economic (Gross Domestic Product (GDP), dependence on hydropower etc); and geopolitical (style of government, present and historic boundaries etc). Each of these was then linked to specific international river basins, which became the basic unit of analysis.



Map 1. Africa's sixty-one International River Basins (redrawn from UNEP (2002:27)) as shown in Ashton & Turton (in press).

From this GIS platform, the data was interrogated and analysed in terms of a number of various parameters. Each dataset was subject to a single and multivariate statistical analysis of the recorded events against the parameters that defined their historic settings (Yoffe *et al.*, 2003; Wolf *et al.*, 2003:38), which concluded the following:

(a) There were no events on the two extremes of the BAR scale in recent time.
(b) Most recorded interactions are of a cooperative nature with a ratio of almost 2:1 in favour of cooperation (1,228 cooperative events compared with 507 conflictive events).
(c) Most interactions are mild, with 784 events falling within the BAR scale range of -1 to +1, and 1,138 events occurring between the -2 and +2 values. Together these account for 62% of all the recorded events. Stated differently, two thirds of the recorded events are of a verbal nature only, with two thirds of these carrying no formal sanction. Of the thirty-seven recorded acute-level conflicts (-5 and -6 on the BAR scale), thirty are between Israel and its various neighbours, with non-Middle East cases relating to only five of the events of this magnitude.
(d) Water acts as an irritant between countries if left unaddressed.
(e) Water acts as a unifier, even when other political tensions exist between countries.
(f) The major water-related issues are about quantity and infrastructure, with a full 64% of all recorded events falling into these two categories. Quality-related issues are also important, but with only 6% of the recorded events falling into this category, this is a distant second.
(g) Countries cooperate over a wide variety of issues relating to water.
(h) The biggest single cause of events that are associated with high conflict (-6 on the BAR scale) are related to volumes of water and hydraulic infrastructure. These account for a staggering 87% of all recorded events.

Building on these core findings, Wolf *et al.*, (2003a:42) focus on vulnerability by using Gleick's typology of indicators (Gleick, 1993a). These consist of four specific indicators: the ratio of water demand to supply; water availability per person; the fraction of water supply originating from outside of the borders of the country concerned (exogenous water); and the dependence on hydropower as a fraction of the country's total electric supply. These were taken to represent the supply side of the overall water resources equation. The BAR methodology was developed to factor these into the overall capacity of the country concerned to absorb the impacts of stress, in the form of changes to that supply (Yoffe *et al.*, 2003). The capacity to absorb stress was translated into institutional capacity. The working hypothesis which emerged was that, "the likelihood and intensity of dispute rises as the rate of change within a basin exceeds the institutional capacity to absorb that change" (Wolf *et al.*, 2003:43). In this regard indicators of rapid change were developed. On the supply side, the indicator tracks changes to the hydrology as a result of major infrastructure development upstream. Statistically the results showed that existing conflicts are their most intense in internationalized basins, specifically those associated with rapid changes in the political landscape. So, for example, the collapse of the British Empire gave rise to a number of newly internationalized river basins that have known high conflict, including the Jordan, Nile, Tigris-Euphrates, Indus and Aral (Wold *et al.*, 2003:44). There was also a strong statistical correlation with unilateral development in a given basin in the absence of a cooperative transboundary water management

institution. In this regard basins without treaties were significantly more conflictive (-2.6 on the BAR scale) than basins with treaties. There was a definite convergence of exacerbating factors however, with no single parameter acting as a clearly discernable driver of conflict in its own right. The areas where convergence occurred included the overall level of friendship/hostility, the number of water-related treaties and the *per capita* GDP, all combined to form a significant set of factors.

Emerging from this analysis was the distillation of what became known as the Basins at Risk (Yoffe *et al.*, 2003; Wolf *et al.*, 2003:46). These consist of seventeen river basins globally, eight of which occur in Africa. Significantly, six of these are found in the Southern African Development Community (SADC) region (Incomati, Cunene, Limpopo, Okavango, Orange and Zambezi) (refer to Table 1). Of even greater relevance, three of these are basins to which South Africa is a riparian (Incomati, Limpopo and Orange). The significance of this arises from the fact that South Africa is the regional hegemonic power, so the logical question is that if the Water Wars thesis is correct, one would assume that it would use its economic and military power to gain access to, and control over, strategic resources like water. This logic is given some support from the environmental security literature if one is to believe the findings by Percival and Homer-Dixon (1998; 2001) that South Africa already has a history of environmental scarcity-driven conflict. The reader is referred to Map 1 for details of the geographic location of all international river basins in Africa, including the so-called Basins at Risk.

The core message from the Oregon School relates to the fact that institutional capacity is regarded as being a key element in the mitigation of potential conflict arising from shared river basins. In this regard the empirical study identified two substantial factors that are relevant if conflict is likely (Wolf *et al.*, 2003:52):

- Basins that are internationalized after the break up of a former unifying power (what Buzan (1991:219-221) and Buzan *et al.*, (1998:12) would call the removal of 'overlay[6]') have a higher propensity for conflict. This has clear implications for Africa, specifically in the post-Colonial era where newly-independent states sought to project their new-found sovereignty and define their own national interests.
- Unilateral development of the water resources within a given international river basin in the absence of a treaty or functioning river basin commission.

Using various databases, the Oregon School has concluded that these conditions are present in six international river basins in Southern Africa - Incomati, Cunene, Limpopo, Okavango, Orange and the Zambezi - and has labelled these as being the Basins at Risk (Wolf *et al.*, 2003: 52) (see Map 1 and Table 1).

The Maryland School

Recognizing the value of empirical work, the Maryland School has launched a variety of initiatives in order to discover if a cooperative international approach to the

[6] Overlay is defined as that condition when great power interests transcend mere penetration and come to dominate a region so heavily that the local pattern of security relations virtually ceases to operate, such as occurred with the European colonization of Africa (Buzan *et al.*, 1998:12).

management of water is emerging. Of the world's 263 known transboundary river basins that cross international political borders (Conca, 2006:93; Wolf, 2002a), a key question revolves on the possible convergence of central norms and values around specific areas of governance in shared aquatic ecosystems. Lamenting the fact that the global response to the management of such systems tends to be focussed on the intended reproduction of one particular institutional form – the negotiated international agreement among sovereign states known as the regime – the Maryland School set out to understand the evolution of such a process (Conca and Wu, 2002; Conca *et al.*, 2003; Conca, 2006:6). Central to this endeavour is the attempt to find rules that contain and channel deeply divisive, often contentious debates that rage at the sub-national level, often with no broad consensus on substance being apparent (Conca, 2006:8). In this regard a regime is taken to be the product of inter-state bargaining in the context of the structural anarchy of the international political system in which states are forced to interact, not because it is the ideal form, but rather because it is the form that the dominant coalition in favour of regimes wants (Conca, 2006:26). This is an example of what Tony Allan and his London-based hydropolitics researchers are starting to think of as hydro-hegemony. A regime[7] is formally defined as, "a set of implicit or explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations" (Krasner, 1982:186; 1983:2).

Informed on the one hand by databases such as the *Systematic Index of International Water Resources Treaties, Declarations, Acts and Cases by Basin* (FAO, 1978), but also linking up with the TFDD at Oregon State University and the FAOLEX legal database, Conca (2006:28) notes that there are now more than 150 basin-specific treaties that set out the rights and responsibilities of states that share a specific international river basin. By analysing these, a set of protonorms have been distilled. A protonorm is defined as a norm that has become sufficiently recognizable and well established, so as to become available for application to watershed governance in basins and watersheds that are beyond the direct reach of the agreement concerned (Conca, 2006:30). Seen through the conceptual lens of an international regime, the seeming absence of open conflict over shared rivers in keeping with the Water Wars thesis, along with the general proliferation of basin-wide agreements, suggests cautious optimism about the governance of international aquatic ecosystems (Conca, 2006:94).

The best example of a global rivers regime in the form of a codified legal instrument is the *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses* (referred to for brevity as the *UN Convention*) that was adopted by the General Assembly in 1997 (Conca, 2006:95). At the opposite end of the scale are a range of bilateral or multilateral agreements that have been negotiated between riparian states at the level of the individual international river basin. Using the TFDD and FAOLEX as primary sources of data, Conca and his team began to extract a number of river management agreements – some sixty-two in total – which they then subjected to a rigorous statistical analysis with reference to the core principles of the 1997 *UN Convention* (Conca, 2006:107). These sixty-two

[7] Attention is drawn to the fact that the Oslo School uses the term "regime" in a different way, so the reader must be aware that when used by different Schools, the concept has different meanings. This conceptual muddle complicates trans-disciplinary research, but need not undermine the ultimate value of that research, provided the reader is aware of the nuances.

agreements covered a total of thirty-six international river basins, or roughly one-seventh of the global total. Of these, only a quarter (sixteen in total) are the first agreements for the particular river basin. For the remaining forty-six agreements, there was evidence of prior agreement in the same river basin, suggesting that at least three-quarters of the agreements studied occurred in basins with a previous history of cooperation between the respective riparian states. It therefore does not appear that the idea of creating an instrument of shared governance by means of a regime is rapidly diffusing to new, previously uncovered basins (Conca, 2006:107). Of the entire dataset consisting of sixty-two agreements, forty-six are bilateral in nature while sixteen contain three or more parties (Conca, 2006:108). Significantly, two-thirds of the bilateral agreements are in basins where there are more than three riparian states. This is what is known as Pike's Law[8], which is used to show that the complexity of negotiations increases exponentially as the number of riparian states increases. This means that in a basin with complex issues, the likelihood of reaching a multilateral agreement is significantly lower than reaching a bilateral agreement.

The existence of evidence of Pike's Law in the real world is significant for two basic reasons. Firstly, multilateral agreements are substantially over-represented in the dataset used by Conca and his team. Two-thirds of the world's international river basins are bilateral (176 of the 263 known basins or 67%), yet more than three-quarters of the agreements written during the study period (forty-nine of sixty-two or 79%) were in basins that had three or more riparian states within their hydrological configuration. Secondly, within the multilateral basins, the most common agreement is a bilateral regime, by a ratio of 2:1. This is an agreement that deliberately excludes one or more of the riparian states within the given river basin. The patterns of fragmented cooperation that was found in the Maryland School study, supports the finding by Wolf and his team at the Oregon School (Conca, 2006:109).

The same trend is evident when the temporal distribution of transboundary freshwater regimes was analysed. The temporal distribution of the sixty-two agreements is marked by three distinct features: relative consistency before the 1992 *UN Convention on the Environment and Development* (UNCED); a spike in agreements immediately following UNCED; and a noticeable drop-off in agreements reached after the UNCED (Conca, 2006:107-108). Statistical analysis of the dataset showed that eight core elements seem to be emerging, but each of these are coalescing around different river basin configurations in different ways. The core normative elements found in the empirical analysis are (Conca, 2006:110-111):

- Equitable use.
- Avoidance of significant harm to other riparian states.
- Sovereign equality and territorial integrity.
- Information exchange.
- Consultation with other riparian states.
- Prior notification.
- Environmental protection.
- Peaceful resolution of disputes.

[8] Pike's Law says that "the effort required to reach any agreement increases by the cube of the number of parties involved" (Turton, 2004:251).

In-depth analysis of the dataset revealed the emergence of two specific clusters of principles. On the one hand there was a distinct correlation around the issue of openness and transparency, such as the commitment to information exchange, prior notification and the peaceful resolution of disputes. Significantly, none of these correlates with the core principles relating to the state's right to water. In similar vein, equitable use correlated with a few content indicators, such as specific water allocation formulae, or whether domestic waters were exempt from the provisions of the agreement. From this assessment it becomes evident that one sub-set of the dataset under investigation is anchored in principles of openness and sustainability, whereas a second distinct sub-set is anchored in the state's right to water (Conca, 2006:116).

Interpreting this work in its totality, it becomes evident that there is a strong tendency for cooperation to be concentrated in international river basins where a prior-history of water-related cooperation already exists (Conca, 2006:118). However, nowhere is there strong evidence of the diffusion of these norms, and more significantly, most of these norms seemed to be well established already at the beginning of the study period, suggesting that they did not evolve more over time. More importantly, while the 1997 *UN Convention* goes well beyond merely codifying existing principles at the basin-level, some of the core themes – universal participation, equitable use and the avoidance of significant harm – appear only sporadically in specific basin-level agreements (Conca, 2006:119). In fact, the *UN Convention*, as an example of the culmination of decades of regime creation in the global management of international river basins, makes a stark and polarized distinction between the domestic sphere of water resource management, which is the sole domain of state governance, and the international sphere between co-riparian states, which is the sole domain of inter-state agreements or regimes (Conca, 2006:120). There is little compelling evidence that a common normative structure is emerging in the sphere of inter-state cooperation, and there is no evidence to suggest that international legal principles are taking on greater depth, or even moving in an identifiable direction (Conca, 2006:121).

This has great significance in the context of the finding by the Oregon School that the so-called Basins at Risk are areas that are likely to be flash-points in the next decade, specifically where river basins have been recently internationalized, or where there is little institutional resilience. This is particularly relevant to South Africa, where Percival and Homer-Dixon (1998; 2001) have found evidence of a history of environmental scarcity-related conflict. The core message from the Maryland School is thus derived from the findings of the Oregon School that a history of inter-state cooperation tends to mitigate against future conflict. Therefore the six Basins at Risk found in Southern Africa, are likely to be crucial in terms of understanding the extent to which water scarcity (or more specifically the impact of the cumulative modification of aquatic ecosystems whose impacts are felt across international borders), is to become a potential driver of conflict.

