

Chapter 4

DESCRIPTIVE OVERVIEW AND ANALYSIS OF THE SOUTH AFRICAN CASE STUDY

4.1 Introduction

The theoretical framework established that water resource management could become securitized under certain conditions (see Chapter 2) and a Securitization Model was developed (see Figure 3). Generally this happens when water deficit threatens the economic growth potential of a state, thereby elevating this to the level of a possible national security concern. In the quest for improving security of supply (in a hydrological sense), insecurity is merely cascaded elsewhere into the international river basin (in a hydropolitical sense), with a strong possibility of a zero-sum outcome if left unchecked. It was subsequently shown that even in the face of possible securitization, there is also a process of desecuritization at work within closed (or closing) international river basins (see Chapter 3) and a Desecuritization Model was developed (see Figure 6). Central to this is the role and function of regimes as key elements in the desecuritization dynamic. It was also shown that a critical element of regime creation is the existence of second-order resources in sufficient quantities and of specific types, of which technical ingenuity and social ingenuity are the most important. An Adaptive Security Spectrum for South Africa's Co-riparian States was developed as a result (see Figure 14). It now remains to be seen to what extent securitization, desecuritization and regime creation has been a feature of South Africa's international river basins. This chapter introduces the physical features that make water resource management somewhat challenging in the South African case. It also provides a descriptive overview and analysis that serves to contextualize the management of international river basins within the broader South African political environment in order to provide the necessary background for the subsequent analysis of the hydropolitical processes that occurred as a result.

4.2 South African Climatological Features

There is a direct causal relationship between climate, geography and the natural characteristics of various river basins globally. It is this causal linkage that makes every international river basin somewhat unique, defying attempts at scientific generalizations. In the case of South Africa, there are a number of specific factors that interact, causing a

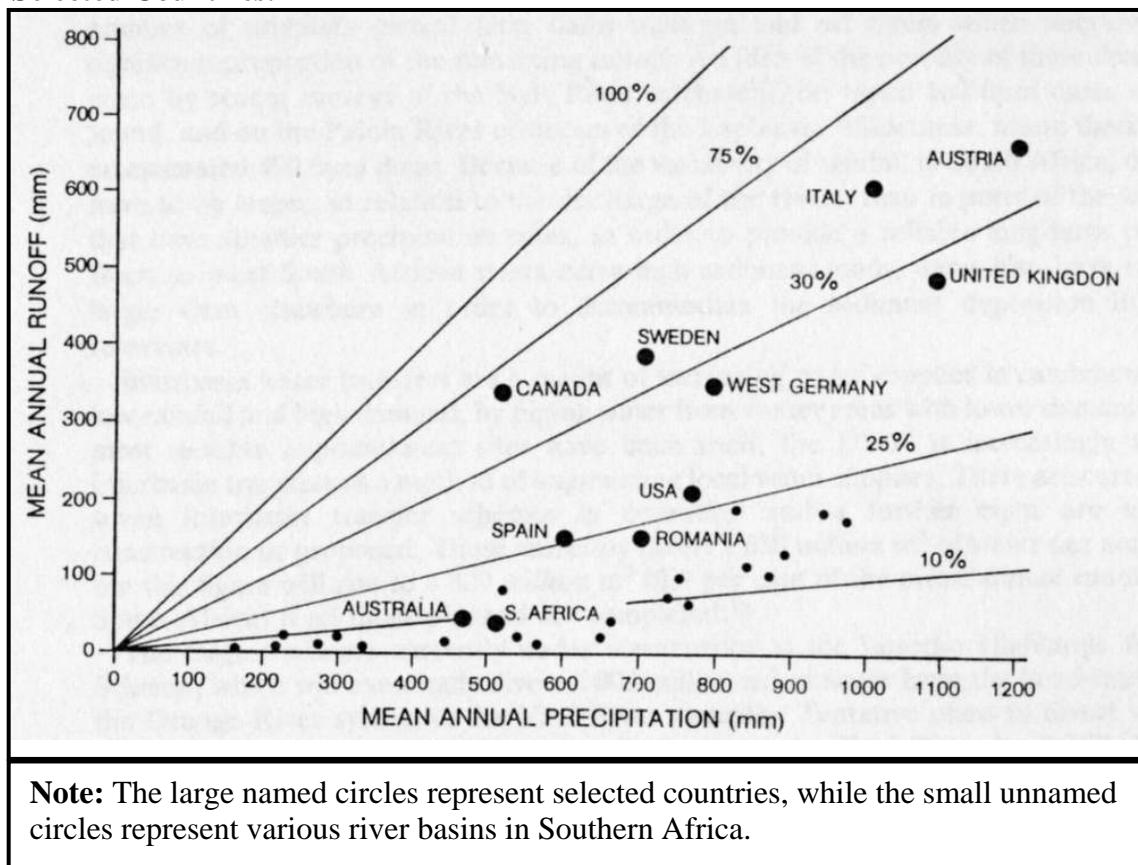
convergence of geophysical processes, which create the unique set of developmental challenges confronting the country. Given that development is about prioritization, wealth creation and the extraction of natural resources, it is also a profoundly political process because it determines who gets what, when, where and how. It is this political context that brings together the physical attributes created by geography, and the various challenges such as the need to create an infrastructure on which all national development aspirations are to be based. In short, in the hydropolitical context, it is these factors combined that drive the hydraulic mission of society. It is therefore necessary to understand these geophysical factors before any sense can be made of the hydropolitical processes inherent in the broader range of political dynamics of the country.

South African shores are washed by two ocean currents, which are fundamental drivers of the climate in the country. The cold Benguela Current flows northwards from the Antarctic along the west coast, which results in the adjacent Namib and Kalahari Deserts. These deserts¹ develop when cold air blows from the sea onto the warmer landmass (called a sea breeze), which is a climatological condition that is not conducive to precipitation. The warm Agulhas Current flows southwards from the tropics, bringing high levels of precipitation along the eastern parts of the country. This occurs when warm, moist air blows off the ocean, and cools as it moves over the landmass, which is a climatological condition that results in precipitation, particularly around mountains and escarpments such as those found in the eastern portion of South Africa. There is a marked gradient of precipitation in South Africa, with higher levels of rainfall occurring in the north and tapering off dramatically to the south, with a similar gradient from east to west. High rainfall is thus concentrated along a narrow band coinciding with the escarpment along the east coast (known as orographic precipitation). The average annual precipitation is 497 mm, compared to the world average of 860 mm, and this is unevenly distributed with 65% of the country receiving less than 500 mm of rainfall annually, and 21% receiving less than 200 mm (Rabie & Day, 1992:647). Aridity is thus the prevailing condition in South Africa with drought being part of the normal climatological cycle, and has been this way since modern recorded time (Brown, 1875; Brown, 1879).

¹ This is a global phenomenon and is not unique to Southern Africa. Wherever a cold ocean current washes a given shore and there is a prevailing sea breeze, there is a desert adjacent to that ocean current. Examples are the Patagonian Desert of South America, the Mojave Desert of North America and the Australian Desert, all of which are surrounded by a semi-arid transition zone.

In addition to the maldistribution of precipitation in South Africa, there is also a very high evaporative demand from the atmosphere, ranging from 1,100 mm in the north-east to more than 3,000 mm along the west coast, always well in excess of the annual precipitation that occurs (Rabie & Day, 1992:647). The final result of this is a very low ratio of mean annual runoff (MAR) when compared to mean annual precipitation (MAP) (see Figure 16). When compared to other countries, the MAR to MAP ratio for South Africa is amongst the lowest for any populated region in the world (O’Keeffe *et al.*, 1992:277; Rabie & Day, 1992:647).

Figure 16. Ratio of Mean Annual Runoff to Mean Annual Precipitation for Selected Countries.



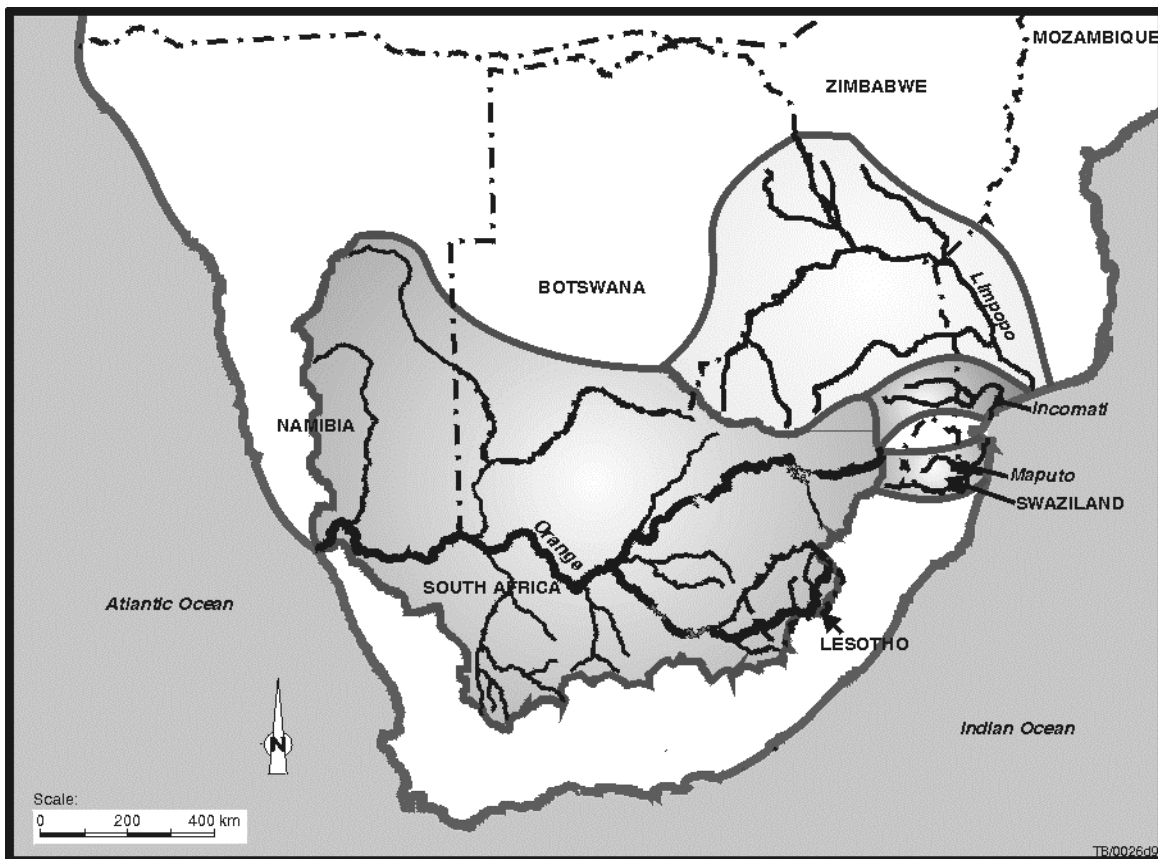
Source: O’Keeffe *et al.*, 1992:281.

