

# 1 Water and Security in Sub-Saharan Africa: Emerging Concepts and their Implications for Effective Water Resource Management in the Southern African Region

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## 1.1 Introduction

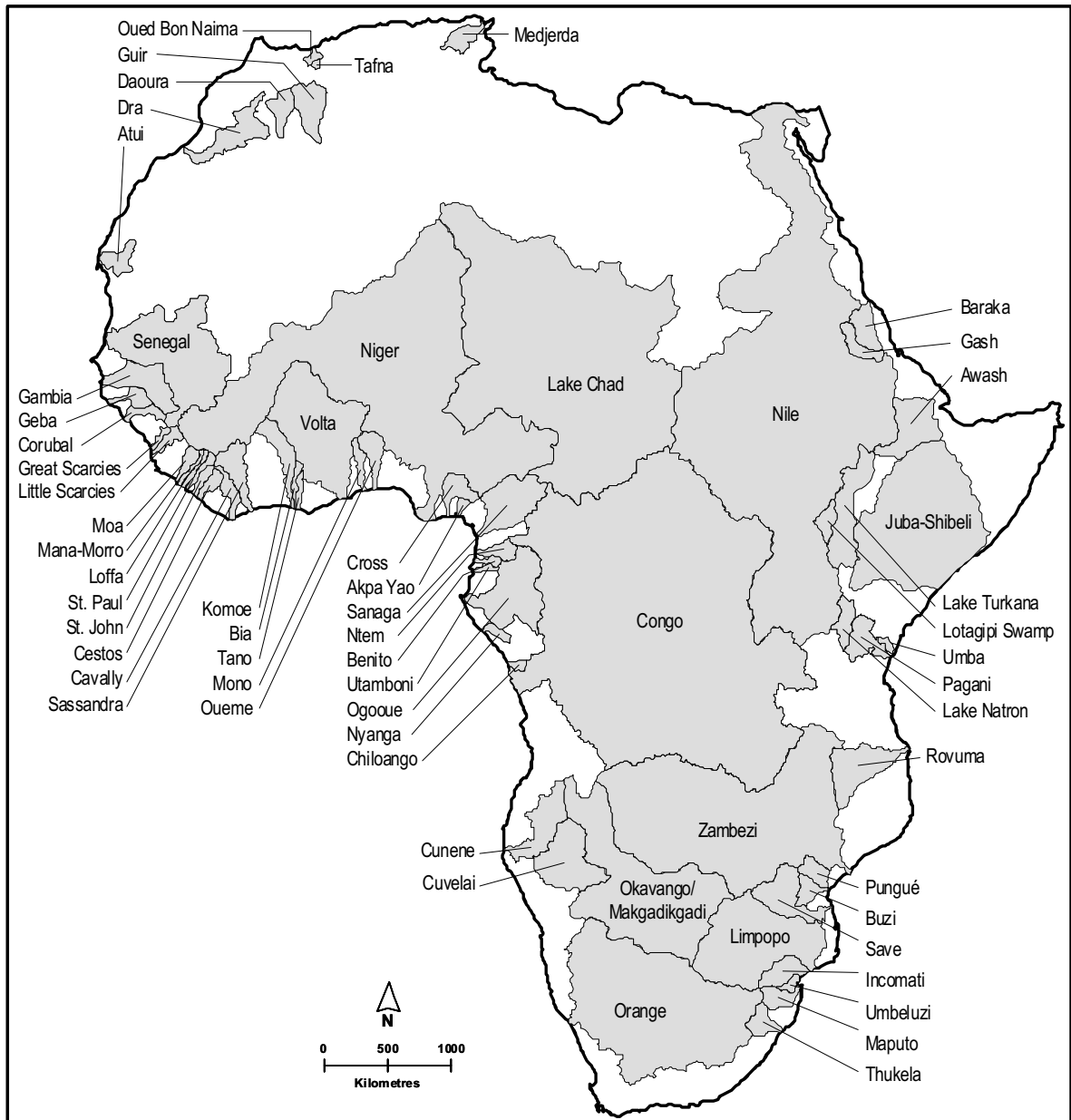
Africa has 63 river basins that cross the international political borders demarcating the 48 countries making up the African continent (Pakenham 1991: 15). Each of these river basins is shared by between two and ten states and this feature poses several strategic implications for the future economic development aspirations of the countries concerned. Significantly, large areas of Africa are arid or water scarce, where the spatial and temporal distribution of surface water is tightly controlled by the interplay between sparse and erratic rainfall and high evaporation rates. In these areas, the availability of surface water seldom matches the water needs of the respective countries and greater reliance is placed on water drawn from underground aquifers for domestic, agricultural, and industrial use (UNESCO-ISARM 2004: 4). In the extremely dry areas of North Africa, every country relies heavily on water drawn from the large shared aquifer systems that characterize this region. Here, the “Great Man-Made River Project” in Libya provides a classical example of this dependence, where the large volumes of water drawn from the Nubian Sandstone Aquifer (shared by Chad, Egypt, Libya, and Sudan) contribute over 90% of Libya’s national water budget (Kuwaiti 2004: 8).

The dilemma posed by the erratic availability of water in many African countries has prompted researchers to pose two inter-related questions. First, will governments go to war over scarce water resources as the finite limits of available supplies are approached? Or will they choose instead to cooperate in the development of joint water management schemes in order to optimize benefits to all? In the context of post Cold War Sub-Saharan Africa, more and more countries are engaging with their neighbours to share their common water resources (Tur-

ton 2003a: 32). Increasingly, this process is taking place through sets of negotiated water-sharing regimes that are most easily understood within the framework of a *Hydropolitical Complex*. The best example of this in sub-Saharan Africa is the Southern African Hydropolitical Complex, where water-sharing agreements between states are now a prominent feature of the international relations of the Southern African Development Community (SADC) region. Indeed, such is the importance of these agreements that water resource management is now widely considered as a driver of regional cooperation in its own right (Heyns 2002: 158, 176; Ramoeli 2002: 107; Turton 2003b: 281).

In this chapter, we argue that the answer to the dilemma posed above requires an understanding of two critical elements relating to the strategic access to water in the context of water and security in sub-Saharan Africa. The first element concerns security of supply (of water), with the hydraulic mission of the state being aimed at achieving this fundamental development objective as a foundation for economic growth, social wellbeing and political stability. The second element relates to the need for each state to choose an appropriate strategy or mix of strategies that will achieve and sustain a high level of security of supply. In our analysis, we explore the relevance of the Southern African Hydropolitical Complex, both as an analytical concept and as a possible mechanism for building and sustaining inter-state cooperation, and thereby avoiding possible conflicts over water.