The Oslo School

The Oslo School consists of a dedicated team of empirical scientists. While recognizing the value of the work being done by Oregon School, the Oslo School has acted independently for a lot of its existence. The Basins at Risk project (Wolf *et al.*, 2003; Yoffe *et al.,* 2003) has served as an input into the Oslo School however, so there is a useful cross-pollination of approaches and ideas starting to occur.

The basic point of departure by the Oslo School has been the rise in prominence of the Water Wars literature, which was associated with the decline in ideological conflict after the Cold War and a perceived shift to inter-state competition for vital resources instead (Klare, 2001a; 2001b). The first large empirical research project was launched to test these ideas being put forward by the Water Wars pundits, and resulted in a large-n study on water and interstate conflict (Toset *et al.,* 2000). Initial analysis of this dataset showed that sharing a river increases the probability of a militarized inter-state dispute in a pair of countries, which was called a dyad. The initial finding also indicated that water scarcity was associated with conflict; and the physical geography of the river basin played a key role. In this regard, a river that was shared across a border rather than a river forming a border was most frequently associated with conflict (Gleditsch *et al.,* 2005). A new study was launched to determine whether these initial findings were spurious (Furlong *et al.,* 2005). This new initiative generated a more sophisticated dataset on international boundaries, but it found that the relationship between shared rivers and conflict was not spurious with respect to boundary length (Furlong & Gleditsch, 2003). Arising from this work comes a more nuanced understanding of the core problem, specifically associated with data limitations.

With respect to the Water Wars literature, the finding by Homer-Dixon (1999b:179-180) that war is likely to occur over non-renewable resources, but where renewable resources were concerned, water had the greatest potential for violent conflict, became the foundation for the Oslo School. Noting that the Water Wars literature is divided into two broad camps, the research program at the Oslo School was designed to test the various hypotheses that underscored the logic within each approach (Gleditsch *et al.,* 2005). Neomalthusian authors foresee a growing level of water scarcity in a number of countries, which they hypothesize, will increase competition in the face of growing population, eventually becoming a trigger for a resource conflict (Homer-Dixon, 1990; 1991; 1994a; 1994c; 1996; Irani, 1991; Klare, 2001a; 2001b; Starr, 1991). The Cornucopian authors argue that cooperation over water is more common than conflict (Turton, 2000; Wolf, 1999a; 1999b).

In an effort to refine these empirical findings, a specific dataset was developed using the 1978 study from the Centre for Natural Resources, Energy, and Transport of the Department of Economics and Social Affairs at the United Nations (CNRET, 1978). This attempted to distinguish between three specific categories of riparian relations: upstream/downstream shared across an international border; rivers demarcating an international border; and a mixed set. This proved problematic however, as only 9% of all coded rivers had a clear upstream/downstream categorization, while 39% ended up in a category that was not clearly definable (Gleditsch *et al.,* 2005). This ambiguity left open one major challenge to the Water Wars hypothesis – the fuzzy boundary scenario – in which countries sharing a common resource might fight over the political boundary being formed by the river, rather than the resource itself. In developing a dataset that could test for this scenario, the CNRET database contained little information about either Asia or Africa. As a result a new dataset was created with four fundamental ambitions in mind:

- All principle river basins of the world were to be represented.

- The ratio between upstream/downstream and boundary-demarcating rivers was to be clarified with a high level of reliability.
- The magnitude of the resource was to be accurately captured in all cases.
- Non-contiguous basin-sharing dyads were to be accurately captured and represented.

In order to achieve this a decision was made to test the Oslo dataset (Toset *et al.*, 2000) against the most comprehensive dataset then in existence – the TFDD at Oregon State University. There was thus a convergence between the work being done by the Oregon and Oslo School's at this point in time. The first test indicated fifty-one missing basins from the Toset dataset, with many examples of different coding and names, adding to some degree of confusion. This resulted in the compilation of a new dataset that was capable of showing minute detail of each tributary and sub-basin within each of the TFDD's 261 known international river basins[9]. Within each contiguous boundary-crossing river basin the exact number of river crossings was measured, and the length of each boundary-demarcating river was assessed. This was processed into a GIS system for later analysis. Historic boundary data changes between 1944 and 1996 were sourced from O'Loughlin *et al.*, (1998) and fed into the new dataset. From this a detailed assessment was made using both bivariate and multivariate analyses, designed specifically to test both the Neomalthusian and Cornucopian views regarding water and conflict (Gleditsch *et al.*, 2005).

Some of the findings of this analysis were consistent with both the Oregon and Maryland School's with respect to a history of peaceful interaction. In this regard, it was found that a history of peaceful interaction tended to be a good indicator of future peaceful resolution of disputes (Gleditsch *et al.*, 2005). The political make-up of the dyad was also found to be very important. What were identified as "Inconsistent Regimes[10]" was found to be the most likely to give recourse to violence (Mansfield & Snyder, 2002; Hegre *et al.*, 2001). The second most dangerous constellation was one involving a single democracy[11]. Another configuration that was found to have a propensity towards violence was a dyad containing two autocracies[12]. Significantly there was no statistical indicator that the level of development in one country within a given dyad had any correlation with the possibility of conflict. This is possible because there is a correlation between the level of development and regime type (democracy, autocracy etc), so the resultant dynamics of this had been accounted for elsewhere in the analysis (Gleditsch *et al.*, 2005). Another important finding was the correlation between basin size and conflict, which statistically was more relevant than either the length of the river boundary or the number of river crossings within each basin. However, in contrast to the Neomalthusian literature (Yoffe *et al.*, 2003), there was no statistical correlation between water stress and specific conflict events. While there is evidence to show that dry countries seem to have a higher risk of interstate

[9] Attention is drawn to the fact that we now know of 263 international river basins (Conca 2006:63; Wolf, 2002a, Wolf, personal communication).

[10] Attention is drawn to the issue of definition here. The Oslo School uses the word "regime" to describe a government type, whereas the Maryland School uses the word regime to define an agreement that has been reached between two sovereign states. This highlights the complexity when working across disciplines in an empirical study where datasets have been generated using different variables.

[11] This refers to a dyad in which one of country is a democracy and one is not.

[12] This refers to a dyad in which neither country is a democracy, and where both countries are autocratic in nature.

conflict, which might indicate that where endemic water scarcity occurs in a shared river basin, there are substantial long-term incentives for the investment in water management measures that avoid conflictual outcomes (Gleditsch *et al.,* 2005).

The core message from the Oslo School is that there is little statistical evidence to support the Neomalthusian view that water and conflict are causally related. Stated differently, the Water Wars thesis does not stand up in the face of rigorous interrogation *via* a statistical analysis of the real world. There is some statistical evidence to support the Cornucopian view however, specifically where shared rivers occur in dyads that have higher levels of economic development. This suggests that wealthier countries can afford to compensate for scarcities by means of either substitution or technological innovation. The strongest results were found where the overall importance of the given river basin was high – something that has been factored into the work by Ashton & Turton (in press). The most important message is that empirical analyses are only as good as the datasets on which they are based, so it is to this issue that we can now turn our attention.

Pulling it all Together: The Tshwane School

The findings of the three sets of empirical studies noted above show the following:

- The Oregon School makes use of a global database that contains every known international river basin in it, supported by an events database that is time-specific covering a period from 1979 – 1994. Analyses from this school have resulted in the identification of seventeen international river basins that are deemed to be "at risk", six of which are found in Southern Africa. The core message is that being at risk is a function of rapid changes to the hydrological aspects of a shared river basin in the face of institutional inability to deal with those rapid changes. The Basins at Risk are therefore in this category because of their *perceived* institutional weakness in the face of current and future demands on the resource-base.
- The Maryland School makes use of the TFDD that was developed by the Oregon School, supported by an events database covering the period 1980-2000. From this a set of sixty-two agreements was selected and these were analysed to determine the extent of normative deepening or convergence. The core message is that there is no evidence of normative deepening, but there is some evidence of the convergence around specific issue-clusters that do not challenge the notion of state sovereignty in regime negotiation. Specifically, a cooperative history of inter-state cooperation tends to mitigate conflict, so a good indicator of river basins to be substantially at risk is detail of the history of that inter-state cooperation as evidenced in regimes, treaties or negotiated agreements.
- The Oslo School makes use of a variety of databases, including the TFDD. Events databases also come from a variety of sources including border changes[13] from 1944 – 1996 and militarized interstate disputes (MID[14]) from 1816 – 2001. Analysis of this more sophisticated dataset shows that cooperation is possible, and indeed likely, if there is a history of cooperative

[13] See O'Loughlin *et al.,* (1998).
[14] See Ghosn & Palmer (2003) for the most recent MID dataset.

> interstate behaviour in a given river basin. The core message is that dataset integrity has a major impact on the results of empirical studies, and that Neomalthusian views have little support from a sophisticated analysis of the real world, but there is some evidence of Cornucopian views being manifest.

Having noted the evolution of these three schools, particularly when the findings of the Oregon School clashed with what was known to exist in the real-world context of Southern Africa, a series of research projects were launched. The first of these was a tentative study that examined existing theory and tried to gather some information on inter-state agreements in Southern Africa (Turton, 1999). This was never formally published, but became the foundation for future work. From this a formal project was launched to capture and record a detailed hydropolitical history of the international river basins to which South Africa is a riparian (Turton *et al.,* 2004). This was based on primary archival material from government, supported by secondary sources where they had made a useful contribution by interpreting historic events. Arising from this was the first compilation of formal agreements to which South Africa was a signatory. With thirty agreements being listed (Turton *et al.,* 2004: 387-389), this was immediately found to be at odds with the *Atlas of International Freshwater Agreements* that had been generated from the TFDD program at Oregon State University (UNEP, 2002). In fact, of the thirty individual agreements that were listed by Turton *et al.,* (2004:387-389), only ten of these were in the *Atlas of International Freshwater Agreements*. In an attempt to gain greater insight, a second formal project was initiated (Ashton *et al.,* 2005), which located fifty-nine agreements to which South Africa was a signatory, and placed the full text of each agreement into a database that can be interrogated by means of specific search terms.

This is significant because the empirical research of the Oregon, Maryland and Oslo Schools is all highly dependent on quality events data, supported by a sophisticated and robust coding system capable of dealing with nuances. For example, Conca (2006:94), citing the TFDD as a primary source, notes incorrectly that there are fifty-nine international rivers in Africa. This is clearly at odds with Map 1 that shows sixty-one. Conca (2006:94) goes on to cite Hamner & Wolf (1997) as having identified 145 international treaties that deal with some non-navigational aspect of international river basins. We now know that the Southern African component of that dataset is under-represented by at least twenty agreements for South Africa alone – one country in the SADC region consisting of thirteen member states. If South Africa alone is a signatory to fifty-nine known agreements (possibly more), and if a number of agreements are known to exist in other parts of the SADC region, but have yet to be captured, then how representative are the 150 basin-specific agreements that Conca used to distil his final sixty-two samples from? Conca (2006:361-364) lists nineteen agreements to which South Africa is a signatory, so we know that his dataset was significantly under-represented from the beginning. Surely the greater number of agreements now known to exist in the SADC region is relevant in light of the finding by all three schools that a history of cooperation is a good indicator of conflict mitigation in future? Had these agreements been available to the researchers from the various schools, would their results have been any different? Would the six Southern African Basins at Risk still be classified as such if this larger dataset was used? It is to this endeavour that we now turn our attention.

Table 1: Basins at Risk in the Southern African Hydropolitical Complex					
Basin		**Riparian States**		**International Regime (3)**	
Name (1)	**Type (2)**	**Name**	**Type (2)**	**Basin-level**	**Other**
Incomati	PB	South Africa Swaziland Mozambique	PS IS IS	**First Use** **Second Use** **TPTC** **JPTWC** **JWC1** **KOBWA** **JWC2**	**SARCCUS** **SADC FP** **SADC WP** **SADC TCM** **NPA**
Cunene	IB	Angola Namibia	IS PS	**First Use** **Second Use** **Third Use** **Fourth Use** **JOA**	**SARCCUS** **SADC FP** **SADC WP** **SADC TCM** **ANJCC**
Limpopo	PB	Botswana Zimbabwe South Africa Mozambique	PS PS PS IS	**First Use** **Second Use** **Massingir Dam** **TPTC** **JPTC** **LBPTC** **Molatedi Dam** **LWC**	**SARCCUS** **SADC FP** **SADC WP** **SADC TCM** **NPA** **JPCC**
Okavango/ Makgadikgadi	IB	Angola Namibia Botswana Zimbabwe *	IS PS PS PS	**First Use** **Second Use** **PJTC** **JPWC** **OKACOM**	**SARCCUS** **SADC FP** **SADC WP** **SADC TCM** **ANJCC**
Orange	PB	Lesotho South Africa Botswana Namibia	IS PS PS PS	**JTC** **JPTC** **LHDA** **TCTA** **LHWC** **PWC** **VNJIS** **JIA** **ORASECOM**	**SARCCUS** **SADC FP** **SADC WP** **SADC TCM**
Zambezi	IB	Angola Zimbabwe Zambia Namibia Botswana Malawi Tanzania Mozambique	IS PS IS PS PS IS IS IS	**ZRA** **ZACPLAN** **ZAMCOM**	**SARCCUS** **SADC FP** **SADC WP** **SADC TCM** **ANJCC** **JCC** **PCC** **PJCC** **JPWC** **PJTC**
***** Basin state not part of OKACOM					
Abbreviations used: IB (Impacted Basin); **PB** (Pivotal Basin); **IS** (Impacted State); **PS** (Pivotal State).					
Source: (1) Wolf *et al.*, (2003:29). (2) Ashton & Turton (in press). (3) Turton, *et al.*, (2004:387-389); Ashton *et al.*, (2005); Heyns (1995).					