Total MAR from South Africa is estimated at around $53,500 \times 10^6 \text{m}^3 \text{yr}^{-1}$, of which approximately 60%-62% ($33\,000 \times 10^6 \text{m}^3 \text{yr}^{-1}$) can be economically exploited (O’Keeffe *et al.*, 1992:278; Rabie & Day, 1992:647). Stated differently, the MAR (water that actually reaches the rivers and becomes streamflow) in South Africa represents only 10% of the MAP (Rabie & Day, 1992:647). In South Africa, 60% of the MAR arises from just 20% of the total land area - mostly the highlands and escarpment to the east of the

country. The economic exploitability of these water resources is further exacerbated by the fact that precipitation patterns are highly variable in South Africa, with consecutive sequences of up to ten years when less than average rainfall occurs (Rabie & Day, 1992:647).

South Africa has the most developed economy in the entire SADC region, and shares 4 international river basins with its 6 co-riparian neighbours. Approximately 60% of the geographic area of South Africa is covered by these 4 international river basins - Orange, Limpopo, Incomati and Maputo - which also represent the most developed transboundary watercourses in the entire SADC region (Basson, 1999). The physical location of these international river basins is shown in Map 7.

Map 7. South Africa's International River Basins.



Source: Basson 1999.

Within the geographical confines of these 4 international river basins, around 32% of the total South African MAR occurs, which supports the generation of approximately 70% of the South African gross national product (GNP) (Basson, 1999:3). In addition to this, a

staggering 90% of the electricity supply in South Africa is generated (which in turn is about half of the electricity generated on the entire African continent), and almost all of the mining activity on which the overall economy is based occurs in these international river basins (Basson, 1999:3). These 4 international river basins are also in close physical proximity to one another, all sharing a common watershed that runs through the Gauteng area where the vast majority of the economic activity is physically located.

Comparative statistics for all of South Africa's international river basins are shown in Table 15.

Table 15. Comparative Statistics for South Africa's International River Basins.

	Orange	Limpopo	Incomati	Maputo
Total Basin Area	964 000 km ²	183 000 km ²	50 000 km ²	35 000 km ²
Average Mean Annual Runoff for the whole basin	11 200 x 10 ⁶ m ³ yr ⁻¹	5 750 x 10 ⁶ m ³ yr ⁻¹	3 600 x 10 ⁶ m ³ yr ⁻¹	3 900 x 10 ⁶ m ³ yr ⁻¹
Basin Area for South Africa	62% (59%)	45% (44%)	62% (61%)	56%
Mean Annual Runoff contribution by South Africa	55% (56%) Uncontested	81% (66%) Contested	81% (64%) Contested	56%
Basin Area for Botswana	9% (11%)	20% (21%)	Nil	Nil
Mean Annual Runoff contribution by Botswana	0% (0%) Uncontested	3% (6%) Contested	Nil	Nil
Basin Area for Zimbabwe	Nil	15% (15%)	Nil	Nil
Mean Annual Runoff contribution by Zimbabwe	Nil	7% (16%) Contested	Nil	Nil
Basin Area for Mozambique	Nil	20% (19%)	33% (33%)	10%
Mozambique contribution to Mean Annual Runoff	Nil	9% (12%) Contested	6% (16%) Contested	6%
Basin Area for Swaziland	Nil	Nil	5% (6%)	34%
Swaziland contribution to Mean Annual Runoff	Nil	Nil	13% (20%) Contested	38%
Basin Area for Lesotho	4% (3%)	Nil	Nil	Nil
Lesotho contribution to Mean Annual Runoff	41% (40%) Uncontested	Nil	Nil	Nil
Basin Area for Namibia	25% (27%)	Nil	Nil	Nil
Namibia contribution to Mean Annual Runoff	4% (4%) Uncontested	Nil	Nil	Nil
Note: Data shown in parenthesis is taken from Savenije & van der Zaag (1998:30) and is used to illustrate the contestable nature of data in some hydropolitical settings.				

Source: Adapted from Basson 1999 and Savenije & van der Zaag 1998:30.

It is apparent that the physical size of each international river basin has a rough correlation with the actual streamflow in each river. The largest basin in terms of surface area is the Orange, followed by the Limpopo, Incomati and Maputo in descending order. The two largest basins - Orange and Limpopo - also link the 4 most economically developed states in the SADC region - South Africa, Botswana, Namibia and Zimbabwe - all of which are also reaching the limits of their available water resources. This means that water deficit is a common problem confronting all of these states, and can have the undesirable impact of decreasing the economic growth potential of these countries, raising the issue to one of national strategic importance to all riparians.

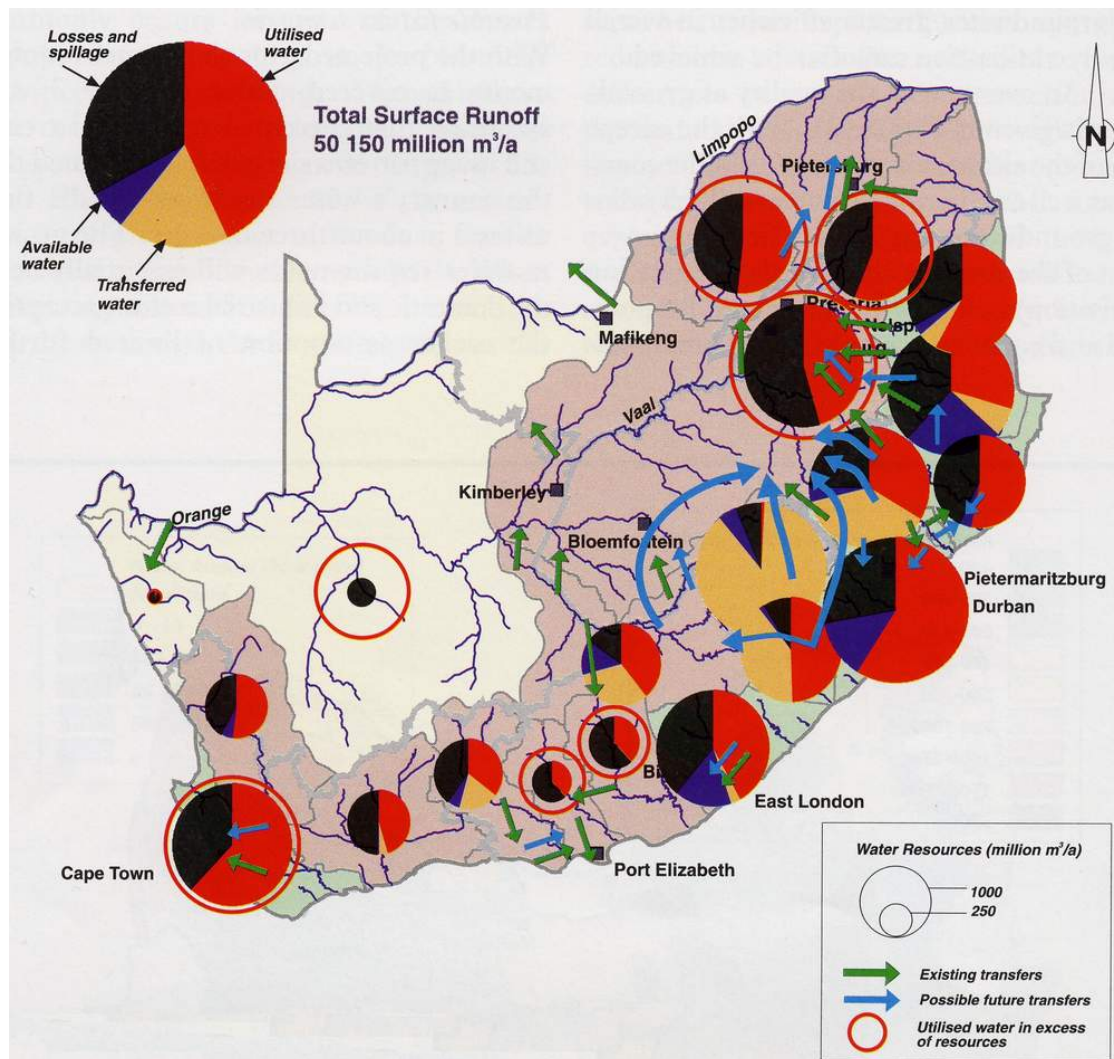
4.3 The Impact of Climatic Conditions on Water Resource Management

As a result of the prevailing climatic conditions, South African rivers are extremely variable, with a great range between high and low flow conditions. Specifics will be dealt with under each individual river basin, but for now it is necessary to note 3 strategic implications of this variability. Firstly, the availability of water has generally dictated the economic development options in the past. Secondly, drought is common, which means that storage of water is a fundamental component of the water resource management strategy for all riparian states in the various international river basins. It is significant to note that the *World Commission on Dams Report* listing the top twenty countries in the world by number of large dams places South Africa in eleventh position and Zimbabwe in twentieth position (WCD, 2000:370). The same report places South Africa in seventh position globally in terms of dams for water supply and ninth position in terms of dams for irrigation (WCD, 2000:373), which is a strong reflection of the extent of its hydraulic mission. Thirdly, given the above two aspects, IBTs are a key component of the South African hydraulic mission.

The relevance of these 3 implications becomes more apparent if possible future scenarios for water utilization in South Africa are considered (see Map 8). The importance of IBTs as a means of alleviating local water scarcity in individual catchments is codified in the *National Water Act* (1998:22). Chapter 2, paragraph 6(g) of the *National Water Act* calls for the provision of “inter-catchment water transfers between surplus Water Management Areas (WMAs) and deficit WMAs” as part of the National Water Resource Strategy. This means that water is managed as a national resource in South Africa, with the need to move water around the country recognized by law, which is somewhat at odds with the prevailing international norm of managing each river basin as in integral hydrological

unit. Attention is drawn to the strategic importance of the rivers that lie to the east of the escarpment, and therefore carry the majority of the unexploited MAR (see Map 8). This is shown as the colour orange in the respective pie chart, making the east-flowing rivers in effect the target for future resource capture. Note should also be taken of the existence of 7 economically important centers in this scenario that will be utilizing water in excess of the resource availability, as well as the existence of the large number of existing and proposed IBTs that cascade water from the eastern watersheds into the economically active areas of South Africa (see Maps 8 & 9).

Map 8. Scenario for the Utilization of River Water in 2030.



Source: Basson *et al.*, 1997:62.

Table 16. Inter-basin Transfers of Water Involving International River Basins in South Africa.