**Figure 1.1:** Map of Africa showing the locations and names of the continent's 63 international (shared) river basins. (Map modified and redrawn from UNEP, 2002: 27, plus own data).

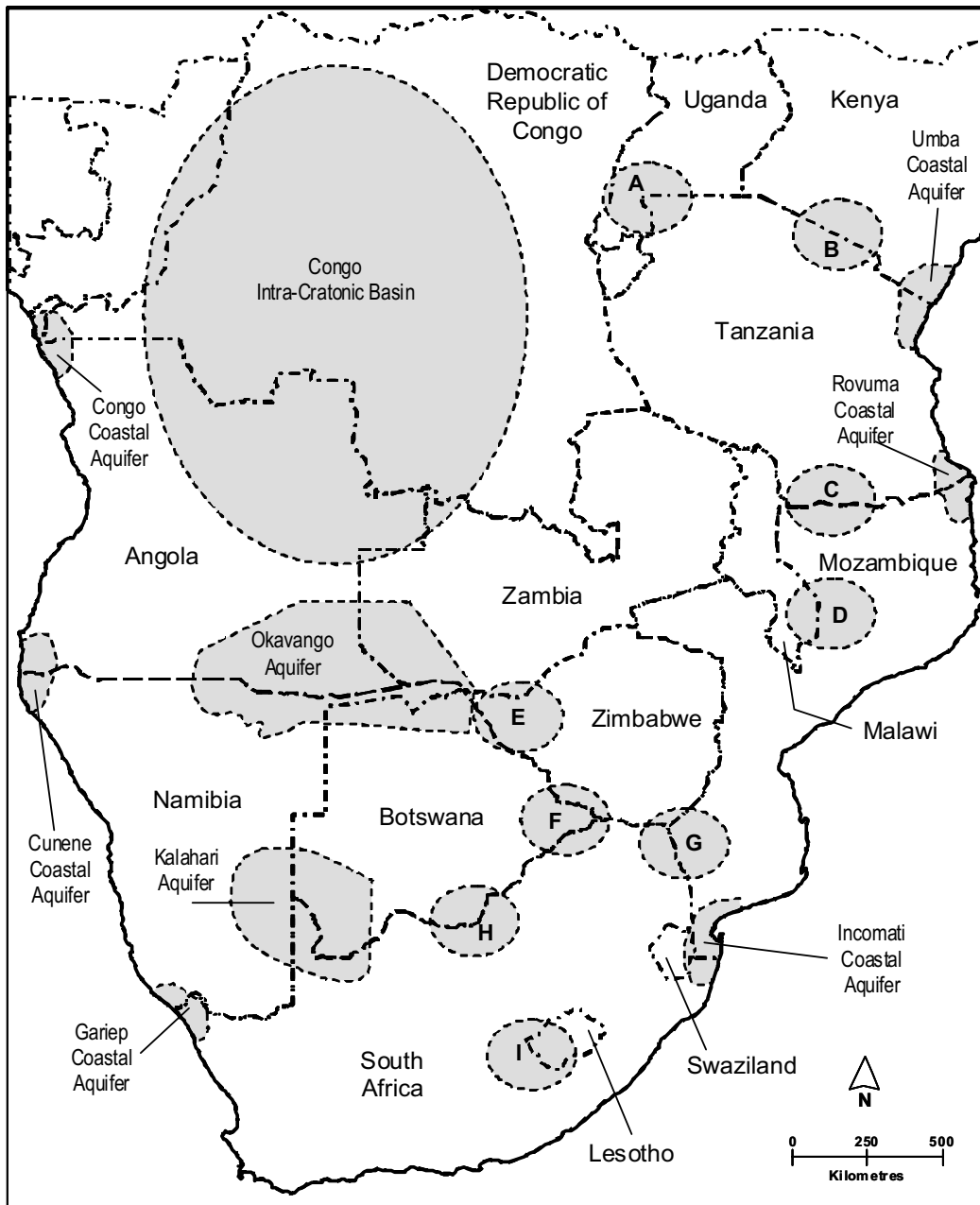


## 1.2 Water Dependencies and Interstate Behaviour: The Basis for Cooperation or Conflict

Africa's shared river basins (Figure 55.1) cover approximately 63% of the surface area of the continent, contain 78% of the human population and, more significantly, hold over 90% of the continent's surface water resources (Ashton/Turton 2004: 5). While far

less information is available on the water contained in shared aquifer systems (Figure 55.2), or the precise extent to which countries in the more arid regions of Africa rely on these systems, they represent critically important sources of water for the countries located in Africa's desert and semi-desert areas (Kuwairi 2004: 2). Similarly, many major cities and towns across Africa rely heavily on groundwater resources to meet the needs of domestic and industrial water users (UNESCO-ISARM 2004: 5). Clearly, a full un-

**Figure 1.2:** Map of Southern Africa, showing the international (shared) aquifer systems used by the SADC states. (A = Kagera Aquifer; B = Kilimanjaro Aquifer; C = Upper Rovuma Aquifer; D = Shire Valley Alluvial Aquifer; E = Nata-Gwaai Aquifer; F = Tuli-Shashe Aquifer; G = Pafuri Alluvial Aquifer; H = Ramotswa Dolomite Aquifer; I = Karoo Sedimentary Aquifer; Map drawn from data in UNESCO-ISARM, 2004: 7, plus own data).