The six Basins at Risk identified by Wolf *et al.,* (2003:29) are listed in the first column of Table 1. The second column gives the classification of each of these river basins in terms of the Southern African Hydropolitical Complex work that has been done by the Tshwane School (Turton, 2003a; Turton & Earle; 2005:154; Turton & Ashton, 2004; and Ashton & Turton; 2004; in press). The third column lists the riparian states to each of these Basins at Risk. Attention is drawn to the Okavango Basin, which is listed in Table 1 as the Okavango/Makgadikgadi Basin, because in reality the Okavango is a sub-basin of the Makgadikgadi Basin to which Zimbabwe is also a riparian on the Nata River (Ashton & Neal, 2003:34). For this reason Zimbabwe is listed as a special case as indicated by the star in Column 3. The fourth column shows the classification of the riparian state in terms of the Southern African Hydropolitical Complex work noted above. This fifth column lists the abbreviated name of each known international regime applicable to each specific river basin, as sourced from Turton *et al.,* (2004: 387-389), Ashton *et al.,* (2005) and Heyns (1995). The final column lists the abbreviated name of each known international regime that is applicable in a context other than within the specific river basin as sourced from Turton *et al.,* (2004: 387-389), Ashton *et al.,* (2005) and Heyns (1995). The last two columns are relevant in terms of the findings by all three Schools that a history of prior peaceful inter-state interaction is a good indicator of future conflict mitigation capability (Conca, 2006: 118; Gleditsch *et al.,* 2005; Wolf *et al.,* 2003:43), specifically in light of the fact that in all three cases the Southern African data is known to be under-represented. This is introduced to support the finding by Gleditsch *et al.,* (2005) that where endemic water-scarcity is the norm, there are substantial long-term incentives for the investment in water management measures to avoid conflictual outcomes. As such the weight of this evidence will be used to oppose the finding (Wolf *et al.,* 2003:29) that these are Basins at Risk, hence the question mark in the title of this chapter.

The Southern African Hydropolitical Complex as a Concept

The SADC region is characterized by three critical facts. Firstly, it contains a large number of international river basins (see Map 1) – at least fifteen if the Okavango is treated as a sub-basin of the Makgadikgadi Basin[15] – forming different patterns of hydraulic linkages across political borders. Secondly, four of the economically most developed states in the region - Botswana, Namibia, South Africa and Zimbabwe - are water scarce, and are known to be approaching the limits of their readily available water resources. Consequently endemic water scarcity is likely to impose limitations to their economic growth potential in the near future, elevating the issue of water resource management to the level of a national security concern (Turton, 2003b:88). This is what is known as the securitization of water resource management, which can become a driver of future conflict if left unmanaged. Finally, these four states are also linked by virtue of their co-riparian status in the Orange and Limpopo basins, both of which are strategically important to the respective riparian states because of the high level of economic activity that they support. Even more significantly however, these

[15] If the Makgadikgadi Basin is separated from the Okavango, then the Nata River becomes relevant because it crosses from Zimbabwe into Botswana, emptying into the Makgadikgadi Pans, which is also the terminus of the Okavango system in years of high flood. Zimbabwe is not riparian to the Okavango, but both the Okavango and Nata Rivers are sub-basins of the Makgadikgadi Basin, which is an internally draining basin or endoreic system.

four countries are all riparian to the so-called Basins at Risk as defined by Wolf *et al.*, (2003:29).

Seen in this light, it becomes necessary to understand de-securitizing dynamics at work. De-securitization is understood as being the normalization of inter-state interaction, through the institutionalization of the conflict potential, by removing water resource management from the security domain, and treating it as a technical issue only (Turton, 2003b:90). This proceduralizes the processes involved (Conca, 2006:8), making them less conflict-prone and hence more predictable. The SAHPC provides this crucial function, by linking riparian states in a series of inter-state arrangements at a level other than the river basin, showing the extent that water issues have become drivers of international relations in their own right. This is based on the core logic that water scarcity occurs at the level of the basin (also known as the watershed), but remedies are found at a level other than the international river basin, in what is known as the Problemshed (Allan, 1999; Earle, 2003). This is relevant in light of the finding by Gleditsch *et al.*, (2005) that countries in which endemic water scarcity occurs in a given shared river basin have substantial long-term incentives for the investment in water management measures to avoid conflictual outcomes. Similarly, it is relevant that more economically developed countries tend to be less conflictual, because they can develop alternative coping strategies, by allocating water away from the thirsty agricultural sector using sectoral water efficiency as a vehicle, or by negotiating cooperative agreements with co-riparian neighbours. This is consistent with the ingenuity thesis that has been developed by Homer-Dixon (1994a; 1995; 1996; 2000), and the concept of second-order resource[16] scarcity that was developed by Ohlsson (1999:146). It is argued that this is the case in Southern Africa, and it is precisely these aspects that have been missed by the Oregon School in their Basins at Risk classification methodology.

The SAHPC is thus predicated on the understanding that two core facts are always relevant in any hydropolitical analysis. Firstly, all river basins are not equal. This is consistent with Gleditsch *et al.*, (2005) as evidenced by the various attempts to develop datasets that accurately capture the nuanced nature of basins with respect to endogenous water, boundary-crossing, boundary-demarcating and other specific criteria that were shown to be statistically relevant. The issue of dependence on exogenous water has been shown to be relevant by the entire range of empirical analyses noted above, suggesting that all river basins are not equal. Secondly, all riparian states are not equal. Some are more dependent on a given river basin for their

[16] A second-order resource is defined as the ability of societies, administrative organizations and managers responsible for dealing with natural resource scarcities (so-called first-order resources), to find appropriate tools for dealing with the social consequences of a first-order scarcity (Ohlsson, 1999:161). It is consequently a scarcity of a specific form of resource, or what Homer-Dixon (2000:22) calls either technical or social ingenuity. Stated differently, it is second-order resources that need to be mobilized if water scarcity is to be prevented from becoming a driver of violent conflict, so this is the critical independent variable that is missing from the finding by Gleditsch *et al.*, (2005) that there are substantial incentives for the investment in water management measures that avoid conflict. It is a core element of the argument being presented in this chapter that the presence of second-order resources in Southern Africa, at the right time and in the appropriate format, are what has made the Basins at Risk (Wolf *et al.*, 2003:29) an incorrect interpretation, simply because the databases that generated the finding, did not have a field capable of measuring second-order resource availability. Conversely, if the Oslo School had to develop a suitable indicator of second-order resource availability, they would probably be able to show why some countries succeed in mitigating water-related conflict while others do not.

future economic security than others. Some are also more reliant on exogenous water than others. Even more significantly, some have greater economic capacity than others, just as they have differing military capabilities. So for ease of reference, the Southern African Hydropolitical Complex as a concept is based on the analytical distinction between river basins and riparian states, using the simple terminology of 'pivotal' versus 'impacted'.

Using the work by Buzan (1991), Buzan *et al.,* (1998) and Schulz (1995) as a point of departure, a conceptual model was developed that factors in the hydropolitical dimension of international relations within the SADC region (Turton, 2003a; 2003c; Turton & Earle, 2005; Ashton & Turton; in press). The rationale for this is based on the fact that international rivers provide permanent linkages between different states within the Southern African Regional Security Complex as originally defined by Buzan (1991:210), but the *exact* nature of the relationship is too nuanced to be understood merely in terms of geography, and a study that focuses only on the river basin level misses this complex reality. Definitions of the four key components of the Southern African Hydropolitical Complex are as follows (Turton, 2003a; Ashton & Turton, in press):

- Pivotal States are riparian states with a high level of economic development[17] that also have a high degree of reliance on shared river basins for strategic sources of water supply. In southern Africa, four states fall into this category: Botswana, Namibia, South Africa and Zimbabwe.

- Impacted States are riparian states that have a critical need for access to water from international river basins that are shared with a Pivotal State, but appear to be unable to negotiate what they consider to be an equitable allocation of water. In southern Africa, seven states are seen to be in this category: Angola, Lesotho, Malawi, Mozambique, Swaziland, Tanzania and Zambia.

- Pivotal Basins are basins that face closure[18], and which are also strategically important to any one (or all) of the Pivotal States by virtue of the range and magnitude of economic activity that they support. In southern Africa, three basins fall into this category: Orange, Limpopo and Incomati. Significantly, all three of these are Basins at Risk (Wolf *et al.,* 2003:29).

[17] This higher level of economic development means that the Pivotal States also have the capacity to project their power outside of their borders. It is significant that all four of the Pivotal States have a history of military activities beyond their own sovereign territory. South Africa was active militarily across many countries in Africa during the Cold War (Bernstein & Strasburg, 1988; Turner, 1998). In the immediate post-Apartheid period, South Africa was involved in Operation Boleas in Lesotho, along with Botswana, in an action that was officially sanctioned by SADC (Turton, 2004:268). Namibia and Zimbabwe both have troops in the Democratic Republic of Congo (DRC), engaging in military actions that have not been sanctioned by SADC. Zimbabwe also deployed troops inside Mozambique to protect its interests during the Mozambique Civil War (Turner, 1998:131-145).

[18] Basin closure is defined as a river with no utilizable outflow of water (Seckler, 1996). A basin is said to be facing closure when all of the available water has been allocated to some productive activity and there is no more water left to be allocated (Svendsen *et al.,* 2001:184). Basin closure therefore becomes a key variable in our understanding of Basins at Risk, because once that threshold is reached, water scarcity can become a trigger for conflict, unless sufficient second-order resources can be mobilized to mitigate that conflict.

- Impacted Basins are those where at least one of the Pivotal States is a co-riparian, and where there appears to be less freedom of choice for an Impacted State to develop its water resources in a manner that is deemed to be fair and equitable. In southern Africa, six basins are in the category: Cunene, Maputo, Okavango, Pungué, Save-Runde and Zambezi. Significantly, three of these are Basins at Risk (Wolf *et al.,* 2003:29).

By using the Southern African Regional Security Complex as defined by Buzan (1991:210), it is possible to use these concepts, linked as they are *via* the SAHPC, to develop a more nuanced understanding of the patterns of co-operation and competition in international river basins. More specifically, a nuanced understanding is possible by analyzing the hydropolitical configuration[19] of Pivotal States versus Impacted States in each basin. This gives an indication of the hydropolitical dynamics, and more importantly, the level of incentive for the negotiation of a conflict mitigating solution. Within the SADC region, water has a long history of politicization, having played a prominent but subtle role during the conflict years of the last three decades (Turton 2004: 254-266). While the overt nature of southern African hydropolitics has changed somewhat in the post-Apartheid era, the underlying drivers remain largely unchanged. The four economically most developed states in the region are also those facing the greatest scarcity of water; they all share international river basins with other states, they are all riparian to the so-called Basins at Risk, and they all face significant limitations to their future economic growth prospects as a result of looming water shortages. In short, the jury is still out as to whether this range of issues will drive conflict in future, so it becomes a good case study for both the Neomalthusian and Cornucopian views on hydropolitics.

The structural configuration of the Southern African Hydropolitical Complex is presented in Figure 1, which shows the cross-cutting linkages across various river basins in which specific states have a strategic interest. It is an alternative to a river basin perspective of the region such as that presented in Map 1, so it represents the Problemshed, rather than the individual watersheds.

As stated above, not all international river basins are equal in strategic importance or in terms of their inherent conflict potential. The Orange, Limpopo and Incomati basins in the SADC region have been classified as Pivotal Basins, based on three critical criteria: a significant portion of the basin falls within Pivotal States; those Pivotal States have a high reliance on the water from these basins; and each basin is approaching the point of closure.

[19] A simple ratio of Pivotal States to Impacted States in a given basin can give some indication of likely strategies that can be considered by each state. For example, a basin with a Pivotal State downstream, is likely to have a regime that is negotiated upstream, in order to protect the interests of the Pivotal State. Similarly, a basin with a Pivotal State upstream, might not have enough incentive to negotiate a basin-wide regime downstream, and might thus manifest as a bilateral arrangement in a multilateral basin. Where more than one Pivotal State occurs in a given basin, there is more chance of a basin-wide agreement being negotiated, because it suits the combined interests of those states. The theoretical work by Lowi (1990:386) is useful in this regard, even if it is couched in the language of Realism (a trend that is outdated in contemporary International Relations literature).