Name of Transfer Scheme	Source International Basin	Recipient International Basin	Average Transfer ($10^6 \text{m}^3 \text{yr}^{-1}$)	Use
Vaal - Crocodile	Orange	Limpopo	615	Industrial, Domestic
Vaal - Olifants	Orange	Limpopo	150	Industrial (ESCOM)
Olifants - Sand	Limpopo	Limpopo	30	Pietersburg
Crocodile - Limpopo	Limpopo	Limpopo	6	Gaborone
Komati - Olifants	Incomati	Limpopo	111	Industrial (ESCOM)
Usuthu - Olifants	Maputo	Limpopo	81	Industrial (ESCOM)
Assegaai - Vaal	Maputo	Orange	81	Industrial, Domestic
Buffalo - Vaal	Non International Basin	Orange	50	Industrial, Domestic
Thukela - Vaal	Non International Basin	Orange	630	Industrial, Domestic
Orange - Buffels	Orange	Non International Basin	10	Industrial, Domestic
Orange - Lower Vaal	Orange	Orange	52	Irrigation, Domestic
Orange - Riet	Orange	Orange	189	Irrigation
Orange - Fish	Orange	Non International Basin	643	Irrigation, Domestic, Industrial
Fish - Sundays	Orange <i>via</i> Fish	Non International Basin	200	Irrigation, Domestic
Caledon - Modder	Orange	Orange	40	Industrial, Domestic
LHWP (1A)	Orange	Orange	574	Industrial, Domestic
LHWP (1B)	Orange	Orange	297 (by year 2003)	Industrial, Domestic

Source: Adapted from Basson *et al.*, 1997:54 and verified by Department of Water Affairs and Forestry.

Given the strategic importance of IBTs in the overall South African development context, this challenges the internationally emerging norm inherent to IWRM that sees each river basin being managed as a hydrological unit. The extent of IBT development involving international river basins in South Africa is shown in Table 16 and on Maps 8 & 9.

Map 9. South African Water Management Areas Showing Inter-basin Transfers.



Source: Department of Water Affairs and Forestry.

The significance of these facts on the overall securitization dynamic becomes apparent in an official DWAF document entitled *Overview of Water Resources Availability and Utilization in South Africa* that lists future options on the availability and utilization of water in South Africa. This reads as follows:

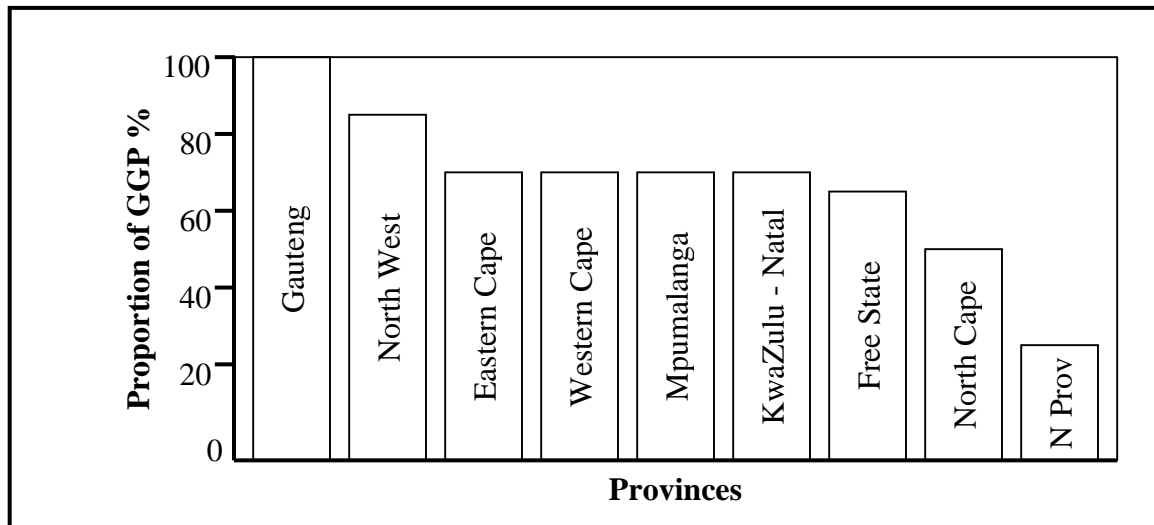
“Importation of water from large under-utilized rivers within reasonable proximity of South Africa could most likely be a viable and sustainable option for the augmentation of local water resources. Because of its size and northern location, the Vaal River System would probably be the logical recipient basin. The Zambezi River is the only river that is reasonably close and of sufficient size to serve as a source for the importation of water. ... A further option is the importation of water from the higher lying southern

tributaries of the Zaire River, through the Zambezi River, to South Africa” (Basson *et al.*, 1997:67).

This is clearly a manifestation of the strategic importance of water for South Africa’s future economic growth and prosperity, with elements of this supply-sided management approach forming a fundamental component of the South African hydraulic mission.

The existing complexity of water resource management at the national level is shown on Map 9, which indicates all major IBTs between official WMAs. Attention is drawn to the fact that almost all river basins are connected by IBT, with water generally being cascaded from the southeast to the northwest across the eastern escarpment, spanning the spatial and temporal disparity between population settlement and natural water availability. Intra-basin Transfers within each WMA are not shown on this map.

Figure 17. Proportion of Gross Geographic Product of Each Province Supported by Inter-basin Transfer of Water in South Africa.



Source: Redrawn from Basson *et al.*, 1997:55.

The local economies in the various South African provinces are heavily reliant on water that has been imported from other river basins by means of IBT (see Figure 17). No less than 8 of the provinces are reliant on IBT water for 50% or more of their Gross Geographic Product (GGP), with 6 having more than 60% of their provincial economic activity totally dependent on this supply of water. Exogenous water, supplied by means off IBTs, is therefore the lifeblood of the South African economy, which would simply collapse if this source of supply were no longer secured, raising water resource management to a strategic issue of great national importance.

4.4 Brief Hydropolitical History of South Africa

In order to assess the relevance of water resource development in South Africa, it is necessary to first understand key elements of the hydropolitical history of the country. These historic elements have provided fundamental drivers of contemporary hydropolitical dynamics in the international river basins under review. As a point of departure, the following quotations encapsulate the key elements of the broader background of international relations in the Southern African region, and lay the foundation for the subsequent assessment of the hydropolitical dimension.

“Except for Angola, the black states in the region are economically closely tied to, and in many cases heavily dependent on, South Africa. In military terms, [South Africa] is ... the regional leviathan. On the political/ideological level, South Africa is seen by the black states as the last remnant of racism and white minority rule in Africa. In addition, South Africa is regarded as something of a colonial power too, maintaining its control of Namibia. ... Being economically dominant is a feature, which in itself can easily give a state the image of a ‘bully’. Add to this [South Africa’s] military supremacy and its political/ideological distance from its neighbours, and the scene is set for heavily strained relationships. The black states also widely believe that South Africa is bent on keeping them economically and militarily weak ... [which] they see as part of South Africa’s strategy to create a regional environment conducive to the perpetuation of the *status quo* in [South Africa]. ... Relations between South Africa and the black states are, on both sides, characterized by suspicion, fear and even a strong dose of paranoia. Each sees its security and stability threatened by the other; each side ... perceives itself the target of destabilization by the other” (Geldenhuis, 1982:48-49).

“The development of economic cooperation with South Africa, including possibly water supply from the Okavango, is likely to reinforce the respect of mutual interests which exists [between South Africa and Botswana]. A security agreement is pending. ... Water, amongst other things, is an issue between Lesotho and South Africa. Pretoria has used failure to reach a firm agreement with Lesotho on security issues, ... to delay a feasibility study on the Highlands Water Project. ... South African technicians involved were actually withdrawn from Lesotho at that time. ... [T]his is an excellent example of the two-pronged approach of South Africa to its problems – military strength, which has actually been used against targets in Lesotho, coupled with the carrot of development” (Gutteridge, 1985a:100).

In attempting to analyze the hydropolitical drivers, a brief description of 3 distinct phases of political dynamics will be made, in order to lay the foundation for the subsequent analysis of the international river basins spanning the country. The hydropolitical dynamics of South Africa can be broken down into 3 distinct time periods.

(a) *Genesis of the hydropolitical dimension*: The period prior to 1974 covers the genesis of the hydropolitical dimension of South African international relations with the birth of the hydraulic mission as a fundamental driver.

(b) *From Détente to Total Onslaught*: The period from 1974 to 1990 covers the era of transition from a policy of *Détente* to the emergence of the official approach that was known as the *Total National Strategy*.

(c) *Post-Cold War era*: The post-1990 period covers the ending of the Cold War and the collapse of apartheid in South Africa, both of which resulted in a reduction of the impact of overlay in the SADC region.

4.4.1 Genesis of the Hydropolitical Dimension

It can be said that the roots of South African international relations, particularly with respect to other states in the Southern African region, date back to the Anglo-Boer War (or the closing of the frontier), but for brevity details of this will be excluded (see Turton *et al.*, 2003).

In 1948 the National Party (NP) won an election victory in South Africa. This was seen as a major triumph for the Afrikaners with strong nationalist sentiments, many of whom still had living memory of their defeat in the Anglo-Boer War and their subsequent treatment in the British concentration camps. So in 1948 the political power that was lost in the Boer War was returned to the Afrikaners, who immediately set about consolidating their position by implementing the policy of Grand Apartheid. While the hydropolitical dimension of South African politics was in its formative stages prior to 1948, it was not yet strongly articulated during this time, so it cannot be seen as an independent variable in the context of the current study (Turton *et al.*, 2003). The earliest known record of water resource management in South Africa can be traced back to two books, both of which were written by J.C. Brown, a botanist at the Cape Town Botanical Gardens, in the 1870s (Brown, 1875; Brown; 1877). The first of these was entitled *Hydrology of South*

Africa; or Details of the Former Hydrographic Condition of the Cape of Good Hope, and Causes of its Present Aridity, with Suggestions of Appropriate Remedies for this Aridity and was published in 1875. The second book was entitled *Water Supply in South Africa and the Facilities for the Storage of it* and was published in 1877. These dates are significant because this corresponds with the closing of the South African frontier (see Turton *et al.*, 2003). The contents of the two books deal extensively with conditions of aridity, drought and floods - factors that are still relevant in contemporary times.