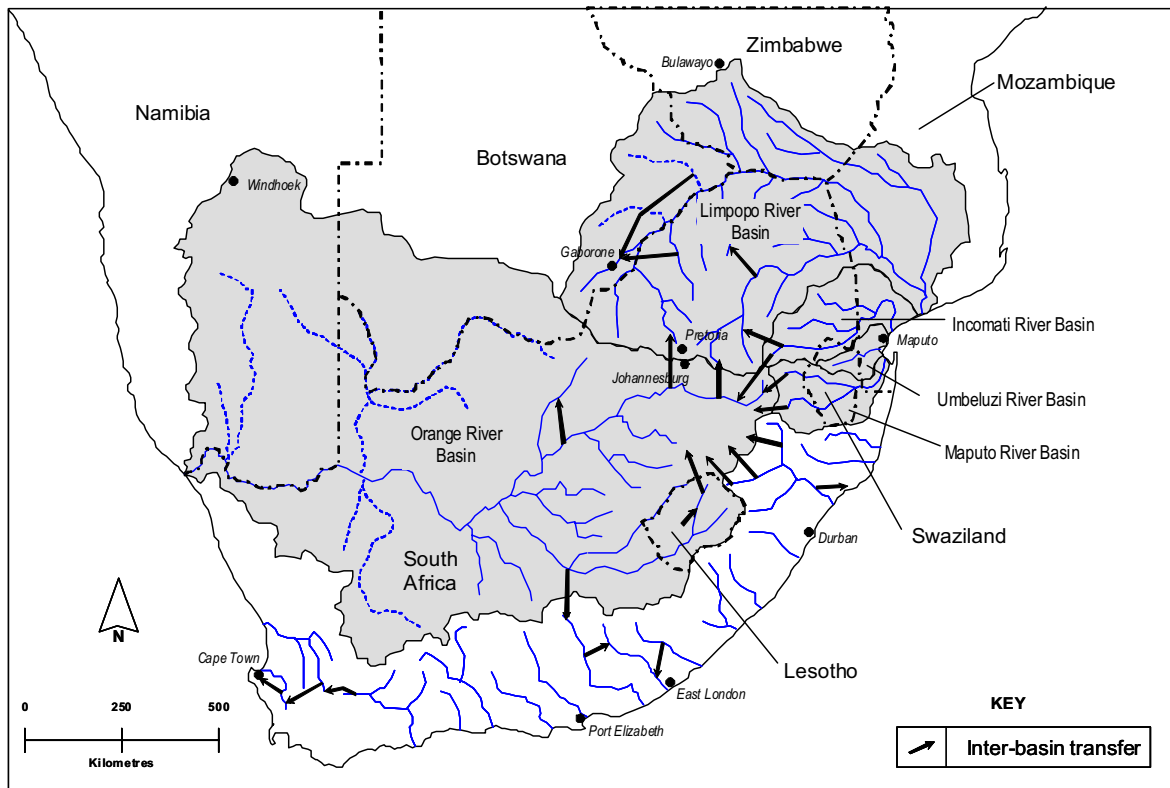
Understanding of the strategic nexus between water and security in sub-Saharan Africa requires a sound knowledge of the role of international river basins and shared aquifers in the current and future development plans of each country.

Several recent social and economic studies (Gleick 1998: 45; Hirji/Johnson/Maro/Chiuta 2002:

45; Hoekstra 2004: 66; Ohlsson 1999: 250) have highlighted the pervasive poverty and low human development index (HDI) values of many countries in sub-Saharan Africa. In these countries, problems caused by a shortage of ‘first-order resources’ (water) are accentuated by the shortage of ‘second-order resources’ (infrastructure, institutions, money, and skills; Ohls-



**Figure 1.4:** Map of the Southern African Hydropolitical Complex, showing the locations of three pivotal basins (Orange, Limpopo, and Incomati) and two impacted basins (Umbeluzi and Maputo), together with the main centres of economic activity and/or capital cities of the four pivotal states (Botswana, Namibia, South Africa, and Zimbabwe), and the positions of major inter-basin water transfer schemes.



sources to resolve their water supply problems (Ashton 2004: 163; Ashton/Turton 2004: 9).

Given the extent and importance of shared water resources in Africa, purely inward-looking strategies offer few dependable prospects of long-term national water security and several countries would likely suffer considerable hardship were they to adopt such strategies (Ashton 2002: 240; 2004: 170). This is clearly illustrated by South Africa and Zimbabwe, where efforts were concentrated on national rather than regional priorities and supply-side options were used to meet the growing demands for water. The outcome of the so-called “hydraulic mission” of these states (Waterbury 1979: 270; Allan 2000: 28) is clearly visible in the numbers of large-scale water storage reservoirs and inter-basin transfer schemes (Figures 55.3 and 55.4). Whilst these schemes provide sufficient water to meet national needs, they increase the pressure on shared water resources and emphasize disparities with neighbouring countries that cannot afford such options (Pallett 1997: 59; Ashton 2004: 167).

The extent to which African countries rely on shared surface and groundwater resources heightens the need for states to look beyond purely national priorities and harness the region’s collective social, economic, and technological resources to attain a common goal, that of assuring long-term water security. In strategic terms, this challenge presents African countries with the opportunity to shape and secure a variety of shared benefits with implications far beyond those of national and regional water security. Most notable amongst these are the promotion of political and economic stability across the continent (Ashton/Turton 2004: 16).

Earlier studies (UNEP 2002: 14; Wolf/Yoffe/Giordano 2003: 29) evaluated the number and types of agreements between countries that shared transboundary water resources. These authors concluded that the available evidence indicated low levels of inter-state collaboration and that this represented a potential “risk” of future conflict between the states concerned. However, more recent studies (Heyns 2002: 158; Ramoeli 2002: 105; Turton 2003a: 302–304; Tur-

ton and Ashton 2004: 16) have revealed a widespread preference amongst Southern African states to cooperate in the management of their shared water resources. This view has been strengthened by the interim results of a study on the scope and intent of international agreements that South Africa has entered into with its neighbours. This study revealed that South Africa has entered into 59 international water-related agreements with neighbouring (SADC) states and the international community (Ashton/Earle/Malzbender/Moloi/Patrick/Turton 2005: 14).

### 1.3 Emerging Concepts: The Southern African Hydropolitical Complex

The collapse of the bipolarity associated with the Cold War prompted considerable speculation that there would be widespread worsening of the international relations between states. However, with few exceptions, this rather pessimistic view was not realised and scholars were prompted to seek reasons to account for the relative absence of widespread conflict. An important outcome of this was the development of a new concept, the regional security complex, and several examples were cited for the developing world (Buzan/Rizvi 1986: 1; Buzan 1988: 16; 1991: 187; 1994: 1; Buzan/Wæver/de Wilde 1998: 201). A regional security complex has been defined as a group of states whose primary security concerns link together sufficiently closely that their national securities cannot realistically be considered apart from one another (Buzan 1991: 190). Typically, a security complex occurs where a set of security relationships stands out from the general background by virtue of its relatively strong, inward-looking character, as well as by its relatively weak outward security interactions with its neighbours. Significantly, the boundaries between regional security complexes are defined by relative indifference towards security perceptions and interactions (Buzan 1991: 193).