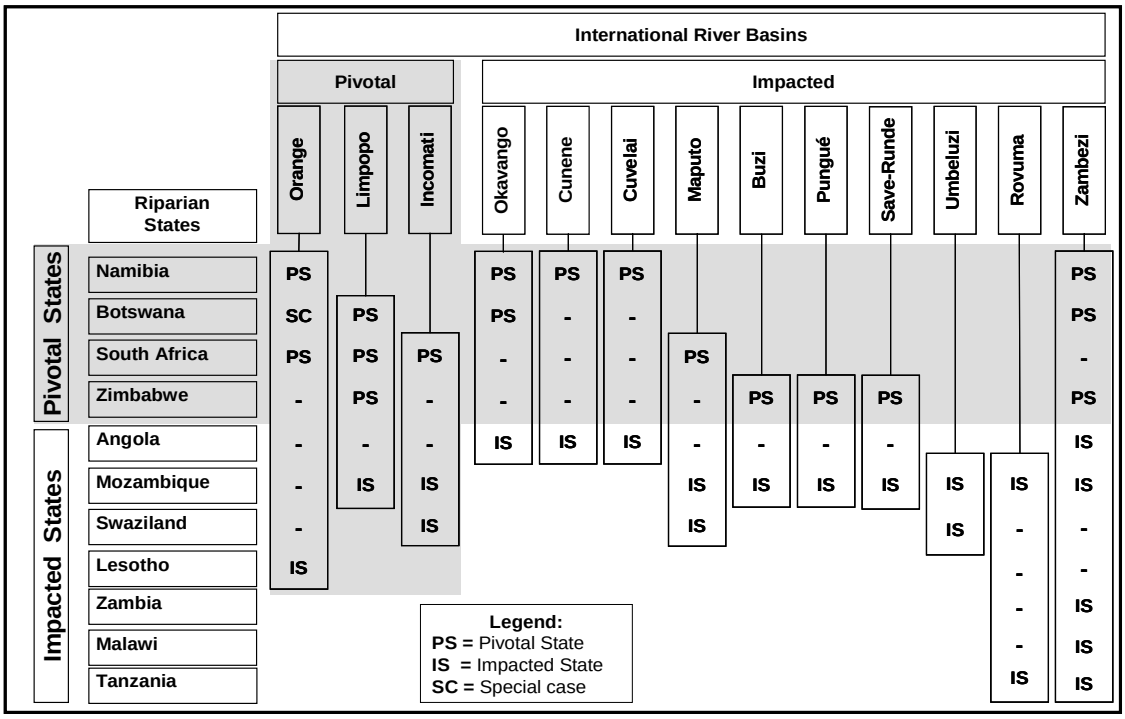


Figure 1. Structural configuration of the Southern African Hydropolitical Complex (Ashton & Turton, in press).

Returning now to the Basins at Risk that Wolf *et al.,* (2003:29) have identified (Table 1), an accurate assessment of the real state of affairs with respect to the status of international agreements, regimes and river basin organizations can be made. This will enable the reader to determine whether they are indeed at risk, or whether that label has been assigned to them merely because of the incomplete dataset used in the Basins at Risk project as designed by Yoffe *et al.,* (2003) and Wolf *et al.,* (2003).

The Incomati River: A Pivotal Basin in the SAHPC

The Incomati River is a Pivotal Basin with three riparian states. South Africa (a Pivotal State) is upstream, with a portion of one of the tributaries (the Komati) flowing through Swaziland (an Impacted State) and back again into South Africa, making the latter both an upstream and downstream riparian in the basin. The downstream riparian is Mozambique (an Impacted State). The basin is strategically important to South Africa because the energy-base of the country consists of coal-fired electricity generation, with most of the coal-fields located across the watershed in the Limpopo Basin. The Incomati and its various tributaries are thus a significant source of the water needed to convert coal into electricity. For this reason there are a number of transfers out of the basin. This can be regarded as being a form of resource capture. The basin is important for Swaziland because hydropower is generated at Maguga Dam on the Komati, and irrigated agriculture forms the foundation of the local economy. The Mozambique portion of the basin lies in a semi-arid area that supports the population around the capital city of Maputo.

The hydropolitics of the basin have been described in detail by a number of authors (Turton, 2004:273-274; Turton *et al.,* 2004:324-363; Turton & Earle, 2005:157-164;

Vas & Pereira, 1998; Vas, 1999) and space precludes a detailed analysis of these processes here. What is relevant however, is the evolution of water management regimes and river basin institutions over time, because it is the perceived absence of these that has labelled the basin to be "at risk". Table 1 shows seven different basin-specific regimes that have evolved over time. The foundation of this regime creation lies in an agreement that was entered into between South Africa and Portugal in 1926 (Ashton *et al.,* 2005; Turton *et al.,* 2004:387). This agreement, commonly known as the *First Use Agreement,* was actually about the management of the Cunene River, but it also included so-called rivers of mutual interest between South Africa and Portugal as the colonial power of the time, controlling both Angola and Mozambique. This fact is not evident in the Basins at Risk study, because the *First Use Agreement* is listed as being about the Cunene. In reality it is also about the Incomati and Limpopo, because it laid the foundation for all future cooperative arrangements in those basins as well.

In 1964 the so-called *Second Use Agreement* was reached between South Africa and Portugal (Ashton *et al.,* 2005; Turton *et al.,* 2004:387). As with the earlier agreement, it was applicable to the Cunene, Incomati and Limpopo, a fact that has escaped the attention of the Basins at Risk team. In 1967 Swaziland acceded to the *Second Use Agreement* (Turton, 2004:273), showing the significance of this historic evolution from the Cunene and so-called rivers of mutual interest, specifically to the Incomati. In 1983 the Tripartite Permanent Technical Committee (TPTC) became the first basin-wide regime in Southern Africa, applying to the Limpopo, the Incomati and the Maputo River basins. This did not function well, largely because of the Cold War that strained relations between South Africa and Mozambique (Vas & Pereira, 1998:119; Turton, 2004:273). As a direct result of this failure, a bilateral agreement was reached between Swaziland and Mozambique in 1991, called the Joint Permanent Technical Water Commission (JPTWC), but it did not function well (Turton, 2004:274). Two bilateral agreements were then negotiated between South Africa and Swaziland in 1992 (Turton, 2004:274; Turton *et al.,* 2004:388; Ashton *et al.,* 2005). The first established the Joint Water Commission (JWC1), and the second established the Komati Basin Water Authority (KOBWA). This was based on the successful model that had evolved from the Lesotho Highlands Water Project (LHWP) and is an example of Pike's Law at work. In 1996 a Joint Water Commission (JWC2) was established bilaterally between South Africa and Mozambique, to manage both the Incomati and the Limpopo Basins (Turton *et al.*, 2004:388; Ashton *et al.,* 2005)

With the cessation of hostilities associated with the demise of the Cold War, the civil war in Mozambique came to an end, and Apartheid collapsed in South Africa. This acted as a strong stimulus for the normalization of relations between all riparian states, which was done *via* the rejuvenation of the TPTC, being the first basin-wide regime to have been created in the region. This was brought to a successful conclusion when the *Incomaputo Agreement* was signed in 2002 (Ashton *et al.,* 2005; Turton *et al.,* 2004:389). This is a complex agreement recognizing the rights of all riparian states along with detailed water allocation and water quality formulae.

From this it is evident that no less than seven different regimes have existed in the Incomati River basin over time, not counting the smaller agreements that were negotiated in support of these agreements, and excluding the agreements that existed at a regional level, but were no less applicable. In the latter category we find the

Southern African Regional Commission for the Conservation and Utilization of the Soil (SARCCUS) that was signed in 1948 (Turton, 2004:268). This has ten standing committees, one of which deals with water (Ohlsson, 1995:60). The Southern African Development Community was established in 1992 when the *SADC Founding Protocol* (SADC FP) entered into force, after the collapse of the Cold War (Turton, 2004:264). This created a regional political framework through which all future inter-state relations will be structured. While this is not a water agreement, it is a profoundly important regime, because it creates the enabling environment through which all other interstate-relations are regulated, including water. It comes as no surprise therefore, that the very first issue-specific protocol to be signed after South Africa became a member of SADC, was the *SADC Water Protocol* (SADC WP), which was signed in Johannesburg in 1995 (Turton, 2004:264). The *SADC Protocol on Transport, Communications and Meteorology* (SADC TCM) was signed by twelve Member States in Maseru on 24 August 1996, establishing a regional cooperative framework for infrastructure and meteorological affairs. The Nkomati Peace Accords (NPA) were signed in 1984 between South Africa and Mozambique, in the hope that a non-aggression pact could form the foundation of inter-state relations during the years of intense military conflict (Turton, 2004:261). There are consequently at least four non-basin specific regimes that are applicable to the Incomati River Basin, as well as a non-aggression pact[20] that created an enabling environment for water resource management to be used as an instrument for peace.

In conclusion, the Incomati River Basin has at least seven basin-specific regimes, four non-basin specific regimes and one non-aggression pact. It also contains the first basin-wide regime ever created in the Southern African region, which was dysfunctional during the height of the hostilities associated with the Cold War, but which survived nonetheless, and is fully functional today. This comprehensive basin-wide agreement recognizes the right of all riparian states to specific volumes of water, elaborating water-sharing formulae, and specifying water quality standards. In short, the Incomati River Basin is not a Basin at Risk, because while there are high demands being placed on the resource-base, the institutions have survived during difficult years, and have shown a high level of resilience. The KOBWA agreement is a complex bilateral arrangement, with specific water allocation formulae, and it is nested[21] within the larger basin-wide arrangement known as the *Incomaputo Agreement*. The reason why these details evaded the Basin at Risk project, is probably because of the nuanced nature of the instruments, with earlier agreements on the Cunene becoming applicable to the Incomati. Another possible issue is the fact that the nomenclature used in some agreements differs, so the Incomati is also referred to as the Nkomati and Komati, being cultural nuances that would not be recognized by non-African researchers, and therefore result in them being filtered out of the dataset.

[20] The non-aggression pact became relevant in halting the further deterioration of relations between South Africa and Mozambique at the height of the Mozambican Civil War, leading immediately to an agreement on the Zambezi Basin (Turton, 2004:261-262), and subsequently to the revilitization of the *Incomaputo Agreement*.

[21] This is similar to the situation in the Orange River Basin where two bilateral arrangements are now falling under the coordination of a larger basin-wide regime.

The Cunene River: An Impacted Basin in the SAHPC

The Cunene River is a relatively uncomplicated basin. There are two riparian states - Angola (an Impacted State) upstream and Namibia (a Pivotal State) downstream - with the river forming a significant portion of the border between these two countries. The real significance of this basin lies in three specific issues. Firstly, it is one of the few that has actually seen military action[22], with attacks on hydraulic infrastructure forming a feature of the hydropolitical history of the basin (Photos 1, 2 & 4). Secondly, the basin is strategically important for the downstream country because of its hydro-power potential, and because it supports the people in central southern Angola and economic activity for a large portion of the Namibian population. Finally, the Cunene is a strategic donor for the adjacent Cuvelai basin, which is an ephemeral river system that supports a major part of the Namibian population and is thus of great political and social importance. It is therefore impossible to understand the Cuvelai without also appreciating its link to the Cunene. However, in terms of generally agreed practice in IWRM and the provisions of the *SADC Water Protocol*, a river basin should be managed as a unitary whole. In the case of the Cuvelai, negotiations are currently taking place between Angola and Namibia to establish a River Basin Commission in the Cuvelai. While there is a hydraulic connection between the two basins, the hydrology, socio-economic and environmental issues differ to such an extent, that they need to be managed by different entities capable of close liaison.

Photos 1 & 2. The Cunene River basin saw military action during the Namibian War of Independence, and the Angolan Civil War. The water transfer pipe from the Cunene to the Cuvelai system was bombed on occasion (left), necessitating protection by combat patrol in the Ruacana area (right).

Photo 1 shows battle damage to the Cunene-Cuvelai pipeline during the Namibian War of Independence, when it was bombed by Cuban pilots. The transfer pipeline was so important that it was buried in a minefield to the right of the road in Photo 2, which shows a helicopter gunship giving support to a ground-based combat patrol. The nature of the military action as it occurred in the Cunene and Cuvelai basins has been graphically documented by Hooper (1990), who describes the activities of a Special

[22] The other river basins that saw military action were the Cuvelai, the Okavango and the Zambezi. In the case of the latter, the Zambezi Basin was the home of the Angolan rebel movement UNITA, and it also saw a lot of action during the Rhodesian Bush War and the Mozambican War of Liberation.

Operations Unit called Koevoet[23] with a high degree of accuracy, albeit in dramatic fashion. The historic elements of these events have been covered by Turner (1998:34-55), specifically as they pertain to the Cunene region (Turner, 1998:39-45); and Steenkamp (1983) who gives precise detail of a number of operational actions in both the Cunene and Cuvelai basins. Specific detail of some of the operations around Ongiva (in the Cuvelai basin) and Xangongo (on the banks of the Cunene) are given by Steenkamp (1983:246). This suggests that the Cunene basin is a prime candidate for analysis of the propensity of a transboundary river to give rise to violent inter-state confrontation, because it was a theatre of both conventional and guerrilla war.

Photos 3, 4 & 5. Clearing land mines before advancing through Namacunde in the Cuvelai Basin (left), through Ongiva (centre) and on to Xangongo on the banks of the Cunene River (right).