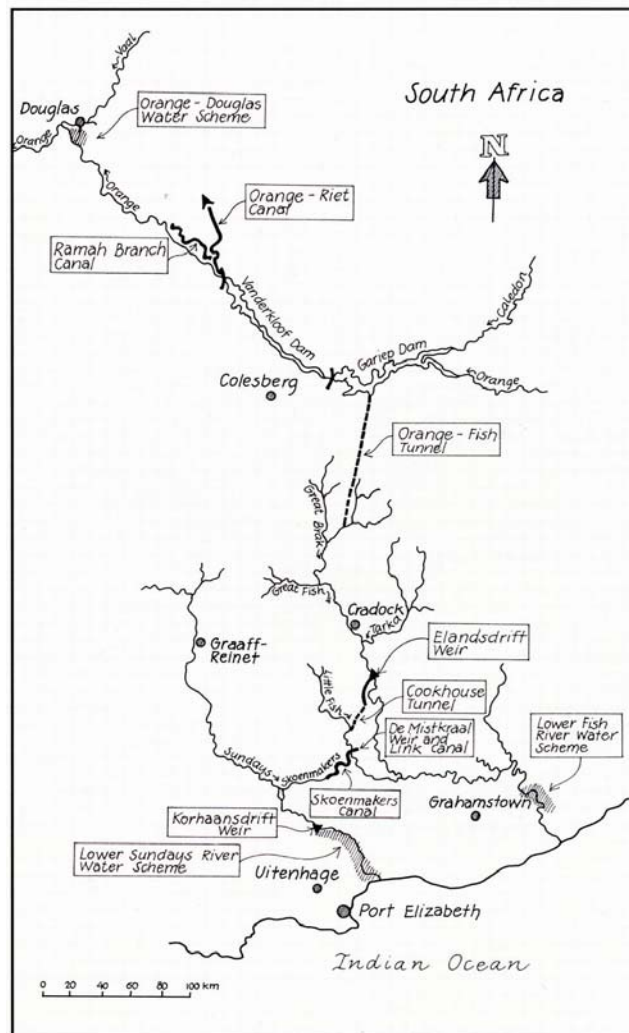
Economic development was high on the agenda when the NP came to power, given the impact of the Anglo-Boer War and the Great Depression, but without water this would be impossible. For this reason early reconnaissance work was begun on the hydrology of Basutoland as a possible source of water for the South African goldfields and their related industrial complex (Ninham Shand, 1956). It was against this socioeconomic background that British Prime Minister Harold Macmillan made his “Winds of Change” speech in the Cape Town Parliament, which referred to the strong desire for independence that was emerging in the former colonies (Geldenhuys, 1984:11). This set the scene for South Africa’s systematic political and economic isolation. Events unfolded rapidly after the Sharpeville massacre in which sixty-nine people were killed and one hundred and eighty wounded, which took place shortly after Macmillan’s speech (Spitz & Chaskalson, 2000:7). The UN Security Council adopted a resolution that mandated the visit by Secretary General Hammarskjöld to South Africa. The 1961 Commonwealth Conference in London saw Prime Minister Verwoerd trying to defend South African racial policies, leading ultimately to its expulsion (withdrawal under duress), which for many Afrikaners was final vindication of their Boer War defeat (Geldenhuys, 1984:24 & 205). This laid the foundation for what has been described as a “garrison state” (Frankel, 1984:30). When Ian Smith, the Rhodesian Prime Minister, announced the Unilateral Declaration of Independence (UDI) of Rhodesia from Britain, South Africa immediately offered its support. This determined the patterns of conflict that were to be unleashed from that moment onwards, with long-term repercussions in the hydropolitical domain.

Sharpeville also reverberated around South Africa, with the banning of the African National Congress (ANC), Pan Africanist Congress (PAC) and the imprisonment of leaders like Nelson Mandela and others. This dramatic series of events saw the birth of the “armed struggle” in the face of the apparent failure of Gandhi-styled passive resistance. The now famous 1964 Rivonia Trial that convicted Nelson Mandela and others was a direct outcome of this series of events (Spitz & Chaskalson, 2000:7). On the

water and development side of the hydropolitical equation, the South African focus of attention again turned to Basotholand, but this time as a source of water for the rapidly growing industrial complex in the Witwatersrand that was outstripping the capacity of the Vaal basin (Young, 1961; Carter, 1965).

At the same time, the Orange River Project (ORP) was launched, which was designed to transfer water from the Orange River downstream of Lesotho, through the escarpment into the Fish River, and then across another catchment into the Sundays River (Conley & van Niekerk, 1998:145) (see Map 10).

Map 10. The Orange River Project.



Source: Pallet *et al.*, 1997:60.

This has a profoundly political undertone to it as it was designed to restore investor confidence in South Africa in the post-Sharpeville period, and it can probably be regarded as the actual birth of the South African hydraulic mission. The strategic importance lies in the fact that the ORP started to make inroads into the economic underdevelopment in the so-called “border” area, which was the geographic home of the “armed struggle”, thereby designed to stem the flow of impoverished militants to the military wings of the respective liberation movements. One dam in the ORP, which was called the H.F. Verwoerd Dam as testimony to the political significance of this project, was completed in 1971 and is still the largest reservoir by volume in South Africa. It has since been renamed the Gariiep Dam. The 5,35-m diameter, 82,8-km long delivery tunnel was the longest in the world at that time and today sustains a major economic hub around the city of Port Elizabeth that would otherwise not have been possible to develop (Conley & van Niekerk, 1998:145). The ORP was hailed as a triumph of Afrikaner independence and technical ingenuity at the time.

In 1966 the guerilla war was launched in South West Africa, significantly drawing South African security forces into the Caprivi Strip where the Okavango and Zambezi form a water-rich haven in the midst of surrounding aridity (Frankel, 1984:102). Faced with this reality, which was manifest as increasing isolation for South Africa, diplomatic contact with Black Africa was deemed to be vital. One of the targets of this period of *détente* or peaceful coexistence was Chief Leabua Jonathan, who was destined to become the Prime Minister of Lesotho, when it gained its independence in 1966 (Geldenhuys, 1984:19). Strong relations were forged with him, and he was even regarded as being a South African *protégé*, until this began to sour (Geldenhuys, 1982:48). In an attempt to divert growing criticism of his own domestic political style, Jonathan became one of South Africa’s strongest critics, openly declaring his support to the liberation struggle. This was a diplomatic slap in the face for South Africa.

Early aspects of the water, economic development and energy nexus can be found in two agreements between South Africa and Portugal during 1969. The first was on the Cahora Bassa Project on the Zambezi River in Mozambique, while the second was on the Cunene River (Treaty, 1969a; Treaty, 1969b). Both saw the need to mobilize water resources on a grand scale in order to create the necessary energy infrastructure on which subsequent economic developments could be based. They also laid the foundation for a regional network of water resource projects that were to have far-reaching implications for Southern Africa as a whole.

In 1970 the Jonathan government was toppled in a military *coup d'état* and Lesotho was plunged into political crisis. The State Security Council (SSC) was established in South Africa during 1972 against the background of this rising insecurity (Gutteridge, 1994:215). This was later to become an extremely important organ in the formulation of South African foreign policy (Geldenhuys, 1984:93). The end of this period is characterized by the deterioration in the threat perception and the publishing of the 1973 *White Paper on Defence*, which for the first time introduced the concept of a “total strategy” (Republic of South Africa, 1973; Geldenhuys, 1984:140). The height of the *détente* era occurred in 1975 with the Victoria Falls Bridge meeting between the intransigent Rhodesian government and Black nationalists, which had been made possible by the interaction between Prime Minister Vorster of South Africa and President Kaunda of Zambia (Geldenhuys, 1984:39).

4.4.2 From *Détente* to *Total Onslaught*

Similar to the 1960 period, when a series of events rapidly shaped a transition phase, 1974 can be called a watershed year in a political sense. The start of this was signaled by the *coup d'état* in Portugal (Geldenhuys, 1984:78). This event, taking place thousands of kilometers away from Southern Africa, set off a domino-effect that was associated with the rapid decolonization of the former Portuguese territories. White Africa was getting smaller, so Macmillan's “Winds of Change” were apparently becoming a real phenomenon. The fact that in each of the former Portuguese colonies, there was an unfinished war of liberation, and the speed with which the decision was made and executed, left no time to prepare for an interim administration. The effect was startling. Overnight the Angolan War of Liberation turned into the Angolan Civil War, which became the longest running civil war in Southern Africa. This raged on for more than a quarter century, although there are indications that it is now coming to an end with the signing of the Memorandum of Understanding on 4 April 2002 (Porto & Clover, 2003:65). South Africa was irretrievably drawn into this with the launch of Operation Savannah (Geldenhuys, 1984:79), which saw South African soldiers cross the border, to become a feature of the political landscape for the next few decades. Alarm bells were sounded as the regional balance of power changed overnight (Gutteridge, 1983:35). The Rhodesian Bush War was already ongoing, and virtually overnight a second front was opened up along the border with Mozambique. The Cahora Bassa Project immediately became a target for military attack, with the long power lines to South Africa proving

impossible to defend. This drew in South African military support, further strengthening the garrison state mentality that had already taken root in South Africa (Frankel, 1984:30). The South African border with Mozambique, a short distance from Pretoria, became a military frontline. Enthused by this series of events, youths took to the streets, angry at the apparent inability of the older generation to liberate South Africa, and the now famous Soweto Riots occurred on 16 June 1976. As with the Sharpeville Massacre, security force retaliation was swift and brutal.

The 1977 *White Paper on Defence* was largely devoted to refining the concept of a *Total National Strategy*, first mooted in 1973, as an official policy (Republic of South Africa, 1977). This defined a *Total National Strategy* as being “the comprehensive plan to utilize all the means available to a state according to an integrated pattern in order to achieve the national aims within the framework of specific policies” (Geldenhuys, 1984:140). This total strategy had its roots in the counter-revolutionary experiences of the Americans in Vietnam, the British in Malaya, and the French in Algeria and Indo-China. The term “total strategy” is derived directly from André Beaufre’s work *An Introduction to Strategy* (Frankel, 1984:46). As such it resonated well with the security elites in the emerging South African garrison state, with its peculiar threat perception that interpreted the Cuban and East German support of the African liberation movements in Southern Africa, as being evidence of a *total onslaught*, driven by Soviet imperialism (Frankel, 1984:55). This saw the development of a two-pronged approach to security-related issues, and heralded the start of the gradual securitization of water resource management. The one element was based on a strong military response to any threat, supported by destabilization through economic means (Gutteridge, 1983:38). The olive branch of economic development thus became securitized with far-reaching ramifications. This was given greater structure when P.W. Botha produced a 12-point plan for survival at the NP Congress in 1979 (Gutteridge, 1985a:93).

Central to this *Total National Strategy* was economic development and the resultant dependencies that would emerge from this. The foundation for this thinking can be traced to the speech made by Prime Minister Vorster in 1974, in which he spoke of a power block of states (Geldenhuys, 1984:39). This was subsequently refined when he spoke of a constellation of politically independent states maintaining close economic ties. When P.W. Botha came to power, he used what he called a Constellation of Southern African States (CONSAS) as the basis of his policy (Geldenhuys, 1984:41). Foreign Minister “Pik” Botha subsequently announced in 1979 that this vision embraced some forty

million people south of the Cunene and Zambezi Rivers all joining forces to design a common approach to the security, economic and political field.