In southern Africa, a regional security complex comprising ten of the mainland SADC states – Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe – has been identified (Buzan 1991: 210). In this context, the term “security complex” emphasizes the interdependence of both shared and competing interests, and incorporates the shifting patterns of cooperation and competition over time (Buzan 1991: 190). But what of transboundary water resources as a stra-

tegic security interest for states in semi-arid areas, specifically where water scarcity constraints can undermine the future economic viability of the state? In this regard an important concept in security complex theory is that of a referent object, which has been defined as “things that are seen to be existentially threatened and that have a legitimate claim to survival such as state sovereignty, national identity, the environment and the economic stability of the state” (Buzan/Wæver/de Wilde 1998: 36). In the context of water, the economic viability of the state becomes the main referent object, because future economic growth plans cannot be implemented in the absence of a high level of assurance of water supply.

Where African states have a relatively low level of socio-political cohesion, it is difficult for an effective central authority to emerge over time and enforce statehood (Oyebande/Amani/Mahe/Niang-Diop 2002: 35). In such situations, challenges to the central authority erode the state from within, making it impossible to enforce laws and guarantee personal security. This factor is critical to an understanding of water and security in sub-Saharan Africa because the hydraulic mission of the state is a necessary (but insufficient) condition for the foundation of an economically viable state. Significantly, most of the politically unstable states in sub-Saharan Africa have yet to embark on the hydraulic mission phase of their national development, and appear unable to secure a high assurance of water supply through infrastructural development.

Schulz (1995: 97) extended the security complex theory of Buzan (1991: 190) and developed the concept of a “hydropolitical security complex” as a distinct form of regional security complex, which he defined as “... including those states that are geographically part ‘owners’ and technically ‘users’ of the [shared] rivers and, as a consequence, consider rivers as a major national security issue.” Importantly, Schulz’s work illustrates what can happen in the field of hydropolitics when water resource management becomes linked to national security concerns, or to other issues of a high politics nature (Turton 2003a: 86; Ashton/Turton 2004: 4).

Given that national security is a relational issue that is mitigated by geographic proximity, the role of international river basins provides an interesting, and largely unexplored, analytical variable. Within the twelve mainland SADC countries, a total of 15 river systems are shared by two or more SADC states, with two major river systems (the Nile and Congo rivers) also being shared with other states to the north (Table 55.1). In addition, Tanzania shares three smaller

**Table 1.1:** Countries sharing the international river basins found in the SADC region (Figure 55.1). The Nile and Congo River systems are also shared with countries to the north of the SADC region, while the Pagani, Umba, and Lake Natron basins are shared by Kenya and Tanzania.

River Basin	Riparian States	Basin Classification
Buzi	Mozambique, Zimbabwe.	Impacted Basin
Congo	Angola, Burundi, Cameroon, Central African Republic, Congo, Democratic Republic of Congo (formerly Zaire), Rwanda, Tanzania, Zambia	Impacted Basin (though SADC countries have relatively little impact)
Cuvelai	Angola, Namibia	Impacted Basin
Incomati	Mozambique, South Africa, Swaziland	Pivotal Basin
Cunene	Angola, Namibia	Impacted Basin
Lake Natron	Kenya, Tanzania	Impacted Basin
Limpopo	Botswana, Mozambique, South Africa, Zimbabwe	Pivotal Basin
Maputo	Mozambique, South Africa, Swaziland	Impacted Basin
Nile	Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda,	Pivotal and Impacted Basin (though SADC countries have relatively little impact)
Okavango / Makgadikgadi	Angola, Botswana, Namibia (Zimbabwe, shares the Nata River sub-basin and is a riparian state of the Makgadikgadi basin, though not the Okavango sub-basin)	Impacted Basin
Orange	Botswana, Lesotho, Namibia, South Africa	Pivotal Basin
Pagani	Kenya, Tanzania	Impacted Basin
Pungué	Mozambique, Zimbabwe	Impacted Basin
Rovuma	Malawi, Mozambique, Tanzania	Impacted Basin
Save-Runde	Mozambique, Zimbabwe	Impacted Basin
Thukela	Lesotho, South Africa	Impacted Basin
Umba	Kenya, Tanzania	Impacted Basin
Umbeluzi	Mozambique, Swaziland	Impacted Basin
Zambezi	Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe	Impacted Basin

basins (the Pagani, Umba and Lake Natron basins) with Kenya to the north (Figure 55.1). Clearly, sovereign control over these shared river basins has to be shared between the riparian states when a given basin is managed as a hydrological unit in keeping with the norms of Integrated Water Resource Management (IWRM).

Potential threats to economic security often become a national security issue because relative economic growth is a major determinant of the power of states in a given system (Buzan 1991: 127). Here, the perception of threat drives decision-making, thereby becoming an independent variable in the international relations of a water scarce state (Turton 2003e: 89). This issue is particularly pertinent to international river basins that are approaching the point of closure, where the available supplies of water have

largely been exploited or allocated. When a shared river approaches closure, competition for water intensifies, with a concomitant increase in the potential for conflict between riparian states. This can become an issue of high politics when looming water scarcity is perceived to pose the threat of reduced economic growth potential (Turton 2003a: 86; 2003d: 78; 2003e: 85), and hence a threat to the economic viability and sovereign integrity of the state.

Because the availability of water supplies at a high level of assurance is a fundamental determinant of the economic growth potential of all states, reliable and sustained access to water supplies is a strategic issue for developing countries situated in arid and semi-arid regions (Ashton/Turton 2004: 2). The significant role played by water in Southern Africa is illustrated by the fact that the first cooperation proto-

col that was signed within the SADC region was the Protocol on Shared Watercourse Systems (Ramoeli 2002: 105). Heyns (2002: 158) notes that one of the major development challenges facing the SADC region in the near future is the need to implement large, regional water-sharing and transfer schemes that can alleviate the economic limitations imposed by looming water scarcity in some countries. This represents a strong call to launch a substantial regional hydraulic mission that will develop the infrastructure needed to provide a high assurance of supply on which future economic growth can be planned with confidence.

Whilst the SADC region contains a large number of international river basins, four of the economically most developed states in the region – Botswana, Namibia, South Africa, and Zimbabwe – are water scarce. These four states are approaching the limits of their readily available surface water resources and looming water scarcity is likely to impose limitations to their economic growth potential in the near future (Ashton/Turton, 2004: 4). This could become particularly acute if the dire predictions of global climate change result in a decrease in the quantity of water available. Significantly, these four states are also linked together through their co-riparian status in the transboundary Orange and Limpopo basins.