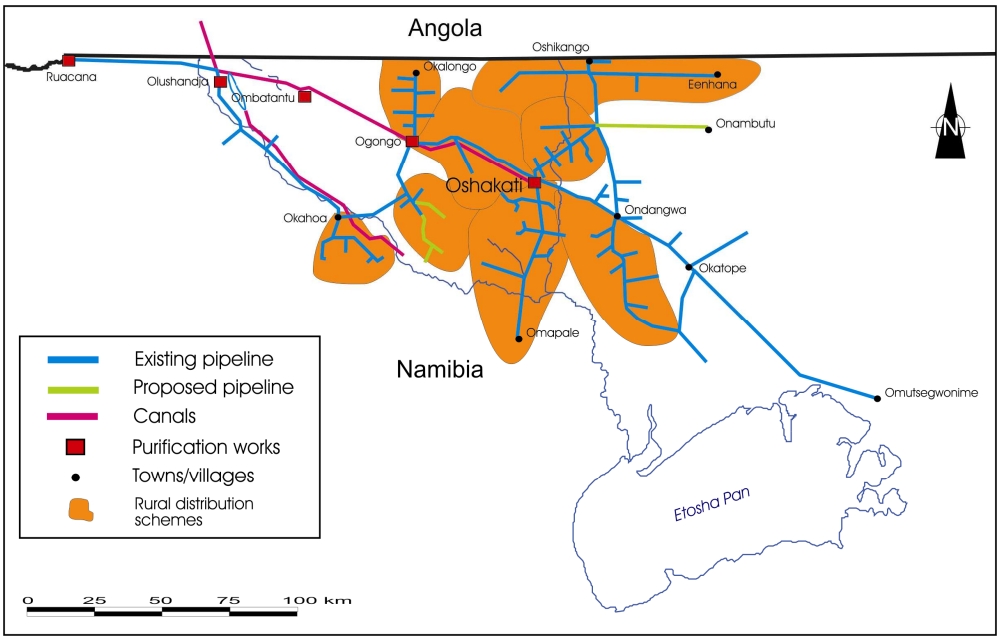
Photo 3 shows combat engineers sweeping for anti-tank mines before advancing through Namacunde in Angola. This also gives an idea of the relative flatness of the terrain in the Cuvelai basin. The town of Ongiva, formally known as Pereira d'Eça, was home to a large contingent of Angolan forces, so it was captured by South African soldiers on 26 August 1981 after two days of fighting during Operation Protea. This happened after the SADF knocked out the Angolan military base at Xangongo on 24 August 1981. In this action the water supply infrastructure at Ongiva was severely damaged (Photo 4). Significantly, the axis of advance during Operation Protea was the Cunene River, with one task force being deployed on each bank (Turner, 1998:40). After being captured, both Xangongo and Ongiva were held by the South Africans for many years, and used as forward operating bases for strikes deeper into Angola (Turner, 1998:41). A number of Russian T34[24] tanks were knocked-out in the process (Photo 5). These actions have tended to destroy the infrastructure in the entire Angolan reach of both the Cunene and the Cuvelai River basins, decimating the human population and destroying the economic viability of southern Angola. This places major emphasis on post conflict reconstruction, with water resource management as a substantial component of that initiative.

The hydropolitics of the basin has been described by a number of authors (Ashton, 2002; Heyns, 1996; Meissner, 2000:103-131; 2003:258-268; Turton, 2004:254-267) so additional analysis will not be done here due to space limitations. Table 1 shows

[23] The word "koevoet" means crowbar in Afrikaans. This was the name of a special operations counter-insurgency police unit. They saw extensive action along both sides of the border between Namibia and Angola, specifically in the Cunene and Cuvelai river basin areas. Koevoet operated up to Namacunde in Angola, mostly in a counter-insurgency role, with the South African Defense Force (SADF) operating from Namacunde northwards, mostly in a conventional role.

[24] The T34 tank was a World War II fighting vehicle, having seen action mainly along the Russian Front and in the Battle of Stalingrad. It was therefore a surplus tank based on old technology, with thousands having been sold into Africa during the Cold War period. Their shot-out hulks litter many an African landscape today.

five different basin-specific regimes that have evolved over time. As with the Incomati case noted above, the foundation of regime creation was the *First Use Agreement* between South Africa and Portugal, which was finalized in 1926 (Ashton *et al.*, 2005; Heyns, 1996:264; Turton, 2004:271; Turton *et al.*, 2004:387). This was followed in 1964 with what became known as the *Second Use Agreement* (Ashton *et al.*, 2005; Heyns, 1996:264; Turton *et al.*, 2004:387). Both of these agreements were specific to the Cunene, although they also dealt with other rivers of mutual interest between South Africa and Portugal. With the planned development of the hydropower capacity around Ruacana and Calueque, an agreement was reached between South Africa and Portugal in 1969 (*Third Use Agreement*) (Ashton *et al.*, 2005; Heyns, 1996:264), creating the Permanent Joint Technical Commission (PJTC) and the Joint Operating Authority (JOA). Engineering started on the Calueque Dam, the Ruacana hydropower scheme and the Cunene-Cuvelai inter-basin transfer, but this was disrupted at different times because of the war (Heyns, 1996:264) (see Photo 1). Regime development became stalled during the various wars[25] that occurred in the Cunene Basin, but immediately after hostilities had ended, the *Fourth Water Use Agreement* was reached between Angola and Namibia in 1990 that reinstated the Permanent Joint Technical Commission (PJTC), charged with the responsibility of managing *inter alia* the Epupa Dam hydropower scheme and the supply of water to northern Namibia (Heyns, 1995; 1996:264). At the same time another agreement was reached between the two riparian states that established the Joint Operating Authority (JOA), charged with the responsibility of managing the regulating structure at Gové Dam, and the Ruacana hydropower infrastructure (Heyns, 1995). Included in the ambit of the JOA is the repair to the Gové Dam arising from damage caused by military action.



Map 2. Detail of the Cunene-Cuvelai inter-basin transfer. The substantial hydraulic infrastructure in Namibia is now being linked back up to Angola *via* Santa Clara, Namacunde and Ongiva as part of post-conflict reconstruction. This will take Cunene water *via* the Cuvelai back into the Cunene Basin.

[25] These include the Namibian War of Liberation and the Angolan Civil War.

From this assessment it is evident that at least five regimes have existed in the Cunene River, excluding the non-basin-specific agreements, of which five exist. Four of these (SARCCUS, SADC FP, SADC WP & SADC TCM) have been described in the section on the Incomati. The fifth is the Angolan Namibian Joint Commission of Cooperation which was signed in 1990 (Heyns, 1995; Ohlsson, 1995:59). This is an enabling instrument that has a large number of functions, all of which are of a cooperative nature, one of which relates to water resource management.

Photos 6 & 7. Shared water resources will play a major role in developing both Angola and Namibia, particularly in the post-conflict reconstruction phase. The Cunene River flows over the Ruacana Falls (left) and makes its way down to the future site of the Epupa Falls Dam (right), where it is a linear oasis in the desert.

In conclusion the critical element in understanding the Cunene River basin is that even though it was a hot theatre of the Cold War, there was still a degree of cooperation between the Angolan and Namibian water resource managers throughout the conflict. It is also important to note that the conflict was about ideology and national liberation, but never about water. Where water infrastructure was damaged, it was because of the perceived tactical advantage that it yielded at the time. Water was therefore a target of war, but never a cause of it. The water management structures that have evolved are therefore resilient, and serve as the foundation for future post-conflict reconstruction and economic development. From this assessment it is evident that the Cunene River is not a Basin at Risk as defined by Wolf *et al.,* (2003:29), having five basin-level regimes and being supported by five other non-basin-specific regimes. It must be remembered that the Cunene is probably the most important single water resource for Namibia, given that there are no permanent flowing rivers on Namibian soil (other than a small reach of the Okavango and Zambezi to be described later), associated with the substantial human population that is supported by this resource. The Cunene at Ruacana Falls (Photo 6) is a source of electric power and an inter-basin transfer to the Cuvelai Basin, which has the densest human settlement of any river basins in Namibia. The Cuvelai is also an ephemeral river (Marsh & Seeley, 1992:5; Jacobson *et al.,* 1995; Heyns *et al.,* 1998:66; Seeley *et al.,* 2002:199) so the flow regime is highly erratic and the resource is therefore unreliable as a foundation for human security on its own. In the future the construction of the Epupa Dam (Photo 7) will become a source of hydrological security of great strategic significance to Namibia. This bears testimony to the conclusion by Gleditsch *et al.,* (2005) that a country with endemic water scarcity has a vested interest in developing water

management measures that avoid conflict. It is this rationale that is central to the logic of the SAHPC as an alternative reality to the Basins at Risk thesis.

The Limpopo River: A Pivotal Basin in the SAHPC

The Limpopo River Basin has four riparian states. Botswana, a Pivotal State, is upstream and is a very arid country. South Africa and Zimbabwe, both Pivotal States, are in the middle reaches of the basin with the border between them being formed by the main stem of the Limpopo River. Mozambique, an Impacted State, is the downstream riparian where the Limpopo meanders across a huge flood plain. There are no dams on the main stem of the river, so there has never been a need to jointly manage hydraulic infrastructure, but there is the possibility of future dams on a tributary that divides South Africa and Botswana. The basin is strategically important to each country for different reasons. For Botswana, it supports the bulk of the human population that live in a belt wedged between the Kalahari Desert and the narrow belt of better-watered land adjacent the South African border. For South Africa it sustains a lot of mining and agriculture, and it also forms a substantial ecological resource for the Kruger National Park. For Zimbabwe, it is the only reliable source of water other than the Zambezi, which for geological reasons is impossible to develop for irrigated agriculture. In Mozambique, it is the only reliable water in a very arid portion of the country with a large population density. The river basin is closed and the water has been over-allocated, so it is a Pivotal Basin in the SAHPC. There is no chance for substantial future development of the resources, although some dams are still being considered, so a major challenge in the basin relates to three major issues. Firstly, the need to re-allocate water out of the agricultural sector to the industrial sector (in order to maximize the development potential from a scarce resource) is a pressing and complex one. Secondly, water quality management is a growing concern, specifically as the result of non-point source pollution arising from mine closure, acid mine drainage and sewage effluent return flows. Finally, equity issues are of major concern, with a number of different dimensions to this problem. International equity relates to water sharing arrangements, specifically with Mozambique having been disadvantaged over time. Intergenerational equity relates to ecological flows through the Kruger Park. Racial equity issues are specific to South Africa, where historically disadvantaged farmers in particular, have the need for re-allocation and government support.

The hydropolitics have been described in detail by a number of authors (Mohammed, 2003; Vas & Pereira, 1998; Turton, 2004:271-272; Turton *et al.,* 2004:263-323; Turton & Earle, 2005:166-167). The evolution of water management regimes has been complex as shown in Table 1, with at least eight basin-specific regimes. As with the Incomati and Cunene River basins, regime creation started in 1926 with the *First Use Agreement* (Turton *et al.,* 2004:387; Ashton *et al.,* 2005). Following a similar trajectory to these other basins, the *Second Use Agreement* was signed in 1964. Evolving from these *Rivers of Mutual Interest Agreements* was the Massingir Dam Treaty that was signed in 1971 (Turton *et al.,* 2004:387; Ashton *et al.,* 2005), allowing the development of a dam downstream from the Kruger Park in Mozambique. In 1983 the Tripartite Permanent Technical Committee (TPTC) was established between South Africa, Swaziland and Mozambique, significantly leaving out Zimbabwe. The reason for this omission was Zimbabwe's refusal to join the Constellation of Southern

African States (CONSAS) that had been proposed by South Africa, as a non-aggression pact, based on regional economic development (Turton, 2004:259).

Zimbabwe became particularly belligerent towards South Africa in 1980, placing pressure on the so-called Front Line States to join forces in the struggle against colonialism, capitalism and racism, which they did by founding the Southern African Development Coordination Conference[26] (SADCC) (Bernstein & Strasburg, 1988: 11; Turton, 2004:259; Turton & Earle, 2005:162). A low intensity civil war in South Africa got under way as a direct result of this, with the first military attacks inside the country occurring after the announcement by the African National Congress (ANC) that it would intensify the armed struggle (Gutteridge, 1990:167). Guerrilla forces took hostages in what became known as the Silverton Bank Siege, an oil refinery was attacked with rocket propelled grenades (RPGs) and a train was derailed, each of which underlined the intention of the liberation movements to intensify the armed struggle inside South Africa (Gutteridge, 1981:8). As a direct result of these events, the first cross border military assault was launched by South African Special Forces in 1981, where they attacked a guerrilla base in Mozambique (Geldenhuys, 1984:140). A year later pre-emptive strikes were launched into Lesotho to clear out guerrilla forward bases (Gutteridge, 1983:35). In 1983 a massive car bomb was detonated outside Military Intelligence Head Quarters in Pretoria, taking the war right into the heart of the Limpopo River Basin (Turton, 2004:261). It was against this political background that the decision was taken not to involve Zimbabwe in the TPTC, which was designed to foster better relations with the other riparian states in an attempt to offer sufficient development inducement to them not to allow their territories to be used by guerrilla forces infiltrating into South Africa. This is why the Nkomati Peace Accords (NPA) were signed in 1984 (Turner, 1988:131-145), so that a non-aggression pact could form the foundation of inter-state relations in all fields of development, including water resource management (Turton, 2004:261).