During the same year, a scheme to divert up to $3,000 \times 10^6 \text{m}^3 \text{yr}^{-1}$ of water from the Zambezi, through the Thamalakane and Boteti Rivers in the lower Okavango basin downstream of the Delta was found to be economically competitive with the Tugela-Vaal scheme (Scudder *et al.*, 1993:263; Midgley, 1987:15). This project, designed to abstract water from the Chobe River (a tributary of the Zambezi in close proximity to the Okavango Delta) and feed it down to South Africa, where it would account for 130% more than was currently available in the Vaal River basin at the time, became an element of this emerging strategy (Trolldalen, 1992:138). Given the fact that Botswana would benefit from this project, this served to mute their opposition to South Africa's policy of apartheid. Another study from the same period found that as much as 7% of the Zambezi River MAR at Katima Mulilo ($95 \text{m}^3 \text{s}^{-1}$) could be diverted to South Africa, without having to develop storage facilities on the Zambezi River itself (Basson, 1995:46; van der Riet, 1980). The water, economic development and state security nexus was becoming stronger, with augmentation plans becoming increasingly sophisticated and ambitious.

At the Lancaster House Conference in late 1979, the foundation was laid for the cessation of hostilities in Rhodesia. Bishop Abel Muzorewa was widely tipped to win the elections. It therefore came as a great shock to the security elites in Pretoria when Robert Mugabe swept to victory in 1980. Mugabe immediately announced that he had no intention of joining the proposed CONSAS. Instead Zimbabwe, along with Botswana, Lesotho, Swaziland, Mozambique, Angola, Zambia, Malawi and Tanzania, joined forces in the Southern African Development Coordination Conference (SADCC), which was formally launched in Lusaka during 1980 (Pallett *et al.*, 1997:70). This new grouping was specifically designed to reduce their combined dependence on South Africa, and was quickly dubbed the "counter-constellation" (Baynham, 1989:88; Conley & van Niekerk, 1998:145; Geldenhuys, 1984:41). The establishment of SADCC was thus a direct response to South Africa's policy of destabilization. The linkage between water and development became manifest at the Fourth SADCC Consultative Conference which was held in Lusaka during 1984. Opening the conference, President Kaunda of Zambia said that the effects of water scarcity and drought had resulted in food deficits and poor prospects for agricultural development in Southern Africa (Africa, 1984).

The emergence of this *Total National Strategy* approach saw South African foreign policy becoming captive to the SSC, which had an all-consuming security focus to it (Frankel, 1984:149). Seen in this light, every aspect of foreign relations became securitized, including cooperation over water resources. An example of the impact of the *Total National Strategy* in the water sector can be found in a paper that was written by the Chief Engineer of the Rand Water Board (RWB), who used the concept to contextualize the need for the South African economic heartland to gain access to secure supplies of water (James, 1980). Listed in this document are IBT schemes such as the Lesotho Highlands Water Project (LHWP), the Tugela-Vaal link and the mooted Okavango development. Significantly, gaining access to the Okavango is referred to in the context of CONSAS, indicating the strategic relevance of water in terms of this overall policy (Blanchon, 2001:123). This is the basis of the “pipelines of power” thesis where political power is seen to result from the construction of major water transfer schemes in semi-arid areas as part of an aggressive hydraulic mission (Turton, 2000b).

In 1980 the armed struggle intensified after an announcement to this effect by the ANC during festivities to mark the occasion of its seventy-eighth anniversary (Gutteridge, 1990:167). A hostage incident at a bank in Silverton involving armed guerillas, along with a rocket attack on the South African Coal and Oil Company (SASOL) refinery, and the subsequent derailment of a train near Richards Bay, all came in quick succession (Gutteridge, 1981:5). This was punctuated by the political energy that the newly-independent Zimbabwe had given to the creation of SADCC, which was “devoted to mutual cooperation for development, and the reduction of members’ collective dependence on South Africa” and therefore seen as further evidence of the *total onslaught* (Geldenhuys, 1984:41; Simon, 1991:205).

In 1981 the first military retaliation was launched, with a South African Defence Force (SADF) Special Forces raid on ANC bases at Matola near Maputo in Mozambique (Geldenhuys, 1984:140; Gutteridge, 1981:14). This was followed in 1982 with retaliatory attacks against ANC targets in Maseru, Lesotho (Gutteridge, 1983:35). These signaled that South Africa was not prepared to countenance what they perceived as being terrorist or guerilla bases in neighbouring states using rhetoric that resembles the contemporary US-led “War on Terror” (Geldenhuys, 1982:47). This was manifest in subsequent attacks on targets in Angola, Mozambique, Lesotho, Botswana and Zimbabwe. A Southern African Defence Zone was conceived embracing Namibia, Botswana, Swaziland and Zimbabwe to counter the presence of East German troops in Angola and Mozambique

(Gutteridge, 1981:19). This marked an escalation in South African destabilization tactics, involving both military action and economic pressure with the entire Southern African region becoming a theatre of operations (Geldenhuys, 1982:43). This approach simply strengthened SADCC resolve to liberate their members from the stranglehold of South African economic power (Geldenhuys, 1982:47). Swaziland was seemingly exempt from this practice because it seemed never to become deeply embroiled in activities that were deemed to be a security risk to South Africa (Geldenhuys, 1982:46).

In 1983 a car bomb was detonated in front of Department of Military Intelligence (DMI) Headquarters in Pretoria with significant casualties. This marked the escalation of the conflict into previously neutral areas, as evidenced by the subsequent bombing of the ANC offices in London, assassination attempts on ANC figures in Brussels, and the actual assassination of Dulcie September, an ANC representative in Paris. This series of events had unforeseen consequences, and South Africa increasingly became isolated as a pariah state, associating closely with the experiences of Taiwan and Israel (Frankel, 1984:65; Geldenhuys, 1990:206). Central to this association was the notion that these states were strategic pillars against a global Marxist onslaught that the Free World would not be able to ignore, which was a cornerstone in the *Total National Strategy* rationale (Geldenhuys, 1984:116).

This round of “tit-for-tat” exchanges ushered in a new era when in 1984 the South African constitution was changed and P.W. Botha was elevated to the status of Executive President. During the buildup to this constitutional watershed event, a security agreement between South Africa and Swaziland was reached, supported by an economic cooperation agreement (Treaty, 1982; Treaty, 1983b). This was followed shortly afterwards when the *Nkomati Peace Accords* (Treaty, 1984a) were signed by President Samora Machel of Mozambique and Prime Minister P.W. Botha of South Africa, during March 1984 (Gutteridge, 1985a:94). Water was intimately linked to the *Nkomati Peace Accords* when an agreement was signed during May in Cape Town between Mozambique, Portugal and South Africa on the revival of the Cahora Bassa Project (Treaty, 1984b).

Similar security agreements were mooted between South Africa and Botswana, where economic cooperation and possible access to the Okavango River was discussed; and Lesotho, where access to water was also a feature (Gutteridge, 1985a:100). Water and energy thus became a key element of this *Total National Strategy*. The need for such a security agreement was underscored by unrest within South Africa that was escalating

uncontrollably, with the SADF being increasingly committed to internal riot control. This started to blur the lines between police and army responsibilities. The ANC held a high-level meeting in Kabwe, Zambia during June 1985 at which time a decision was taken to allow attacks on soft targets (Gutteridge, 1985b:129). Special Forces reprisal was launched in Kabwe a few days later. A State of Emergency was announced in 1985, giving security forces wider powers (Gutteridge, 1985b:124). The ANC leadership started to regard the internal situation as a “peoples’ war” from this moment onwards (Gutteridge, 1995b:130). The situation deteriorated rapidly with a flight of foreign capital threatening a total collapse of the economy, so all foreign currency trading was suspended in South Africa on 27 August 1985 (Gutteridge, 1985b:144). The security situation was precariously balanced indeed, with the possibility of a collapse of the South African Apartheid State a very real one at the time.

During 1986 violence erupted in Natal between *comrades* from the ANC and Zulu *impis* from Chief Buthelezi’s Inkatha Freedom Party (IFP) (Gutteridge, 1990:168). This degenerated into a localized low-intensity civil war, which endured until after the election of Nelson Mandela as the first democratic President of South Africa (Percival & Homer-Dixon, 1995:3). In neighbouring Lesotho, Major General Justin Lekhanya overthrew Leabua Jonathan during a military *coup d’état* on 20 January 1986 (Esterhuysen, 1992:46; Lawrence, 1986). Shortly after this the *Treaty on the Lesotho Highlands Water Project* (LHWP) was signed on 24 October 1986 between “Pik” Botha of South Africa and Colonel Thaabe Letsie of Lesotho, fuelling speculation about possible South African involvement in the *coup d’état* (Homer-Dixon, 1994:19; Treaty, 1986a). Commentary on the LHWP from that time reflects the socio-economic benefit angle that was central to the *Total National Strategy* approach (Vorster, 1988:95).

During 1987 an agreement was reached between South Africa and the Transitional Government of Namibia on the creation of a Joint Technical Committee to oversee future projects on the Orange River (Treaty, 1987). During the same year another study on the feasibility of transferring water from the Zambezi through Botswana found that the cost of water delivered to Pretoria was competitive with existing water supply schemes (Scudder *et al.*, 1993:263; Midgley, 1987:15). This plan had been developed from earlier studies, with the most refined version consisting of a 1,116-km concrete structure feeding $2,500 \times 10^6 \text{m}^3 \text{yr}^{-1}$ of water from the Zambezi/Chobe confluence through Botswana to a dam in South Africa, from where it would be reticulated to the Vaal River Supply Area (Borchert & Kemp, 1985; Borchert, 1987; Scudder *et al.*, 1993:268; Trollalden,

1992:138). This water was needed to meet the estimated demand by 2015 even with the LHWP functioning (Williams, 1986; Scudder *et al.*, 1993:268). Botswana would have been supplied $60 \times 10^6 \text{m}^3 \text{yr}^{-1}$ from this aqueduct (Borchert & Kemp, 1985; Scudder *et al.*, 1993:268). The existing (smaller) transboundary water supply from the Molatedi Dam in South Africa to Gaborone should be seen in light of this *Total National Strategy* approach (see Table 16).

This era drew to an end in the upper reaches of the Okavango River basin, where the battle of Cuito Cuanavale took place in 1988. This battle saw the first significant setback of the SADF since its initial incursion into Angola during Operation Savannah in 1975/6, thereby shattering the myth of South African invincibility. Although officially denied at first, General Magnus Malan subsequently admitted that this event turned the balance in favour of ditching “the millstone which Namibia had become” (Simon, 1991:187).

4.4.3 Post-Cold War Era

This era was ushered in by the political demise of P.W. Botha and the assumption of power by F.W. de Klerk. On 2 February 1990 de Klerk made a watershed speech in which he appealed for a united South Africa as a way to overcome the divisions of violently conflicting nationalisms (Gutteridge, 1994:214). This effectively marked the end of the SSC and the *total onslaught* mentality that they had established in the international relations of South Africa, which by this time had become all-embracing and somewhat paranoid (Spitz & Chaskalson, 2000:15). Almost immediately Nelson Mandela was released from prison and a process of the “normalization” of South African politics began. This was being actively brokered behind the scenes by the National Intelligence Service (NIS), with the Convention for a Democratic South Africa (CODESA) as a key high profile component.