Using the work of Buzan (1991: 1; 1994: 1), Buzan/Wæver/de Wilde (1998: 1), and Schulz (1995: 91), Turton (2003a: 294) developed a conceptual model that factors in the hydropolitical dimension of international relations within the SADC region where water scarcity has not yet been intimately linked to national survival. The rationale for this is based on the fact that co-riparian status on the region's many international rivers (Table 55.1) provides permanent linkages between different states within the Southern African security complex as originally defined by Buzan (1991: 187), but has not yet become a driver of securitization in its own right. The original typology proposed by Turton (2003a: 293) and refined here, distinguishes two types of riparian state (pivotal state and impacted state), and two categories of international river basin (pivotal basin and impacted basin). Each of these concepts is defined below.

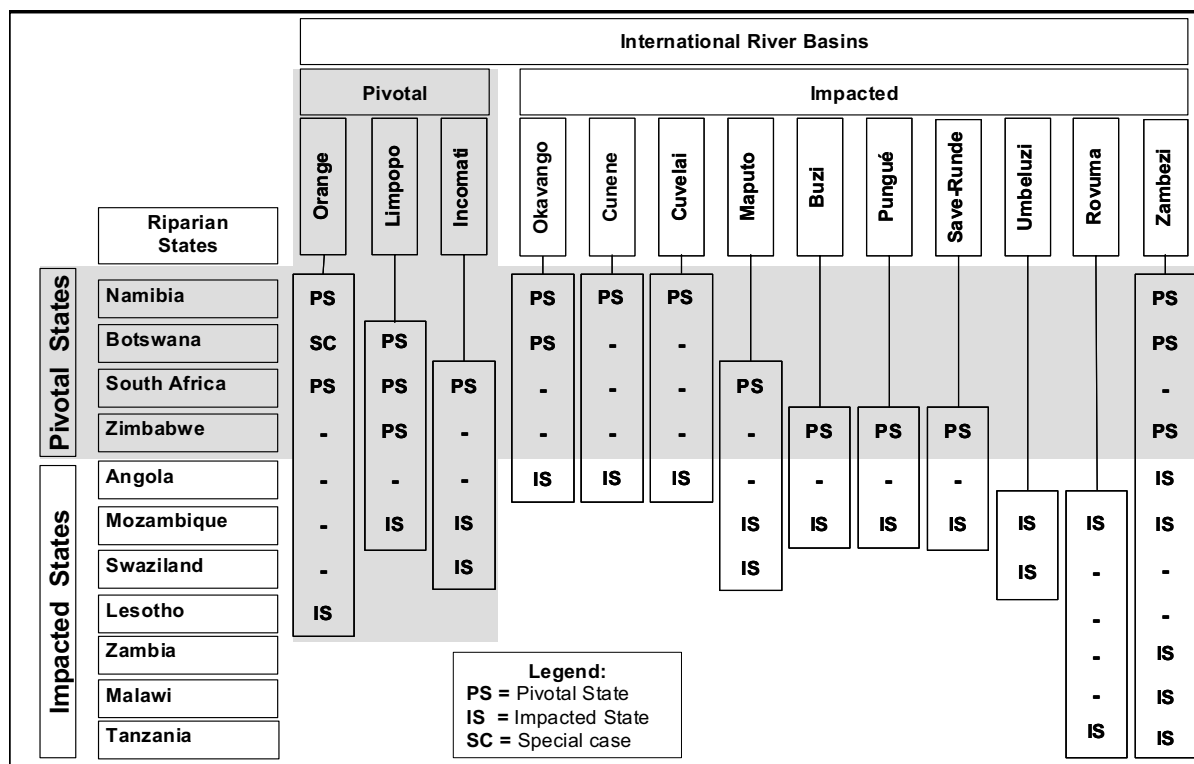
- *Pivotal States* are riparian states with a high level of economic development and a high degree of reliance on shared river basins for strategic sources of water supply. Four Southern African

states are in this category, namely: Botswana, Namibia, South Africa, and Zimbabwe.

- *Impacted States* are riparian states that have a critical need for access to water from an international river basin that they share with a pivotal state, but appear to be unable to negotiate what they consider to be an equitable allocation of water. As a consequence, their future developmental aspirations are impeded by their asymmetric power relations with the pivotal states to which they are co-riparian. In Southern Africa, seven states are seen to be in this category: Angola, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, and Zambia.
- *Pivotal Basins* are international river basins that face closure, but 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 are regarded as being pivotal basins (Orange, Incomati, and Limpopo).
- *Impacted Basins* are those international river basins that are not yet approaching a point of closure, and which are strategically important for at least one of the riparian states. An impacted basin has at least one of the pivotal states as riparian, so that there appears to be less freedom of choice for an impacted (riparian) state to develop its water resources in a manner that it deems to be fair and equitable. Often, this would appear to be due to perceptions about the asymmetric power relations that exist between the riparian states, where the pivotal state may view any unallocated water as a strategic reserve. Seven impacted basins occur in Southern Africa: Cunene, Maputo, Okavango, Cuvelai, Pungué, Save-Runde, and Zambezi.

Based on these concepts, Turton's original conceptual model (Turton 2003a: 294) has been expanded to display the patterns of cooperation and competition within international river basins (Figure 55.5), as a critical component of the Southern African Regional Security Complex defined by Buzan (1991: 210). The Southern African Hydropolitical Complex can thus be understood as being a set of political interactions nested within the Southern African Regional Security Complex, across various levels and between different units, centred on patterns of amity and enmity in the broadest sense, but amplified specifically with respect to water resource management in transboundary river basins. It differs from the Hydropolitical Security Complex defined by Schultz (1995: 97), because water has not yet been elevated to

**Figure 1.5:** Schematic diagram illustrating the relationships between shared river basins within the SADC region and countries comprising the Southern African Hydropolitical Complex; pivotal basins and pivotal states are shaded. (Source: amended and redrawn from Turton 2003a: 294; Ashton/Turton 2004: 7).



become a major driver of threat perception in Southern Africa, or to the extent that national survival might be equated with direct control over the resource by military means. Within the SADC region, water has a long history of politicization (rather than securitization), having played a prominent but subtle role during the liberation conflict years of the last three decades (Turton 2003a: 203; Turton/Earle forthcoming). The overt nature of Southern African water politics has changed somewhat in the post-Apartheid era, but 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; and they all face significant limitations to their future economic growth prospects as a result of looming water shortages (Table 55.2).