As a result of the exclusion of Zimbabwe, the TPTC did not function very well, so applying Pike's Law to the problem, a bilateral regime was negotiated between South Africa and Botswana during 1983, giving rise to the Joint Permanent Technical Committee (JPTC) (Turton, 2004:272; Turton *et al.,* 2004; 387; Ashton *et al.,* 2005). This was followed in 1986 by the establishment of the Limpopo Basin Permanent Technical Committee (LBPTC) with all four riparian states as signatories (Turton, 2004:272; Turton *et al.,* 2004:388; Ashton *et al.,* 2005). Botswana was experiencing an acute water shortage in the capital Gaborone, so an agreement was reached in 1988 for the cross-border supply from the Molatedi Dam. This agreement has escaped the notice of most scholars, because it was negotiated at the height of Apartheid, and it involved the so-called independent Bantustan of Bophuthatswana. Given the strategic significance of water and the need to secure the supply, the Government of Botswana overcame the political dilemma of negotiating with a Bantustan, by having the agreement signed by their national water utility rather than by a Government Department (Turton *et al.,* 2004:320). The bilateral JPTC was upgraded to a full

[26] The SADCC is the fore-runner of the present-day Southern African Development Community (SADC), which had as its core objective, the isolation of South Africa and the prosecution of the various wars of liberation and independence that were then raging (Bernstein & Strasburg, 1988). The effect of this was to securitize water resource management in South Africa with all foreign relations falling under the ambit of the State Security Council (SSC) (Turton, 2004:260; Turton & Earle, 2005:163).

commission in 1989 (Turton *et al.*, 2004:388). Regime evolution was completed when in 2003, a basin-wide agreement was reached between all riparian states to establish the Limpopo Watercourse Commission (LWC) (Treaty, 2003).

From this it is evident that there are eight basin-specific regimes pertaining to the Limpopo River basin. In addition to this there are six non-basin specific regimes that are relevant to the Limpopo. The SARCCUS, SADC FP, SADC WP and SADC TCM have been described in the section on the Incomati River, so they will not be discussed further. The Nkomati Peace Accords (NPA) are also relevant to the Limpopo, because they created an enabling environment that eventually led to the normalization of relations between South Africa and Mozambique, and hence played a role in the evolution of the basin-wide LBPTC, and subsequent LWC over time. Hydropolitical scholars tend to ignore this fact by filtering out non-aggression pacts from datasets, on the pretext that they are not about water resource management. The bilateral agreement between South Africa and Botswana in 1997 that established the Joint Permanent Commission of Cooperation (JPCC) is also an enabling instrument, covering a range of issues from crime to migration, but significantly also including water resource management (Turton *et al.*, 2004:403). Based on this evidence it is clear that the Limpopo is not a Basin at Risk, having a number of regimes that have proven to be remarkably resilient over time. It must also be noted that the failure of the TPTC can be explained by the fact that it was a very ambitious agreement – in essence an agreement between three sovereign states to manage three different river basins (one of which had four riparians) – something that exceeds the norms of contemporary river basin regimes as determined by the Maryland School. Failure was therefore almost inevitable, simply because the scope of the intended regime was too large in the first place. It should therefore be seen as a learning curve experience, rather than a direct failure, remembering that river basin regimes are a relatively new phenomenon. Regime evolution in this case also provides evidence of Pike's Law at work, when bilateral arrangements are reached after the failure of more inclusive basin-wide agreements. Significantly however, this case also shows how basin-wide arrangements are negotiated once the political climate is conducive to a normalization of relations. Under those conditions the country that pulled out of the relationship for reasons of protest, usually returned in a significantly weaker position than before (Turton & Earle, 2005:167). There is consequently an important lesson to be learned from the Limpopo Basin as a result of these hydropolitical dynamics.

The Okavango/Makgadikgadi River: An Impacted Basin in the SAHPC

The Okavango River Basin has three riparian states, flowing from an area of high rainfall into the Kalahari Desert where the water is finally lost to evaporation in the Okavango Delta (Mendelsohn & el Obeid, 2004:63). Technically the Okavango is a sub-basin of the Makgadikgadi Basin of which the Nata River is also a component (Ashton & Neal, 2003:34). It is an endoreic system that does not flow into the sea, much like the Cuvelai Basin alongside it. Angola, an Impacted State, is upstream and is well-watered, having access to a number of large river basins for their own national development. In the middle reach of the system it becomes the only river[27] to flow across Namibian soil, which is does for a short distance as it crosses the entrance to

[27] The Kwando River is a tributary of the Zambezi and it also flows across the Caprivi Strip roughly parallel to the Kavango as the Okavango is locally known in Namibia. See Mendelsohn *et al.*, (2002:11) and Mendelsohn & el Obeid, (2004:9) for more detail.

the Caprivi Strip. This is the only well-watered part of Namibia, a Pivotal State, being the location of the Zambezi as well. Botswana, also a Pivotal State, is downstream with a large human population deriving livelihoods from the resource-flows associated with the Okavango Delta. The Okavango Delta is created because of tectonic activity, with fault lines that are associated with the Great Rift Valley of Africa forming the distil end (McCarthy & Ellery, 1993). There is a hydraulic connection to the Zambezi River *via* the Selinda Spillway, which flows in periods of extremely high flood on the Zambezi and back-floods into the Okavango (Davies *et al.,* 1993:94). On occasion the Okavango Delta floods over the Tamalakane fault line *via* the Boteti River into the Makgadikgadi Salt Pans, which are also fed by the Nata River that comes into Botswana from Zimbabwe. Therefore depending on how one defines the overall river basin, there are either three or four riparian states.

The basin is strategically important to each of the riparians for different reasons. For Angola, it represents a potential hydropower and irrigation resource for the post-conflict reconstruction of an area that was devastated by the Angolan Civil War and Namibian War of Liberation. For Namibia it represents the second most important river basin (after the Cunene), with planning for the use of the resource as a strategic back-up, thereby allowing the dams in other parts of the Eastern National Water Carrier (ENWC) system to be drawn down to lower levels. This is important because of the high evaporative losses in Namibia, so a strategic reserve like the Okavango will enable Namibia to make better use of its existing resources, secure in the knowledge that during times of drought, there will be a reliable back-up. Planning underway will develop a pipeline from Rundu at the entrance to the Caprivi Strip, to join with the existing ENWC, finally delivering the water into the reticulation system that supports the capital city, Windhoek. Research is ongoing regarding the possible use of confined aquifer systems for the storage of this water, in order to conserve as much of the resource possible from evaporative losses. For Botswana, it represents a substantial resource for rural livelihood support, as well as the generation of foreign currency through ecotourism. Botswana has previously tried to use the resource for mining, but this was vigorously opposed (Scudder *et al.,* 1993). If Botswana does develop the resource then it opens the door to Namibian plans, so there is somewhat of a checkmate situation prevailing. Public pressure is high and Namibia is seen to be the bad neighbour that wishes to dry up the Delta (Jenvey, 1997; Mkone, 1997; Ramberg, 1997; Weekly Mail & Guardian, 1996a; 1996b). This rhetoric is devoid of any truth and the Namibian Government is known to be responsible, with a track record of cooperation throughout its short[28] but stable existence.

The hydropolitics of the basin have been described by a number of authors (Ashton, 2000a; 2002; 2003; Ashton & Neal, 2003; Turton *et al.,* 2003). A significant feature of the basin is that it is internationalized in the sense that there is a global stakeholder in the form of the environmental movement that will not allow the Okavango Delta to be harmed in any way (Scudder, 1990; Scudder *et al.,* 1993), even though the best available scientific research has shown that the proposed pipeline in Namibia will have an impact so small that currently available technology will be unable to measure it (Ashton, 2000b; CSIR, 1997: I-15). The basin was also the scene of intense fighting during the Namibian War of Liberation and the Angolan Civil War.

[28] Namibia became independent on 21 March 1990 when UN Resolution 435 was implemented.

Major fighting took place around Caiundo during Operation Askari on 3-6 January 1984, when the FAPLA[29] 11'th Brigade, with support from Cuban troops, attacked an SADF task force moving north-east of Cuvelai (Turner, 1998:44). There was a fierce battle and the attackers were driven northwards in disarray. After this the territory fell under alternative control, oscillating between UNITA[30] and FAPLA. Fighting between August 1987 and July 1988 was heavy, being seen by some commentators as the climax of the Cold War in the region (Turner, 1998:115). During the course of fighting in Cuanda Cubango and Moxico provinces, FAPLA suffered one of the largest defeats to befall any army since the Second World War (Turner, 1998:115). Operation Modular began modestly, as UNITA, with the support of the South Africans, began to harass FAPLA forces along the Lomba River. South African mechanized units became fully engaged, leading to a major battle on 3-4 October 1987. This was followed by the FAPLA withdrawal to Cuito Cuanavale, where the final battle of the war took place after Operations Hooper and Packer softened the target. The existence of heavy armour in the form of Russian T54/55 tanks[31] is significant (Photo 1), as this represented a substantially stronger and more modern force than was present in the Cunene and Cuvelai Basins (Xangongo and Ongiva)(Photos 5). This drew in South African heavy armour, with the loss of three Olifant main battle tanks, when they got bogged down in a minefield around Cuito Cuanavale and drew heavy fire. This was the final battle of the war, with the Cubans losing the will to fight, and with the South Africans seeing the chance for genuine peace as a result of secret negotiations[32] between a Special Operations Unit of the National Intelligence Service (NIS) and Mr. Nelson Mandela. Both sides claim victory, but in truth the war was a dirty affair, with no clear victor in the professional opinion of the author, himself a veteran. When the author returned to the scene some years later, he counted no less than 100 tanks and their support vehicles on the Caiundo-Menongue road alone, all of which lay destroyed, either from aerial strafing, or through close combat when they become bogged down in minefields. As with the Cunene and Cuvelai basins, the Okavango saw heavy fighting with substantial loss of life and the total destruction of all infrastructure. There are many minefields throughout the basin, most of which are unmapped. There is consequently a major role to play in post conflict reconstruction, with water resource management being a key instrument for the return to reasonable levels of household food security.

[31] Unlike the T34, the T54/55 was a formidable fighting vehicle. It had been developed by Russia as the main battle tank during the early part of the Cold War, so it contained sophisticated armour and technology.

[32] This has been documented in **Turton**, **A.R.,** (2004), An Untold Story: The Private Memoirs of Anthony Richard Turton., Unpublished Manuscript. Many of the photos in this chapter have also been sourced from this manuscript.

Photos 8 & 9. The Okavango River Basin was the theatre of war and has been devastated as a result. A Russian T54/55 tank lies destroyed in a minefield near Caiundo (left) while the people of Menongue are forced to draw water daily after negotiating a minefield (right). Post-conflict reconstruction is a major priority.

The number of regimes in the basin is presented in Table 1. As with the Incomati, Cunene and Limpopo River basin's noted above, regime creation started with the *First Use Agreement* in 1926 (Ashton *et al.*, 2005; Heyns, 1996:263; Turton *et al.*, 2004: 387). This was followed in 1964 with the *Second Use Agreement* (Ashton *et al.*, 2005; Heyns, 1996:264; Turton *et al.*, 2004:387). This facilitated contact between the Angolan and Namibian authorities, although the latter were at that time South African citizens, because Namibia was being administered as a *de facto* province of South Africa under United Nations mandate. Regime creation stalled from 1969 to 1990 because of the Namibian War of Liberation and the Angolan Civil War, during which time hydraulic installations became the target for military forces (Turton, 2004:276). Again Pike's Law came into play during 1990 when a bilateral agreement was signed between Botswana and Namibia that established the Joint Permanent Water Commission (JPWC) for the management of both the Okavango and the Chobe-Linyanti-Zambezi transboundary aquatic ecosystems (Turton, 2004:26). This is one of the few river management regimes that has groundwater management as a component to it. As hostilities receded, a bilateral agreement was reached between Angola and Namibia, endorsing the *Third Water Use Agreement* that was reached between the former colonial powers in 1969, creating the PJTC (Turton, 2004:276). As the Cold War ended, the political processes started to normalize, and South Africa gave Namibia its independence. This led to the negotiation of the Permanent Okavango River Basin Water Commission (OKACOM) being created in 1994 (Turton, 2004:277). It is significant that this happened shortly after Namibia gained its independence, lending credence to the finding by Gleditsch *et al.*, (2005) that water scarce states have substantial long-term incentives to develop water management measures that avoid conflict. It also happened at a time when the Kasikili/Sedudu Island dispute was referred to the International Court of Justice (ICJ) for a ruling, thereby settling the issue in a peaceful manner (Ashton, 2000a:96-98; 2002).

Consequently there are five basin-specific regimes at work within the Okavango River basin. These are supported by five non-basin specific regimes, all of which have been described already (SARCCUS, SADC FP, SADC WP, SADC TCM & ANJCC). Based on the balance of evidence presented, it seems that the Okavango River basin is not really a Basin at Risk, having been defined as such by Wolf *et al.*, (2003:29) because of incomplete datasets and a lack of the nuanced understanding of the detailed hydropolitical history of the region.