The security forces had become deeply divided during the latter parts of the 1980s, with “hawkish” elements of the Police and Army combining to form the now deeply discredited paramilitary Vlakplaas Unit and Civil Cooperation Bureau (CCB), whose antics included the bombing of the London ANC offices and the assassination of a senior South West African Peoples Organization (SWAPO) activist in Namibia. “Dovish” elements clustered under the leadership of Dr. Niel Barnard, Director General of the NIS, with various special operations units being tasked with the sensitive role of determining the strategic implications, strategies and pitfalls of a negotiated settlement. This “dovish”

element played a major but low profile role in establishing the enabling environment in which a number of strategic actions could occur. These included the Cuban troop withdrawal from Angola and the implementation of UN Resolution 435 in Namibia; CODESA that negotiated the necessary transitional arrangements needed to ensure that the process of democratization could proceed with relative peace and stability; and the cessation of hostilities in Mozambique, in particular bringing the rebel *Resistência Nacional Moçambicana* (RENAMO) into the elections.

Namibian independence followed shortly after the release of Mandela, heralding the end of a liberation struggle that was second in duration only to that of South Africa itself (Simon, 1991:185). This series of events threatened to outpace SADCC, whose *raison d'être* was now being challenged by the rapidly changing political climate. A decision was therefore made to transform SADCC into the Southern African Development Community (SADC), which was concluded formally in Windhoek, Namibia in 1992 (Treaty, 1992a; Pallett *et al.*, 1997:70; Granit, 2000). A small blemish on South African / Namibian relations occurred in the form of a dispute over the border² between the two countries along the shared portion of the Orange River, but this has never become a major issue (Ashton, 2000b:86-89; Maletsky, 1999; Meissner, 2001).

The first democratic elections took place in South Africa during 1994, marking the end of isolation and the policy of destabilization. One of the first tasks of the newly elected ANC Government, was to resume full state control over water, most of which was linked to the land rights of approximately 60 000 white commercial farmers, on behalf of the majority of South Africans (Conley, 1997:23). Significantly, the first protocol that was agreed on within the context of SADC after the admission of South Africa as a full member was the *SADC Protocol on Shared Watercourse Systems* that was signed in Johannesburg during 1995 (Ramoeli, 2002:105). This was amended in 1997 and became known as the *Revised Protocol on Shared Watercourses* in order to incorporate the principles found in the *United Nations Convention on the Non-Navigational Uses of International Watercourses* (Granit, 2000; Ramoeli, 2002:106). While this has laid the foundation for greater cooperation in the water sector, economic development is still

² While the South African government is of the opinion that this issue has been effectively resolved, the Namibian government perspective differs somewhat (Heyns, 2003:20). The important aspect is that it is not a major driver of conflict at the time of writing.

threatened by the current political turmoil in Zimbabwe, and the aftermath of the civil wars in Angola and the DRC (Granit, 2000).

In 1998, political instability again erupted in Lesotho. This became a major test for SADC in general, and South Africa in particular given its past history. SADC decided to send in a peacekeeping force, comprising soldiers from South Africa and Botswana. This became known as Operation Boleas, which moved across the border and immediately came under heavy and unanticipated fire. Boleas forces split into two with one element concentrating on Maseru while the other moved in to secure the infrastructure related to the LHWP. A number of casualties were sustained on all sides. This has unfortunately caused strained relations between South Africa and Lesotho (Laurence, 1998; Mopheme, 1998a; Mopheme, 1998b; Mills, 1998).

4.4.4 Overlay and South African Hydropolitics

If the events noted above contextualize the patterns of regional conflict and cooperation, then it is necessary to locate these within the broader Cold War theatre. The interaction between the sub-regional and international political milieu relates to what Buzan (1991:216-220) and Buzan *et al.*, (1998:13-14) have called overlay. The link between these regional dynamics and global political interaction can be traced back to 1957. At that time a Soviet strategist and expert on economic warfare by the name of Major General A.N. Lagovsky, formulated what became known as the “weak link principle” (Gutteridge, 1984:60-61). In terms of this thinking, the Western powers such as the North Atlantic Treaty Organization (NATO) and its allies, were almost entirely dependent on a wide range of strategic minerals that were imported from countries in the developing world. By contrast, the Warsaw Pact countries were more-or-less self-sufficient in those strategic resources. This prompted General Alexander Haig (in his capacity as senior strategic advisor to the White House) to conclude, in a presentation to the US House of Representatives in 1980, that the era of the “resource war” had arrived (Gutteridge, 1984:61).

This made Southern Africa a theatre in which proxy-wars were played out, some of which involved strategic access to natural resources. Central to this was the theory of limited war that had been developed by Henry Kissinger, an academic and one-time US Secretary of State, who postulated that in the thermo-nuclear age, the risk of total war was so high that it was to be avoided at all costs (Dougherty & Pfaltzgraff, 1981:111-

116). Instead of total war between nuclear powers, a series of local proxy wars could be fought, each allowing global political tensions to be dissipated in a controlled way, and each allowing non-nuclear military technology to be developed by the nuclear powers and tested through the proxy forces. The linkage was established after the 1974 Portuguese *coup d'état*, when through a series of rapid political events, the Angolan War of Liberation became the Angolan Civil War. South Africa became deeply alarmed at this turn of events. Encouraged by Kissinger's statement that the Soviet and Cuban support of the Popular Movement for the Liberation of Angola (MPLA) in the Angolan Civil War was a "serious matter", and that Moscow's "hegemonial aspirations" would not be tolerated, South Africa decided to become the US proxy force in the region (Geldenhuys, 1984:79). This notion of limited warfare was played out in classic fashion when US support for the SADF proxy force, which at that time was literally in sight of Luanda, was suddenly withdrawn. This was seen as a humiliation by South Africa whose soldiers were left stranded and therefore forced to withdraw without capturing the capital city (Gutteridge, 1985a:97).

The final link to the Cold War is related to the cessation of hostilities associated with the collapse of the former USSR. On the same day in January 1990 on which President Gorbachev was in Vilnius remonstrating with Lithuanian secessionists, President de Klerk was in Umtata trying to persuade General Bantu Holomisa to reintegrate the "independent homeland" of Transkei back into South Africa, which was now firmly on the road to negotiations with the previously banned ANC and other political parties through CODESA (Gutteridge, 1990:176). The demise of apartheid is intimately linked with the collapse of the former USSR and consequently the ending of the Cold War. As such, this watershed removed the influence of overlay and consequently unleashed a set of political dynamics that will start to shape a new pattern of conflict and cooperation, and consequently impact on hydropolitical dynamics within the international river basins found in South Africa (Buzan, 1991:216-220; Buzan *et al.*, 1998:13-14).

4.5 The Orange River Basin

The Orange River basin is the most developed of all the rivers in Southern Africa, with at least twenty-nine dams having a storage capacity of more than $12 \times 10^6 \text{m}^3$ (twenty-four in South Africa and 5 in Namibia) (Heyns, 1995:10-11) (see Map 11). The largest of these are the Gariep Dam, with a storage capacity of $5,600 \times 10^6 \text{m}^3$ and the Vanderkloof Dam, with a storage capacity of $3,200 \times 10^6 \text{m}^3$, both of which are in South Africa with the

former being a critical component of the ORP (see Map 10). The fact that the Gauteng Province is 100% reliant on IBT water (see Figure 17), all of which is channeled through the Vaal River system (see Table 16), illustrates the strategic importance of the Orange River basin given the heavy reliance of the South African national economy on water from this particular basin. It is evident that the Orange River basin is the largest of all the international river basins in South Africa, both in terms of physical size, and in terms of the volume of water (MAR) involved (see Table 15). The importance of this river basin is also evident (see Table 16), because the Orange is a recipient basin for 3 IBTs; a donor basin for 3 IBTs; with 4 intra-basin transfers also in existence. The Orange River basin is considered to be “at risk” (Wolf *et al.*, 2003:47).

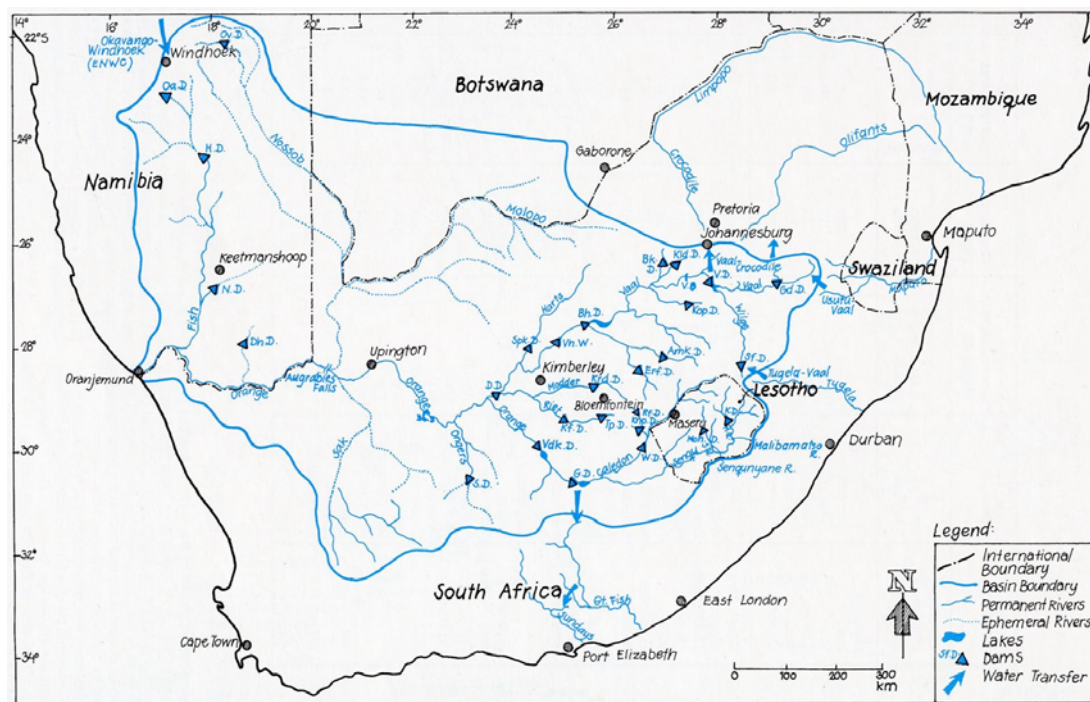
4.5.1 Physical Description of the Orange River Basin

The Orange River basin has a total basin area of 964,000 km² with an annual MAR of 11,200 x 10⁶m³ (see Table 15). There are 4 riparians, with 4% of the basin area lying in Lesotho (upstream riparian), 62% in South Africa, 9% lying in Botswana, and 25% in Namibia (downstream riparian) (see Map 11). Contribution to MAR by each riparian is unequally distributed, with 55% coming from South Africa, 0% coming from Botswana, 41% coming from Lesotho and 4% coming from Namibia (Basson, 1999). There are slight variations in this data between the riparians (see Table 15), but this is not contested in any way, so this minor discrepancy is hydrologically irrelevant. The Orange River carries approximately 20% of the total river flow in South Africa, with the Vaal being an important tributary (Basson *et al.*, 1997:40).