The population statistics shown in Table 55.2 reveal two important points. Firstly, three SADC countries (Botswana, Lesotho, and Swaziland) are expected to have negative population growth rates during the period 2000 to 2025, with South Africa being expected to show a very modest increase in

population numbers (UNPD 2005). This can be ascribed to the devastating effects of the HIV/AIDS pandemic in Southern Africa, with these four countries having the highest adult prevalence of HIV/AIDS of any African country (Ashton/Ramasar 2002: 219). Secondly, the other SADC countries are expected to have relatively high population growth rates of between 14.6% and 106.2% for the same period. Similar high population growth rates are also expected to occur in the other sub-Saharan countries, while slightly lower growth rates are anticipated in North Africa (UNPD 2005; Table 55.2). Clearly, population growth rates of the magnitude shown in Table 55.2 will exacerbate the existing problems associated with water shortages in these countries, making it even more difficult for the respective governments and water resource management authorities to provide their citizens with appropriate services.

Clearly 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 one or

**Table 1.2:** Projected Population Growth in SADC Countries, (2000 – 2025 – medium estimate), Compared With Other African Regions.

Country	2000 Popula- tion (m.)	2025 Popula- tion (m.)	Increase (2000 – 2025)	
			(m.)	(%)
Angola	13.841	26.829	12.988	+93.8
Botswana	1.754	1.655	-0.099	-5.6
Dem. Rep. of Congo	50.052	103.224	53.172	106.2
Lesotho	1.788	1.690	-0.098	-5.5
Malawi	11.512	19.737	8.225	71.5
Mozambique	17.911	27.556	9.645	53.9
Namibia	1.894	2.519	0.625	33.0
South Africa	45.610	48.297	2.687	5.9
Swaziland	1.023	0.975	-0.048	-4.7
Tanzania	34.763	52.807	18.044	51.9
Zambia	10.702	16.419	5.717	53.4
Zimbabwe	12.595	14.430	1.835	14.6
<b>SADC</b>	203.445	316.138	112.693	55.4
Southern Africa <sup>a</sup>	118.630	160.107	41.477	35.0
Central Africa <sup>b</sup>	73.844	140.088	66.244	89.7
East Africa <sup>c</sup>	216.983	387.413	170.430	78.6
West Africa <sup>d</sup>	241.386	417.814	176.428	73.1
North Africa <sup>e</sup>	142.148	204.927	62.779	44.2
Sub-Saharan- Africa <sup>f</sup>	650.843	1 105.422	454.579	69.8
Africa <sup>g</sup>	792.991	1 310.349	517.358	65.2

- a. Southern Africa = Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe.
- b. Central Africa = Cameroon, Central African Republic, Republic of Congo, Democratic Republic of Congo (DRC), Equatorial Guinea, Gabon.
- c. East Africa = Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania, Uganda.
- d. West Africa = Benin, Burkina Faso, Chad, Cte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo.
- e. North Africa = Algeria, Egypt, Libya, Morocco, Tunisia, Western Sahara.
- f. Sub-Saharan Africa = Southern Africa + Central Africa + East Africa + West Africa (as listed above).
- g. Africa = Southern Africa + Central Africa + East Africa + West Africa + North Africa (as listed above).

more of the pivotal states; at least one of those pivotal states has a high reliance on the water from these basins; and each basin is approaching the point of closure. A deeper analysis of these three pivotal basins raises a number of subtle but important facts that are not immediately visible. For example, the Orange River is the largest of the three basins in terms of its volume of flow (Basson/van Niekerk/van Rooyen 1997: 44; Turton 2003c: 137) and it is arguably the most strategically important river to which South Africa has access. Whilst Botswana is a co-riparian state, the portion of the basin within the boundaries of Botswana is part of the Kalahari Desert, containing ephemeral watercourses that contribute no stream flow to the main channel of the river. Botswana is therefore listed as being a special case, because it occupies its position as co-riparian in all deliberations over the Orange River, but currently makes no use of the surface water in the basin (although it does use water from the transboundary Kalahari Aquifer).

#### 1.4 Implications

While Africa's many states display varying levels of socio-political cohesion and different levels of economic development, their prospects for future development are linked to three key features: (1) the spatial and temporal variability of water across the continent; (2) the degree to which available water resources are shared by different states; and (3) the highly uneven levels of access to water supply infrastructure. Many of the less developed countries in Africa have low levels of water supply infrastructure and concomitant low assurance of water supply; this contrasts with regional hegemonic states that generally display a higher level of infrastructural development and enjoy a greater assurance of water supply.

The Southern African Hydropolitical Complex provides a potentially useful analytical tool with which to consider the water and security nexus in Southern Africa (Ashton/Turton 2004: 6). This approach offers a more nuanced understanding of two specific aspects – issues that are pertinent to the security of water supply, and issues that are important for the selection of a national strategy to achieve higher assurance of supply levels. Both are explored below.

### 1.4.1 Security of Supply

Assurance of supply lies at the heart of economic growth and development, because sustainable social and economic development is impossible where a low assurance of supply prevails (Postel 1999: 25). In essence, a country is only able to develop once appropriate hydraulic (and other) infrastructure is in place and the quest to achieve a high assurance of supply - the so-called "hydraulic mission" (Waterbury 1979: 270; Allan 2000: 28) - has been initiated.

To date, the hydraulic mission of the Southern African Hydropolitical Complex can be segmented into two distinct phases, with a probable third phase that will likely occur in the future. The first phase saw South Africa as the regional hegemon develop massive hydraulic infrastructure, and lay the foundation for rapid and sustained economic growth centred on the mining sector and irrigated agriculture (Turton/Meissner/Mampane/Seremo 2004: 398). Simultaneously, a comparable sequence of events occurred in Namibia (which was being run as a *de facto* province of South Africa), whilst Zimbabwe initiated a strong hydraulic mission centred on the development of the Kariba Dam and numerous widespread irrigated agriculture systems. The start of the second phase occurred when the other pivotal states (Botswana, Namibia, and Zimbabwe) attained independence and launched their own hydraulic mission to underpin their economic growth. It is anticipated that the third (future) phase will begin when the other impacted states in the region launch their own hydraulic missions in pursuit of social development objectives consistent with the Millennium Development Goals (MDGs), and which will enable their economies to engage more fully with the globalization trend. Based on current trends of increasing inter-state cooperation in Southern Africa, this third phase is likely to be characterized by cooperative partnerships between the underdeveloped states and their more technologically advanced neighbours, the pivotal states.