The Orange River: A Pivotal Basin in the SAHPC

The Orange River is a complex basin. Unlike many of the other Basins at Risk, there has never been any prolonged military conflict in the Orange Basin. Where it has

existed it has been short, sharp and focussed, always conducted by Special Forces with surgical precision. The upper riparian is Lesotho (an Impacted State) with a high economic reliance on South Africa. The other three riparians are all Pivotal States. The hydropolitical configuration has all three Pivotal States in downstream positions with a ratio between Pivotal States to Impacted States of 3:1, making it somewhat unique[33] in the context of the SAHPC. South Africa has a high economic dependence on the Orange, with a staggering 100% of the gross geographic product (GGP) of Gauteng Province being dependent on inter-basin transfers involving the Orange system (Basson *et al.,* 1997:55). Namibia is the downstream riparian with a high reliance on the Orange for economic activity in the southern portions of that country. Botswana is an interesting case, because it contributes no stream-flow and uses none of the surface water in the basin, but it is riparian because of the ephemeral Nossob and Molopo Rivers, both of which form the border with South Africa, neither of which have made a hydraulic contribution to the Orange in living memory. Botswana has made use of its legal rights to engage in all activities of a "normal" riparian state, and by so doing has opened the door to future water supply from the Lesotho Highlands Water Project (LHWP), which is technically feasible but probably too expensive to be realistic at this time. Nonetheless, Botswana now plays an important role in decisions around the management of the basin, wielding hydropolitical power beyond its own expectations, because of the change in dynamics that it can create by voting either one way or another. It is for this reason that the details of the Zambezi River, to be explained in the next section, are so critically important within the overall framework of the SAHPC. The Orange River is best understood in terms of six strategic issues. The first relates to the high reliance on the resource for two of the Pivotal States in the SAHPC (South Africa and Namibia). The second relates to the complexity associated with water allocation away from the agricultural sector to industry and the services sector. The third relates to the deteriorating water quality, specifically associated with managing a closed river basin, where base flow in years of drought is adversely affected by effluent return flows and specific pollution arising from acid mine drainage. The fourth relates to good neighbourliness, as enshrined in the *South African National Water Act*, which stipulates that minimum ecological flows and volumes agreed to in specific water sharing regimes must be adhered to. At the heart of this issue is the emotive aspect of balancing resource protection with resource use. The fifth relates to inter-basin transfers, which is a central feature of the Orange River system. Finally, the Orange River forms a border between Namibia and South Africa. This border is being disputed (Meissner, 2001), making the Orange River an excellent case for an empirical study of how water resource managers deal with sovereignty issues that are typically conflict-drivers.

[33] The PS:IS ratios in the rest of the so-called Basins at Risk are as follows: Incomati (1:2); Cunene (1:1); Limpopo (3:1) – similar to the Orange but the location of the Pivotal States is different (all three being upstream in the Limpopo); Okavango (2:1); Orange (3:1); and Zambezi (3:5). The PS:IS ratio is a very crude indicator, but it does give some insight into possible negotiation strategies and hence the prognosis for future conflict preventing regimes. For example, where a PS is downstream of a significant resource, it is likely to tie in the upstream neighbour by means of a regime. Where a PS is upstream, it is more likely to favour unilateral development of a significant resource, or where an agreement is needed, then it is likely to favour a bilateral arrangement. Where a number of PS's are clustered together, they are likely to form a coalition and negotiate a solution that favours their joint positions, because they all have a vested interest in a cooperative arrangement. These nuances are possible to assess in the context of the SAHPC, but are not possible to detect if an analysis focuses only on the river basin as the unit of analysis, even when basins are compared to each other.

The hydropolitics of the basin have been described in detail by a number of authors (Ashton, 200a; 2002; Blanchon, 2001; Turton, 2003c:136-163; Turton, 2004:267-271; Turton & Earle, 2005:165-166; Turton *et al.,* 2004:88-262) and space precludes a more detailed analysis here. Regarding regime creation, the basin history starts in 1948 with SARCCUS. The first major inter-basin transfer was developed in response to the Sharpeville Massacre, taking water from the Orange River, *via* the Fish River to the Sundays River (Turton *et al.,* 2004:183-188). This is the birth of the aggressive phase of the South African hydraulic mission, creating the mindset that water security was essential for future economic growth and political stability. In 1978 the Joint Technical Committee (JTC) was created to investigate the feasibility of what was later to become the Lesotho Highlands Water Project (LHWP) (Turton, 2004:268). This led to the signing of the LHWP Agreement in 1986, which created the Joint Permanent Technical Commission (JPTC), the Lesotho Highlands Development Authority (LHDA) and the Trans-Caledon Tunnel Authority (TCTA) (Turton, 2004:269). Various new agreements were signed, each dealing with specific issues as they arose, during the different evolutions of the LHWP. Details of these are excluded from this analysis for brevity (see Ashton, 2005; Turton *et al.,* 2004:241 and Turton, 2004:269). In 1999, the JPTC was upgraded to the Lesotho Highlands Water Commission (LHWC).

As the Cold War ground to an end and South Africa could disengage itself from the various regional wars of liberation, the independence of Namibia became a reality. As a result the Permanent Water Commission (PWC) was established in 1999 between South Africa and Namibia. At the same time the Vioolsdrift and Noordoewer Joint Irrigation Scheme (VNJIS) was developed. This scheme is interesting because the feed canal crosses the border between South Africa and Namibia, largely because of geophysical reasons, but this means that one canal feeds both countries, so there can never be a situation such as that which exists between India and Pakistan. The Joint Irrigation Authority (JIA) was established to manage this scheme. As soon as Namibia became independent, negotiations were started on the establishment of the Orange-Senqu River Commission (ORASECOM), which came to fruition in 2000. This became the first basin-wide regime to be established in terms of the SADC WP, but the fourth to be established in Southern Africa (Turton, 2004:270).

From this it is evident that nine different regimes have evolved over time. While the initial focus was on bilateral arrangements between South Africa as the regional hegemon, and the other riparian state, a basin-wide regime was negotiated with relative ease when the circumstances were right. The two bilateral agreements both have complex water sharing formulae, and the LHWP agreements eventually formed the foundation on which KOBWA, PWC and the Incomaputo Agreement's were based. This shows evidence of cascading from basin to basin, contrary to the finding by Conca (2006:106). In addition to this, there are four non-basin specific regimes – SARCCUS, SADC FP, SADC WP & SADC TCM – each of which have already been describe elsewhere in this chapter.

In conclusion, the Orange River basin is the most stable international river basin in the entire SADC region, with the highest number of basin-specific regimes. It has the most sophisticated water resource management structures and the underlying agreements that have evolved over time, have shown a deepening in complexity, to the point where they have become the foundation for subsequent agreements in other

of the so-called Basins at Risk. The finding by Wolf *et al.*, (2003:29) simply does not stand up to scrutiny in the light of real facts. More significantly, the Orange River case provides some of the best evidence in support of the SAHPC, because of the activities of Botswana, specifically in linking the Orange issue to the Zambezi *problematique* as discussed in the next section.

The Zambezi River: An Impacted Basin in the SAHPC

The Zambezi River basin is the most complex of all the Basins at Risk, given the sheer number of riparian states. With eight riparians, three are Pivotal States (Zimbabwe, Namibia and Botswana), while the rest are Impacted States (Angola, Zambia, Malawi, Tanzania and Mozambique). It has a hydropolitical configuration of three Pivotal States in the middle reaches of the river, and five Impacted States in both an upstream and downstream location. With the large number of riparian states, it is a classic example of the likelihood of Pike's Law to be at work, given the inherent complexity of reaching consensus between so many different sovereign states, each with different levels of development and each with possibly opposing perceptions of their respective national interest (to use a Realism focus).

The Zambezi basin has been the location of military conflict during the Cold War period. In Angola, the rebel UNITA movement had its headquarters at Jamba, between the Cuito River (a tributary of the Okavango) and the Cuando River (a tributary of the Zambezi). There was consequently a lot of heavy fighting in that area, with many minefields still in existence. Further downstream, the Zambezi Valley formed a theatre for the guerrilla activities associated with the Rhodesian Bush War[34]. The fighting here consisted mostly of small skirmishes with guerrilla forces as they infiltrated from Zambia. Two specific incidents of note took place that can illustrate to the reader the type of warfare that was being conducted in the then Rhodesian reach of the Zambezi Valley. Guerrilla forces operating inside present day Zimbabwe used shoulder-fired SAM 7 surface to air missiles to bring down two commercial airliners. The first attack occurred on 3 September 1978 when Air Rhodesia Flight RH 825 was shot down *en route* to the capital city from Kariba (Stiff, 1985:215-217; Turner, 1998:27). Of the original forty-eight civilian passengers on board, eighteen survived the subsequent crash, but guerrilla forces were waiting on the ground and ten of these survivors were bayoneted to death (Reid-Daly, 1982:346-347). The second attack occurred in 1979 where all fifty-nine passengers were killed when the SAM 7 rocket hit the aircraft in flight. The conflict in Rhodesia was thus a dirty war with emphasis on Counter Insurgency operations in which Special Forces were mostly used. Atrocities were committed on both sides (Frederikse, 1982:119-147), with a strong undercurrent of terrorist-styled actions against non-combatants, such as the downing of the two civilian airliners in an act similar to the Lockerbie air disaster.

Similarly, the rebel RENAMO[35] movement in Mozambique was based around Meringue, with heavy fighting in the Zambezi basin area. It was here that the war was

[34] For a description of some of the combat in the Zambezi Valley, see Reid-Daly (1982) and Stiff, (1985). This gives some insight into the government Special Forces side of the Rhodesian Bush War, but these perspectives are not balanced and are likely to be contested by guerrilla veterans. It gives an insight into the mindset of the time however. For an alternative view see Frederikse (1982).

[35] The acronym for the Resistencia Nacional de Moçambique (National Resistance Movement of Mozambique).

probably the most protracted and intense. The Beira Corridor, a vital life-line for land-locked Zimbabwe, was threatened by RENAMO forces, prompting the Zimbabwe Government to commit troops to the defence of this infrastructure on 31 May 1982. This deployment did not meet its tactical objective as RENAMO expanded its base of operations in Tete and Zambezia Provinces. In January 1983, a RENAMO spokesman claimed that during the previous year, 1,582 actions had been engaged in, with 123 acts of railway sabotage having been initiated, resulting in the destruction of fifty-seven trains. Furthermore, the communiqué stated that 1,521 soldiers of the Mozambique Armed Forces (FAM) had been killed. At that time RENAMO had around 6,000 trained fighters in Mozambique, with new operational initiatives expanding their area of operations out of the Zambezi basin into the Limpopo. FAM launched a counter-offensive in 1983 under the official name of "The 50'th Birthday of President Samora Machel", but was only able to claim 318 RENAMO killed, with 102 captured. By the winter of 1984, the Mozambique Government decided to open serious negotiations with the South African Government, designed to stop support of the latter for the RENAMO forces. This is the background to the Nkomati Peace Accords (NPA) that were signed in 1984 (Turner, 1998:131-145). From this it is evident that the armed conflict in the Zambezi basin was mostly of a guerrilla and counter insurgency nature, with few of the conventional battles that were typical of the Cunene/Cuvelai and Okavango basins. The type of terrain dictated the battle plan, with RENAMO forces controlling the ground while government forces controlled the air. Photo 10 shows a small team of RENAMO soldiers crossing a river in a rudimentary boat, while Photo 11 shows a small team of South African Special Operations personnel navigating through the thick bush around Meringue.

Photos 10 & 11. RENAMO operations in the Zambezi Basin used rivers in the absence of roads (left), which were at best tracks in the dense bush (right). All bridges and conventional roads were mined and regularly ambushed.

The hydropolitics of the basin have never been described accurately in great detail, but some authors have covered aspects of the core drivers at work (Bannink, 1996; Borchert, 1987; Borchert & Kemp, 1997; Dale, 1992; Matiza *et al.*, 1995; Maluwa, 1992; Mpande & Tawanda, 1996; Nakayama, 2003:101-113; Tumbare, 1997; Turton, 1998; Wellington, 1949; Williams, 1986). Regime creation in the basin dates back to the construction of the Kariba Dam in the 1960's, with the negotiation of the Zambezi River Authority (ZRA) for the sole purpose of managing the hydropower associated with the project. The ZRA is a bilateral arrangement between Zimbabwe and Zambia and it has a limited mandate. In the 1980's there was considerable foreign donor

interest in the basin, and an initiative was launched to establish a basin-wide commission. Given the name of Zambezi Action Plan (ZACPLAN), agreement was reached between the riparian states on the need for such an approach (Nakayama, 2003:101), but this was largely a donor-driven initiative. One of the positive spin-offs from ZACPLAN was the drafting of the *SADC Water Protocol* (Ramoeli, 2002:105), which the riparian states felt would be necessary to support the Zambezi Water Commission (ZAMCOM) when it would eventually be established. Agreement on the establishment of ZAMCOM has been reached between all riparian states, with seven of these signing the treaty on 13 July 2004 at Kasane in Botswana (Treaty, 2004). The eighth riparian state has committed themselves to the agreement, but needs time for additional internal consultations. The ZAMCOM treaty will enter into force when two-thirds of the signatory states have ratified the agreement through their respective parliamentary systems. This is set to occur by the end of 2005. Before the ZAMCOM Agreement comes into force, the provisions of the SADC WP act as a surrogate basin-wide agreement.