The Vaal River is regarded as being a river basin in its own right and provides Gauteng with all of its water. Gauteng (formerly Witwatersrand) in turn houses 40% of the South African population, creates 50% of the country’s wealth and generates 85% of the electricity in the entire country (Conley & van Niekerk, 1998:146). In order to support this economic activity, the Vaal sub-basin has links to 8 other river basins in a complex arrangement of IBTs that range from the Limpopo in the North, to the Sundays in the South (Heyns, 1995:18) (see Table 16 and Map 11). In the Vaal basin, much of the water returns to the Orange River as treated effluent, which is available for downstream users (Conley, 1995:11) A staggering 100% of the economic activity in Gauteng is reliant on IBTs (Basson *et al.*, 1997:55) (see Figure 17). This makes the Orange River of great strategic importance to South Africa, hence the significance of the LHWP (Blanchon, 2001; Davies *et al.*, 1993:169; Davies & Day, 1998:299-304; James, 1980). The Orange

River is closed, with an official classification of being “in deficit”, so further opportunities for development are severely limited (Conley, 1995:7; Conley, 1996a:17). Namibia has expressed an interest in obtaining more water from the Orange River, but for transfers to occur the large losses that are experienced in the Lower Orange would have to be taken into account. The city of Gaborone can be supplied with water from Lesotho in future, giving Botswana a strategic interest in the basin, even though it contributes no MAR and uses none of the water from the Orange River basin at present.

Map 11. The Orange River Basin.



Source: Pallett *et al.*, 1997:79.

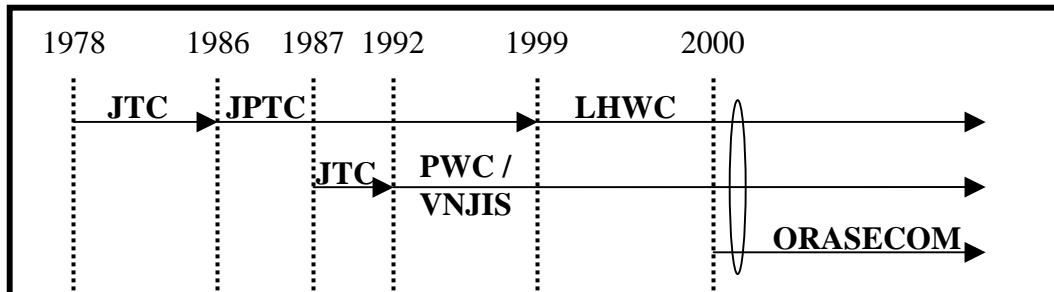
The Orange River forms the international border between South Africa and Namibia. There has been confusion over the actual location of the border, with a demarcation in 1890 being the high-water level on the northern bank, effectively depriving Namibia of independent access to the water (Hangula, 1993:105; Heyns, 1995:11). There is a border dispute between South Africa and Namibia as a result of promises that the border would be moved to the middle of the river, which were allegedly made during the run up to Namibian independence (Maletsky, 1999; Ashton, 2000b:86-89; Meissner, 2001:35). Shifting of the border has never occurred and allegations are being made that South Africa has reneged on its agreement. This has the potential to tarnish South Africa’s

hydropolitical image, which was damaged during Operation Boleas in Lesotho during 1998, but it does not seem to be a major issue that threatens international relations.

4.5.2 Historical Progression of Regime Creation in the Orange River Basin

Regime creation within the basin has been fragmented but intense where it has occurred, reaching degrees of sophistication not evident in any of the other basins under review. It began with the establishment of the Southern African Regional Commission for the Conservation and Utilization of the Soil (SARCCUS) in 1948. This has 10 standing committees, one of which deals with water (Ohlsson, 1995b:60). An historic overview of regime creation is presented in Figure 18. For the purposes of a detailed analysis, the basin has been divided into 3 distinct components - the upper, middle and lower basin - with international relations in the hydropolitical realm having been characterized by the creation of various bilateral regimes of increasing sophistication over time, until a multilateral basin-wide agreement was reached between all riparian states in 2000, known as the *ORASECOM Agreement* (Treaty, 2000b).

Figure 18. Historic Overview of Regime Creation in the Orange River Basin.



The Orange-Senqu River Commission (ORASECOM) that was established through the *ORASECOM Agreement* is the fourth basin-wide regime to be established in Southern Africa and the first under the *SADC Protocol on Shared Watercourse Systems* (Treaty, 2000b). A significant aspect of the *ORASECOM Agreement* is the fact that Botswana is a recognized riparian state, even though it contributes no stream-flow and makes no use of the water from the Orange River (see Table 15). This gives Botswana a wider range of diplomatic options by allowing concessions to be granted to other riparian states in return for political support in RBCs where they have a greater strategic interest such as in the Limpopo and Okavango basins (Turton, 2003:152). This makes Botswana the balancer of political power in ORASECOM, with bargaining positions either in support of Namibia

(in return for concessions elsewhere such as in the Okavango and Zambezi River basins), or in support of Lesotho (in return for future concessions such as the supply of water to Gaborone).

The *ORASECOM Agreement* recognizes the *Helsinki Rules*, the *United Nations Convention on the Non-Navigational Uses of International Watercourses* and the *SADC Protocol on Shared Watercourse Systems*. It also refers to the *Revised Protocol on Shared Watercourses* with respect to definitions of the key concepts “equitable and reasonable” and “significant harm”. Dispute resolution is formally vested in the SADC Tribunal, which is a first for regime creation in the regional water sector. It recognizes the right of the Parties to form bilateral arrangements (such as the Lesotho Highlands Water Commission (LHWC) and the Permanent Water Commission (PWC) although these are not mentioned by name), and it says that any new Commission will be subordinate to ORASECOM, while existing Commissions must merely liaise with ORASECOM (Treaty, 2000b: Article 1, para.1.4). This means that the LHWC will essentially continue to function as a bilateral arrangement, but that downstream riparians will be kept informed of upstream developments. Similarly, the PWC and its associated Vioolsdrift and Noordoewer Joint Irrigation Scheme (VNJIS) will also continue to exist as separate entities. As such South Africa will still have direct control over its strategic interest in the basin, while Botswana will have formally gained a foothold in to negotiations on future water-sharing agreements between the riparians.

4.5.2.1 The Upper Basin: South Africa and Lesotho

Unlike the Limpopo basin case, for a long period of time there was no regime creation at all in the Orange River basin, until 1978 when a Joint Technical Committee (JTC) was established between South Africa and Lesotho to investigate the feasibility of the proposed LHWP (Mohammed, 2003:226). A year later the JTC tabled its preliminary feasibility investigation, and a decision was taken to proceed to the next stage of the work (Heyns, 1995:11). In 1986 the *Lesotho Highlands Water Project Treaty* was signed (Treaty, 1986a), but this did not constitute a determination of the apportionment of water according to Conley & van Niekerk (1997:11). The *Lesotho Highlands Water Project Treaty* has 4 protocols covering in detail aspects of design, construction, operation and maintenance, and the institutional arrangements needed to manage such a complex project. The *Lesotho Highlands Water Project Treaty* is the most comprehensive in existence in the Southern African water sector, with the main document being eighty-five

pages in length excluding annexures. From an institutional perspective, the *Lesotho Highlands Water Project Treaty* established two autonomous statutory parastatal bodies (Heyns, 1995:11). The Lesotho Highlands Development Authority (LHDA) is responsible for the management of the dam construction and related issues within Lesotho itself (Treaty, 1986a:23-32), whereas the Trans-Caledon Tunnel Authority (TCTA) is responsible for the management of the complex set of delivery tunnels into South Africa (Treaty, 1986a:33-39). In addition to these, a Joint Permanent Technical Commission (JPTC) was established, consisting of delegates from both riparian states, with the responsibility of coordinating the two parastatals, as well as to report back to their respective Governments. Article 10 of the *Lesotho Highlands Water Project Treaty* stipulates that South Africa is responsible for the costs of the project except for the Muela hydroelectric power station, which Lesotho has to pay for. Paragraph 6 of Article 11 of the *Lesotho Highlands Water Project Treaty* stipulates that South Africa will guarantee the loans. Article 5 of the *Lesotho Highlands Water Project Treaty* stipulates the calculation of royalty payments, which has been determined as half of the difference in cost for supplying $70\text{m}^3\text{s}^{-1}$ from the LHWP, and the least cost of the alternative Orange Vaal Transfer Scheme. Annexure II of the *Lesotho Highlands Water Project Treaty* stipulates minimum quantities of water to be delivered by the LHWP over time, starting with $57 \times 10^6\text{m}^3\text{yr}^{-1}$ in 1995, and ending with $2,208 \times 10^6\text{m}^3\text{yr}^{-1}$ after 2020. A related treaty deals with issues of diplomatic immunity for the JPTC members (Treaty, 1986b).

This regime was further strengthened in 1999 with the agreement on what became known as *Protocol VI of the Lesotho Highlands Water Project Treaty*, which upgraded the JPTC into the Lesotho Highlands Water Commission (LHWC) (Treaty, 1999a). This in turn resulted in the implementation of a new governance model that retained the two parastatal bodies (TCTA and LHDA). This change was the result of a study that highlighted problems with respect to reporting relationships and lines of authority between the LHDA and the JPTC. The final proposals regarding those changes were accepted by the two Governments on 22 November 1995, and implemented in 1999 as the New Governance Model of the original *Lesotho Highlands Water Project Treaty* (Treaty, 1999b). In essence the implementation of the new governance model marked the end of the initial construction phase (Phase 1a) and the commencement of water delivery.

4.5.2.2 The Middle Basin: South Africa and Botswana

There was no regime creation with respect to the Orange River basin between South Africa and Botswana prior to the *ORASECOM Agreement*. This is because although Botswana is technically a riparian state by virtue of its geographic location within the Orange River basin, it has contributed no streamflow in living memory, and the tributaries in that country can be regarded as being endoreic (Basson, 1999:17; Conley & van Niekerk, 1997:9; Heyns, 1995:10). Botswana therefore has had no overt interest in the Orange River basin prior to the *ORASECOM Agreement*, or stated differently, had not been given a chance to articulate those interests because historically regime creation was bilateral in nature, always involving South Africa as the hegemonic state, and one other hydrologically weaker riparian state. This is now changing as the Botswana government has begun to realize that one of its strategic future options is to possibly obtain water from Lesotho (or at least to keep that alternative open to future exploration) (Turton, 2003:151).