Present water use patterns in the pivotal states are characterized by constraints found in two distinct categories. First-order, or hydrological, constraints are represented by the regional patterns of rainfall and runoff, with each of the four pivotal states generally receiving far lower rainfalls than they require to meet their development objectives (Pallett 1997: 14). Second-order, or infrastructural, constraints are represented by dams and inter-basin transfer schemes that capture and store the runoff and channel it to where it is required for use. Significantly, each of the four

pivotal states in Southern Africa has amongst the lowest ratios of mean annual rainfall to runoff in the world, averaging less than 8% (O'Keeffe/Uys/Bruton 1992: 281). In South Africa, over 60% of the total annual runoff is captured and stored in dams - this large fraction appears to be close to the limits of economic viability and sustainable ecological integrity (Rabie/Day 1992: 647). Significantly, both South Africa (ranked 11) and Zimbabwe (ranked 20) have been singled out amongst African states by virtue of the number of large dams that have been built in these countries (Figure 55.3; WCD 2000: 370).

Another important characteristic of the Southern African Hydropolitical Complex is the high degree of dependence of the four pivotal states on flows in shared rivers that arise beyond their borders. In this regard, approximately 90% of the surface water within Botswana is derived from upstream countries, with Namibia (76%), Zimbabwe (58%) and South Africa (12%) also relying on inflows from neighbouring states (UN-FAO 2004: 2). This feature makes the pivotal states particularly vulnerable to the actions of other states, and requires them to cooperate with neighbouring countries to solve their assurance of supply problems. Compounding this problem is the fact that the centres of major economic development in each of the four pivotal states lie on or close to major watersheds (Figure 55.4). The implications of this are that each country has a high degree of reliance on inter-basin transfers and major hydraulic infrastructure, and these infrastructure elements will always be a strategic feature of the economic and political vulnerability of the SADC region.

The countries comprising the Southern African Hydropolitical Complex share a total of eighteen transboundary aquifer systems (10 shared within the SADC countries, and a further eight with countries to the north; Figure 55.2; UNESCO-ISARM 2005: 7). Extensive exploitation of an aquifer in one country could lower the regional water table and exert adverse effects on the communities in neighbouring states who also depend on the system. Consequently, joint management of these groundwater resources is essential to ensure that the strategic interests of each state are not adversely affected.

One of the major implications of pervasive water scarcity for the future economic growth potential of the SADC region lies in the need to develop inter-basin transfer schemes (Heyns 2002: 176). Given the asymmetric distribution of rainfall patterns and river flows, many of the planned transfer schemes will have to cross international borders. This will require

close cooperation between states and each pipeline or canal that crosses a border will entrench the co-dependency of the respective states on their shared water resources. The most developed state in the Southern African Hydropolitical Complex (South Africa) is already deeply dependent on inter-basin transfer schemes. For example, eight of the nine provinces in South Africa are already dependent for more than 50% of their gross geographic product (GGP) on water provided from outside their borders, with six of these provinces having a dependency in excess of 70% (Basson/van Niekerk/van Rooyen 1997: 55). Gauteng Province, the economic heartland of South Africa, generating 10% of the economic output of the entire African continent, is already totally dependent on inter-basin transfer schemes for its survival (Turton 2004: 12).

#### 1.4.2 Strategies to Achieve Higher Assurance of Supply Levels

Since regional water scarcity has the potential to limit the future economic growth and prosperity of states in the SADC region, and every state also relies to varying degrees on transboundary surface and ground-water resources, it is important to understand the implications of possible cooperative strategies that could improve assurance of water supply throughout the region. In this regard, significant advances have been made to establish a body of international law and regimes for the management of transboundary river systems. Here, three elements are particularly important.

Firstly, the body of international water law codified in the *Helsinki Rules on the Uses of the Waters of International Rivers* and the *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses* has been supported by every state in the Southern African Hydropolitical Complex. Key elements from both of these international legal instruments have been incorporated into the *SADC Protocol on Shared Watercourse Systems* and its 2000 Amendment, the *Revised SADC Protocol on Shared Watercourses*, which form the legal and institutional foundation for the management of transboundary rivers in all SADC Member States (Ramoeli 2002: 106). This is highly significant, because there is no correlation between the ratification of these two pieces of international law by the respective riparian states, and their actual use of the principles embodied therein (Eckstein 2002: 88; Boisson de Shazournes 2003: 217). Therefore, even if an

individual SADC state has not ratified the two international conventions described above, it is still bound by the core principles enshrined in them by virtue of their ratification of the *SADC Water Protocol* and the 2000 revision. Further evidence for increasing cooperation is the emergence of a trend that shows African governments to be spearheading the notion of an ecosystem approach to the development of international environmental law (McIntyre 2004).

Secondly, contrary to earlier assertions (UNEP 2002: 14; Wolf/Yoffe/Giordano 2003: 29), there is increasing evidence for a high level of sophistication to the development of international water-sharing and cooperation agreements between riparian states in sub-Saharan Africa. A recent study (Ashton/Earle/Malzbender/Moloi/Patrick/Turton 2005: 14) indicates that South Africa alone is a signatory to 59 water-related agreements, and there is sufficient evidence to show that the corpus of international water agreements to which South Africa is a signatory, is more robust than originally shown by Turton/Meissner/Mampane/Seremo (2004: 392).

Thirdly, evidence has been presented to show that even during the height of the Cold War, when many of the local wars of liberation in Africa were being fought as proxy wars for the respective Superpowers (Turner 1998), water resource managers were able to negotiate peaceful water-sharing agreements (often between belligerent powers) (Turton 2003a: 300; Turton/Meissner/Mampane/Seremo 2004: 392; Turton/Earle forthcoming; Turton/Ashton forthcoming: 13). These agreements demonstrate that shared concerns over scarce water resources provide a strong reason for countries to collaborate with each other for mutual benefit. In addition, these agreements provide strong support for regional economic integration efforts that accompany reconstruction and peace building in Southern Africa.