There are also a number of regimes that foster cooperation between the various riparian states outside of the immediate ZAMCOM configuration. There is SARCCUS, SADC FP, SADC WP and the SADC TCM described in the Incomati Basin section of this chapter. In addition to these, there is the ANJCC that fosters cooperation between the Angolan and Namibian Governments in the field of water resource management. The Joint Commission of Cooperation (JCC) between Malawi and Tanzania; the Permanent Commission of Cooperation (PCC) between Malawi and Zambia; the Permanent Joint Commission of Cooperation (PJCC) between Malawi and Mozambique; the Joint Permanent Water Commission (JPWC) between Botswana and Namibia; and the Permanent Joint Technical Commission (PJTC) between Angola and Namibia; all act in a similar way, by bringing together commissioners from the various countries, but in smaller groups where it is easier to gain consensus (with Pike's Law in mind). The NPA also played a role, when it was linked to the revitalization of the Cahora Bassa Project, within weeks after South Africa and Mozambique having agreed to the non-aggression pact (Turton, 2004:262). This is not listed in Table 1 because South Africa is not a riparian to the Zambezi.

An interesting aspect of the Zambezi basin relates to the river as a component of the SAHPC. The Zambezi River has three of the four Pivotal States as riparian (Botswana, Namibia and Zimbabwe). All three of these have a pressing need to secure water from the Zambezi in future, but there are subtle complications in each case. Zimbabwe has major water needs, but the Zambezi Valley is so steep and high that the cost of pumping water out of the river makes it prohibitive (Turton, 1998:227-230). This is one of the reasons why the Batoka Gorge Dam was mooted – by reducing the pumping head and by generating surplus electricity – it could allow for Zimbabwean use of the resource. Zambia does not want to support the plan however, and given the current state of the Zimbabwean economy, the Government is unlikely to be able to mobilize the money needed for the project. Namibia has a pressing need for improved assurance of supply in the Windhoek area. This is why the Namibian Government has announced its intention of building a pipeline from the Okavango River. This is being opposed on environmental grounds, much the same as the Botswana Government plans to use Okavango water for the Orapa Diamond mine were opposed (Scudder *et al.,* 1993). This is causing Namibia to look to the Zambezi for solutions. The one remedy is to build an inter-basin transfer from the Zambezi into

the upper reaches of the Okavango (Heyns, 2002:166), thereby creating a surplus for Namibia to use downstream, theoretically without reducing the base flow to the delta. Botswana has a similar problem, but for different reasons. The Botswana energy-base is derived from coal, but there is not enough water to generate sufficient steam. It cannot use Okavango water because such actions were vigorously blocked before by international environmentalists (Scudder *et al.,* 1993). This leaves only the Zambezi open as an option, but here there are problems. Both Namibia and Botswana have only a very small frontage onto the Zambezi River, in an area where the geology precludes dam construction. The only option open is to develop a cooperative basis for the use of the Zambezi, and then to develop a communal pipeline that serves the interests of various stakeholders. Such a pipeline has been mooted by the Botswana Government (Heyns, 2002:167), taking water from the Zambezi at a point where Namibia could also be serviced, then delivering water to Bulawayo in Zimbabwe, *via* Francistown in Botswana, where it would connect to the existing North-South Carrier at Selibe Phikwe, for onward delivery to the capital city, Gaborone.

This is an ambitious plan, that would cost a lot of money, but it is a plan that has a viable future because it looks after the strategic interests of the three Pivotal States in the Zambezi basin. What is really significant about this plan however, is the way that the Botswana Government has shown that water could also be delivered to Pretoria in South Africa through the same system (Heyns, 2002:167). This is a tantalizing dangle for the South African Government, whose possible involvement in such an ambitious plan would ensure the economic feasibility by increasing the throughput of the system, and by increasing the investment-base of the project. South Africa has been interested in the Zambezi River as a strategic supply of water in the past (Borchert, 1987; Borchert & Kemp, 1985; Davies *et al.*, 1993:143; Scudder *et al.*, 1993:263; Turton, 2004:259), with some detailed planning having been done (MacDonald *et al.*, 1990:2-10; Turton, 1998:231). The Post-Apartheid Government no longer harbours such aspirations, either in private, or in official policy documents. Seen in this light however, the strategic interests of the four Pivotal States in the SAHPC could be met, to the mutual benefit of all, including the Impacted States that lack the financial capacity to raise the funds to develop the necessary infrastructure. This is one of the key reasons why the existence of a Hydropolitical Complex in Southern Africa is so important, because it enables strategic trade-offs to be made at a level other than the river basin.

Another indication of inter-state relations over water has been provided in the Zambezi basin. The Kasikili/Sedudu Island is in the Chobe River, a tributary of the Zambezi, on the border between Namibia and Botswana (Ashton, 2000a:96-98). When Namibia became independent, a dispute arose over sovereignty of this small island. Tension rose when a flag was erected on the island, prompting a response. This came in the form of an agreement to refer the matter to the ICJ at The Hague. The ICJ finally ruled in favour of Botswana, thereby settling the dispute in an amicable way. From this it is evident that the favoured channel for dispute resolution, at least between some of the Zambezi riparian states, is by recourse to legal processes.

In conclusion, the Zambezi basin has one functioning bilateral regime (ZRA), with a basin-wide agreement that is about to launch ZAMCOM. This commission does not yet exist formally, but the treaty has already been signed by seven of the eight riparians, is awaiting the ratification process, and should enter into force by the end of

2005. This is the result of decades of work under ZACPLAN. Compensating for the absence of a basin-wide regime is the existence of a large number of non-basin specific arrangements – ten in all – which is the highest number in this category of any of the so-called Basins at Risk (see Table 1). While it could be called a Basin at Risk by virtue of the absence of a dedicated river basin institution, the existence of the *SADC Water Protocol* can be regarded as a surrogate regime, because it provides the necessary legal framework. Significantly however, the Zambezi Basin has the largest number on non-basin specific regimes in place (Table 1), and it also gives empirical evidence of the peaceful resolution of disputes by means of recourse to the ICJ. This trend should also be interpreted against the background of the global norm, with a direct relationship known to exist between the number of riparian states and the likelihood of a multilateral regime. Very few international rivers with eight riparian states have negotiated a functioning basin-wide regime, so the absence of such an institution does not mean that the basin is automatically at risk. On the contrary, the fact that negotiations have taken so long, suggests that the riparian states are taking the process very seriously indeed – an interpretation supported by the fact that the *SADC Water Protocol* was spawned from the ZACPLAN deliberations.

Conclusion

The six Southern African Basins at Risk are valuable to study, because half of them have been theatres of both conventional and guerrilla war, thereby creating a starkly polarized background against which water resource management was practiced. Notwithstanding the depth of armed conflict, at no time did the war ever focus on water as a causal factor, and in all cases the water management institutions proved robust enough to withstand the rigours of protracted military conflict. This provides strong support to the Oslo School's finding that where endemic water scarcity occurs in international river basins, there are substantial long-term incentives for the investment in water management measures to avoid conflictual outcomes (Gleditsch *et al.*, 2005). The water governance structures and management institutions are robust in Southern Africa, only because water is so important for each riparian state. Too important to fight over, to the extent that water agreements are significant enough to be considered as drivers of international relations in their own right, leading to the conclusion that a Hydropolitical Complex exists in Southern Africa. This is a distinct component of the Regional Security Complex that was originally defined by Buzan (1991:210). The Oregon School's Basins at Risk conclusion simply does not measure up to informed scrutiny from the real world. This raises a number of questions about methodological and epistemological issues when it comes to the type of empirical studies being conducted by the Oregon, Maryland and Oslo School's.

There is strong evidence in the SAHPC that regimes are cumulative in nature, but the analysis in this chapter is methodologically incapable of refuting Conca's (2006:106) finding that regimes are not emerging *via* a basin-cumulative path. It does seem probable however, that the dataset used to achieve that result, might have been too small to generate truly conclusive findings. What is more significant is the finding by Conca (2006:109) that bilateral regimes were more common in river basins with three or more riparian states, by a ratio of 2:1. This is evidence of Pike's Law in action. It is also very significant when one notes that in six of the so-called Basins at Risk, basin-wide regimes exist in all cases except the Zambezi, which is an extremely complex basin given the large number of riparian states. This includes the three basins in which

armed conflict was endemic for substantial parts of the Cold War – the Cunene/Cuvelai, Okavango and parts of the Zambezi. While no multilateral basin-wide agreement exists in the Zambezi yet, there are a number of bilateral arrangements between riparians in other basins, and the basin-wide *ZAMCOM Agreement* is expected to enter into force before the end of 2005. The *SADC Water Protocol* can also be regarded as being a surrogate regime in the case of the Zambezi, mitigating against conflict potential and providing the necessary legal recourse when needed. As such the case of the SAHPC goes contrary to the global trend in the evolution of river management regimes.

With respect to internationalized basins and conflict potential, the SAHPC case is interesting, because it shows no propensity towards conflict as the colonial overlay was removed. In fact the opposite holds true. As overlay was removed, so too was the external support to the various wars of liberation and civil wars. One explanation is that the *SADC Water Protocol* came into play so soon after the ending of the Cold War, that it acted as a regime of sufficient robustness to withstand the rigours of national liberation and independence. Another explanation is that the Cold War rivals were the main protagonists in the various local conflicts, so once the Cold War ended, so too did the external support for the various surrogate militarized political groupings. The coincidence of the outbreak of peace in the Southern African region and the demise of the Cold War is too stark to be dismissed as being merely coincidental. These nuanced facts have not been captured in any of the literature, which is one of the possible reasons why so many of the Southern African basins are said to be "at risk".

The hydropolitical configuration of river basins is important. Such nuances are not possible using current methodologies, but the Oslo School seems best placed to rectify this problem. It is for this reason that the Oregon School drew their Basins at Risk conclusion for the Southern African river systems. In the SAHPC there are four Pivotal States, each hegemonic in their own right, but to a different degree and in a different form. It is significant therefore that each regime has been initiated by one of the four Pivotal States, with the two most water-scarce of these (Namibia and Botswana) being avid participants in all recorded cooperative arrangements. This is a nuanced form of hegemonic stability theory that is only visible when using the SAHPC as an analytical construct. More importantly though, all three of the Pivotal Basins in the SAHPC have basin-wide regimes. This is no small achievement in the face of finding that while two-thirds of the world's international river basins have more than two riparian states, the most common form of regime is a bilateral one by a ratio of 2:1 (Conca, 2006: 109). The trend in the SAHPC therefore does not fit this global pattern, suggesting that where endemic water scarcity is a potential limiting factor to future economic growth and political stability, the incentives are high for the development of conflict mitigating arrangements. The Oslo School is to be encouraged as they pursue this direction of future research, because it is likely to yield considerable insight into the nuances of the de-securitization of water resource management in international river basins.

With respect to the Oregon School, their work is very useful when it shows the propensity for riparian states to cooperate, along with the distribution of events at specific levels of intensity using the BAR Scale. All of the empirical schools have found that a history of peaceful co-existence is more likely to result in peaceful

resolution of resource-related conflict. It is therefore a great pity that the TFDD did not have an accurate dataset from the SAHPC, because there is a rich history of cooperation at various levels, including non-aggression pacts. This chapter has shown that a large number of regimes exist in Southern Africa, suggesting that the regional reality was not represented in the TFDD and therefore under-represented in the Oslo School and Maryland School database. The Oregon School work falls short when attempting to identify Basins at Risk however, because the methodology is simply not robust enough for the highly nuanced coding that is needed to capture the type of data that is in existence in the SAHPC. Part of the problem is that these data are simply not readily available, so this is not an indictment of the TFDD effort, merely a statement of fact that more effort is needed to capture appropriate information using reliable local partners.

With respect to the Maryland School, the SAHPC case suggests that there is a cascading of regimes from basin to basin, but detail of this was not captured in the TFDD that was used as one of the primary datasets for the study. If captured, it might well have shown that cascading is taking place, because merely by virtue of the signatory status of each SADC Member State to the *SADC Water Protocol*, each country has bound themselves to the *UN Convention* (Ramoeli, 2002:109). Subsequent amendments to the *SADC Water Protocol* have also been made, each reflecting evolving international legal norms. Conca (2006:119) found that the core norms in the 1997 *UN Convention* were not present in most basin-level agreements. The *ZAMCOM Agreement* is interesting in this regard, because Article 12 makes specific reference to eight legal principles, which are sourced from wider than the *UN Convention* alone. In the SAHPC case, it has been shown that this is somewhat different, but these facts were filtered out of the TFDD dataset and therefore never informed the Maryland School analysis. This is a great pity because their work is of such a high standard that a larger dataset might have made a difference to the conclusion. Similarly, the finding by Conca (2006:116) that water allocation formulae are generally missing from river basin regimes does not reflect the SAHPC reality. A number of agreements within the SAHPC have such specific water allocation formulae, most notably the LHWP, KOBWA, the *Incomaputo Agreement* and the VNJIS.

Finally, with respect to results of all three schools that a history of cooperation between riparian states is a strong indicator of future cooperation, the Tshwane School findings provide factual evidence to support this. It is the author's opinion that had a more nuanced dataset been available at the time of the Basins at Risk project, the results would probably have been somewhat different. Colleagues working in those empirical fields are to be encouraged to refine their methodologies, so this chapter should not be interpreted as an attack, but rather as an attempt at critical evaluation by providing some of the missing information. It is for this reason that the chapter is rather long.

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were taken by the author during a project on the Okavango that was funded by USAID. Map 2 and Photos 6 & 7 were provided by Piet Heyns of the Namibian Ministry of Agriculture, Water and Rural Development (MAWRD).

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