## 1.5 Conclusions

In answer to the worrisome question about the best options available to African states confronted by water scarcity limitations to their future economic growth potential, the balance of evidence suggests that cooperation will be favoured rather than conflict. In this regard, the African continent has seen the development of many water-sharing agreements for the management of its transboundary river basins. In sub-Saharan Africa, the best example of this can be found in the Southern African Hydropolitical Com-

plex. Clustered on the strategic water needs of the four most economically developed states in the SADC region (Botswana, Namibia, South Africa, and Zimbabwe), the Southern African Hydropolitical Complex shows that a variety of linkages exist between the sovereign states of the Southern African Regional Security Complex originally defined by Buzan (1991: 210).

In this regard, the referent object is the economic stability of the country, and consequently the sovereign integrity of the state in question, making water scarcity a strategic concern. Given the high reliance on transboundary rivers, combined with the historic evidence of cooperation in the development and utilization of those resources, the Southern African Hydropolitical Complex is unlike the Hydropolitical Secu-

rity Complex mooted by Schultz (1995: 97) to exist in the Tigris and Euphrates case. As such the Southern African Hydropolitical Complex is not a security complex in its own right, but rather a distinct component of the Southern African Regional Security Complex defined by Buzan (1991: 210). The implications of these conclusions are that, in terms of water security in sub-Saharan Africa, the future trajectory of the various states in the Southern African Hydropolitical Complex will most likely be based on mutual cooperation, where the management of transboundary water resources will become a driver of regional integration in its own right.

**Document 55.1: "Protocol on Shared Watercourses in the Southern African Development Community (SADC)" signed in 2000**

(Two key Articles have been taken from this important regional treaty. Article 2 describes the objectives of the revised Protocol while Article 3 list the details of the General Principles embodied in the revised Protocol. Together, these two articles convey both the spirit and intent of the Protocol and therefore provide a useful overview of the main features of this agreement).

**Article 2**

**Objective**

The overall objective of this Protocol is to foster closer cooperation for judicious, sustainable and co-ordinated management, protection and utilisation of shared watercourses and advance the SADC agenda of regional integration and poverty alleviation. In order to achieve this objective, this Protocol seeks to:

- a.) Promote and facilitate the establishment of shared watercourse agreements and Shared Watercourse Institutions for the management of shared watercourses;
- b.) Advance the sustainable, equitable and reasonable utilisation of the shared watercourses;
- c.) Promote a co-ordinated and integrated environmentally sound development and management of shared watercourses;
- d.) Promote the harmonisation and monitoring of legislation and policies for planning, development, conservation, protection of shared watercourses, and allocation of the resources thereof; and
- e.) Promote research and technology development, information exchange, capacity building, and the application of appropriate technologies in shared watercourses management."

**Article 3**

**General Principles**

For the purposes of this Protocol the following general principles shall apply:

1. The State Parties recognise the principle of the unity and coherence of each shared watercourse and in accordance with this principle, undertake to harmonise the water uses in the shared watercourses and to ensure that all necessary interventions are consistent with the sustainable development of all Watercourse States and observe the objectives of regional integration and harmonisation of their socio-economic policies and plans.
2. The utilisation of shared watercourses within the SADC Region shall be open to each Watercourse State, in respect of the watercourses within its territory and without prejudice to its sovereign rights, in accordance with the principles contained in this Protocol. The utilisation of the resources of the watercourses shall include agricultural, domestic, industrial, navigational and environmental uses.
3. State Parties undertake to respect the existing rules of customary or general international law relating to the utilisation and management of the resources of shared watercourses.
4. State Parties shall maintain a proper balance between resource development for a higher standard of living for their people and conservation and enhancement of the environment to promote sustainable development.
5. State Parties undertake to pursue and establish close co-operation with regard to the study and execution

of all projects likely to have an effect on the regime of the shared watercourse.

6. State Parties shall exchange available information and data regarding the hydrological, hydro geological, water quality, meteorological and environmental condition of shared watercourses.
7. a.) Watercourse States shall in their respective territories utilise a shared watercourse in an equitable and reasonable manner. In particular, a shared watercourse shall be used and developed by Watercourse States with a view to attain optimal and sustainable utilisation thereof and benefits therefrom, taking into account the interests of the Watercourse States concerned, consistent with adequate protection of the watercourse for the benefit of current and future generations.
  - b.) Watercourse States shall participate in the use, development and protection of a shared watercourse in an equitable and reasonable manner. Such participation includes both the right to utilise the watercourse and the duty to co-operate in the protection and development thereof, as provided in this Protocol.
8. a.) Utilisation of a shared watercourse in an equitable and reasonable manner within the meaning of Article 7 (a) and (b) requires taking into account all relevant factors and circumstances including:
  - (i) geographical, hydrographical, hydrological, climatic, ecological and other factors of a natural character;
  - (ii) the social, economic and environmental needs of the Watercourse States concerned;
  - (iii) the population dependent on the shared watercourse in each Watercourse State;
  - (iv) the effects of the use or uses of a shared watercourse in one Watercourse State on other Watercourse States;
  - (v) existing and potential uses of the watercourse;
  - (vi) conservation, protection, development and economy of use of the water resources of the shared watercourse and the costs of measures taken to that effect; and
  - (vii) the availability of alternatives, of comparable value, to a particular planned or existing use.
- b.) The weight to be given to each factor is to be determined by its importance in comparison with

that of other relevant factors. In determining what is an equitable and reasonable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.

9. State Parties shall deal with planned measures in conformity with the procedure set out in Article 4 (1).
10. a.) State Parties shall, in utilising a shared watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other Watercourse States.
  - b.) Where significant harm is nevertheless caused to another Watercourse State, the State whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of paragraph (a) above in consultation with the affected States, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.
  - c.) Unless the Watercourse States concerned have agreed otherwise for the protection of the interests of persons, natural or juridical, who have suffered or are under a serious threat of suffering significant transboundary harm as a result of activities related to a shared watercourse, a Watercourse State shall not discriminate on the basis of nationality or residence or place where the injury occurred, in granting to such persons, in accordance with its legal system, access to judicial or other procedures, or a right to claim compensation or other relief in respect of significant harm caused by such activities carried on in its territory.

Signed at Windhoek, Namibia, on the 7<sup>th</sup> of August 2000 in three original texts in the English, French and Portuguese languages, all texts being equally authentic.

*(The Protocol was signed by Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe; not signed by DR Congo.)*

A copy of the full document can be obtained from: [http://www.sadc.int/index.php?action=ar001&page\\_id=protocols\\_shared\\_watercourse\\_revised](http://www.sadc.int/index.php?action=ar001&page_id=protocols_shared_watercourse_revised)