4.5.2.3 The Lower Basin: South Africa and Namibia

In 1987 a Joint Technical Committee (JTC) was established to advise the South African government and the South-West African Transitional government on matters pertaining to the Orange River, referred to as the *Cooperation Agreement* (Treaty, 1987). Given that Namibia was not a sovereign state until 1990, and was therefore unable to enter into formal agreements with its co-riparians, there was a spate of agreements signed immediately after independence (Pinheiro *et al.*, 2003:117). It was against this background that the JTC was upgraded during 1992, when a treaty was signed between South Africa and Namibia, known as the *Agreement on the Establishment of a Permanent Water Commission* (PWC) (Treaty, 1992b; Chenje & Johnson, 1996:165; Pallett *et al.*, 1997:70). At the same time an agreement was signed on the establishment of a Joint Irrigation Authority (JIA) to implement the *Agreement on the Vioolsdrift and Noordoewer Joint Irrigation Schemes* (VNJIS) (Treaty, 1992c; Chenje & Johnson, 1996:165; Pallett *et al.*, 1997:70). This was followed in 1994 by the launching of the Orange River Replanning Study (ORRS) (DWAF, 1998). Initially intended to clarify South Africa's own priorities as a country study, formal invitations were extended to Namibia and Lesotho to participate. This caused officials in those countries some unease at the time because the study was not being conducted under the auspices of a recognized international forum, and South African officials also initially experienced misgivings at

exposing potentially acrimonious internal deliberations to outside observers (Conley & van Niekerk, 1997:13). After the inception of the ORRS however, Namibia undertook its own study, to be followed by Lesotho. While these two studies did not have observers from the other riparian states, the results were shared. This created an improved climate of trust. Subsequent to this negotiations were started between all of the riparian states, motivated largely by Namibia, on the establishment of a basin-wide regime. This came to fruition when the Orange-Senqu River Commission (ORASECOM) was formally established on 3 November 2000 under the *ORASECOM Agreement*.

4.5.3 The Orange River Basin within a Broader Regional Setting

The Orange River basin is an extremely important source of water for 3 of the most economically developed states in Southern Africa - South Africa, Botswana and Namibia. While it is clearly the largest single water resource available to South Africa (see Table 15), it is also extremely important for Namibia, with a quarter of the total basin area falling under the sovereign control of that state containing no less than 5 dams with a combined capacity of $452 \times 10^6 \text{m}^3$ (Pallett *et al.*, 1997:80). Botswana's main economic development is centered on the city of Gaborone, which can be supplied with water from Lesotho, and which is being fed at this moment in time from an IBT from South Africa and a major scheme in the form of the North-South Carrier (NSC), which derives its water from the Limpopo River basin (see Map 15).

4.5.4 Critical Hydropolitical Issues within the Orange River Basin

From the perspective of regime creation, there are 4 critical issues to note within the Orange River basin.

(a) *ORASECOM and existing bilateral regimes*: The relationship of the historically older bilateral regimes (JPTC and PWC) with the relatively new basin-wide multilateral ORASECOM is as yet largely unknown. In this regard, Paragraph 1.4 of Article 1 in the *ORASECOM Agreement* specifically states that all parties have the right to form bilateral agreements, and that existing Commissions will merely liaise with ORASECOM. As such, the existence of ORASECOM does not threaten the hegemonic status of South Africa within the overall hydropolitical configuration of the basin, but this situation may not go unchallenged by other riparian states. The robustness of the *ORASECOM Agreement* as a regime *vis-à-vis* the existing bilateral arrangements will be tested in the

middle-term future, with hydropolitically weaker riparian states like Namibia and Botswana probably throwing their support behind ORASECOM as a multilateral structure, while the hydropolitical hegemon (South Africa) is likely to opt for a maintenance of the *status quo* and the retention of the existing bilateral arrangements as the dominant instruments of cooperation.

(b) *Impact of basin closure*: Basin closure is known to result in a growing sense of insecurity for the respective riparian states in other international river basins, so why should the Orange River case be any different? In this regard, the key element is likely to be the extent to which water deficit impacts negatively on the economic growth potential of the respective riparian states. It is in this context that SWE starts to become relevant. The existing water use in the Orange River basin is known to be inefficient, with around 90% of the current allocation going to irrigation, which in turn produces low value crops (Basson, 1999:10). The relatively low SWE of agriculture will thus become a management focal point in the near future, with attempts being made to redirect agricultural water to industrial and other activities. This will likely have a significant social and political effect as the agricultural economy is slowly transformed to an industrial one. ORASECOM as an institutional arrangement will be severely tested as water allocations are made between riparian states at some time in the future.

(c) *Strategic ramifications of IBTs*: Given the high level of economic development in the basin, and its central role in a number of existing IBTs, the Orange River basin is likely to become more of a recipient basin in future as current resource capture trends continue. This has the capacity to increase the conflict potential within the basin, particularly when donor basins such as the Thukela, Incomati, Maputo and others, have their own economic growth potential capped as the result of what is in essence a form of induced scarcity. Basson (1995:42) has already noted that “the operation of the water resources systems in the central part of South Africa already impacts on the flow of major rivers draining from the central plateau of the country. Therefore, it also impacts on Botswana, Mozambique, Namibia, Swaziland, Zambia and Zimbabwe, as well as on Lesotho as a donor state”.

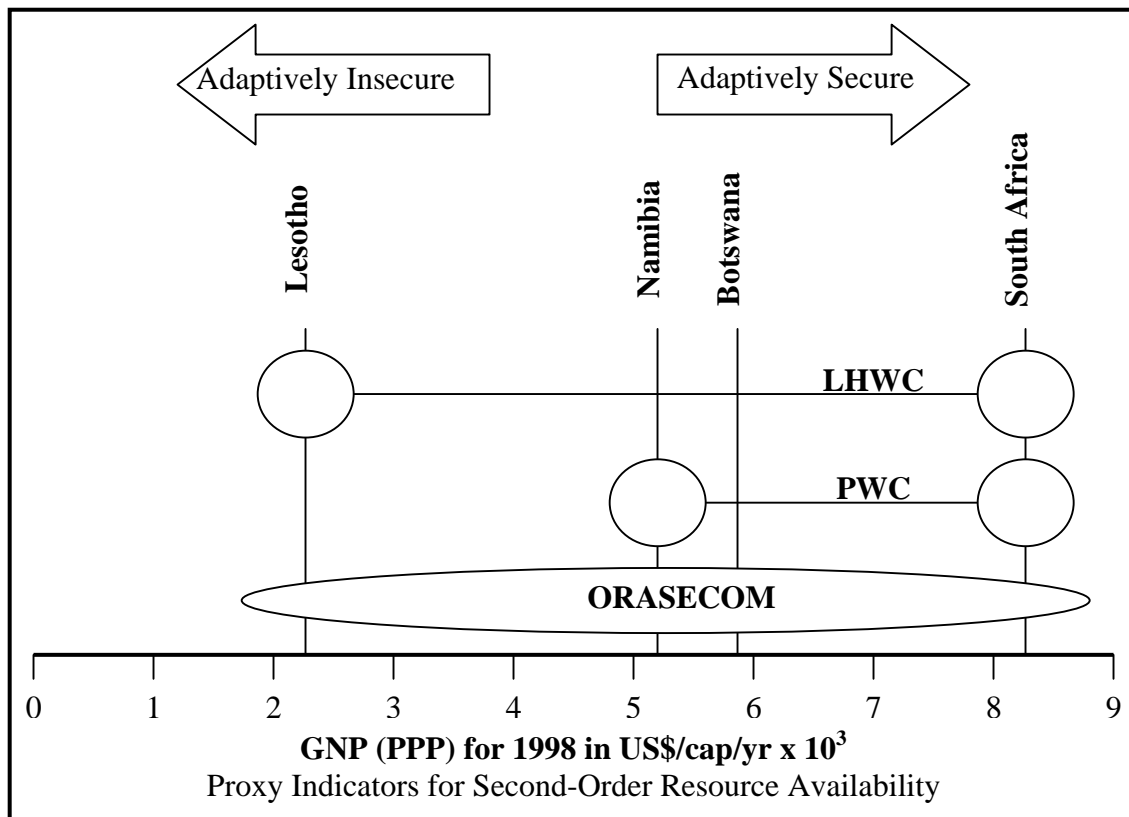
(d) *Hydrological data and regime creation*: The role of shared and uncontested hydrological data is clearly manifest in the Orange River basin. While the decision to make the ORRS an inclusive process was regarded with some misgiving at the time, it ultimately yielded a body of data that is transparent and uncontested. It can be argued that this aspect, combined with other factors such as the historic linkage between the

Namibian and South Africa Departments of Water Affairs, is one of the main reasons why the conflict potential in the Orange River basin remains well within manageable limits.

4.5.5 The Adaptive Security Spectrum in the Orange River Basin

Given the importance of second-order resource availability to the initial establishment and subsequent maintenance of a regime in an international river basin, it becomes instructive to contextualize the Orange River basin in terms of the Adaptive Security Spectrum for South Africa’s Co-riparian States (see Figure 14). The adaptive security spectrum as it applies to the Orange River basin is presented in Figure 19.

Figure 19. The Adaptive Security Spectrum in the Orange River Basin.



Source: Drawn from World Bank 2000:42-43 data used in Turton & Warner 2002:65.

This finding challenges the conclusion by Wolf *et al* (2003:47) that the Orange River is a basin “at risk”, because of all the international river basins in Southern Africa, the Orange has a functioning set of bilateral regimes, one of which is arguably the most sophisticated

in the SADC region (*Lesotho Highlands Water Project Treaty*), and a new but apparently healthy basin-wide regime (*ORASECOM Agreement*).

4.5.6 Conclusion Regarding the Orange River Basin

The Orange River basin has the most comprehensive history of successful regime creation in the entire Southern African region, with the *Lesotho Highlands Water Project Treaty* being the most complex bilateral arrangement in existence, placing it somewhat at odds with Wolf *et al's.*, (2003:47) classification. This reflects South African strategic needs for water, with regime creation having been driven largely by their own national interest. An interesting aspect of the basin is the role that was played by Namibia in driving the *ORASECOM Agreement* negotiations, which reflects the fact that downstream riparians with a high resource need have a vested interest in taking the lead in regime creation, because it is perceived to be in their own national interest. The Orange River basin thus illustrates 5 distinct hydropolitical tendencies.

(a) *Hydropolitical conditions favouring bilateral regimes*: Hegemonic states with a high resource need logically prefer to enter into bilateral arrangements, because under such conditions, they are more likely to have their national interest served.

(b) *Hydropolitical conditions favouring multilateral regimes*: Other states within a given international river basin, with high resource needs but in a low-order riparian position, logically prefer a multilateral basin-wide approach, with a preference for well-defined legal principles such as “equitable and reasonable” use and “significant harm” as central components, because these best serve their own national aspirations.

(c) *Emergence of a hydropolitical complex*: Certain riparian states with cross-cutting interests, such as those manifest by Botswana, which has a greater interest in other basins such as the Limpopo, Okavango and Zambezi, can maximize their strategic advantage by becoming involved in certain regime creation where they act as balancers of hydropolitical power. This can provide impetus to the emergence of a hydropolitical complex, clustered on pivotal river basins in which key riparian states have a high dependence on the resource-base for their long-term economic growth.

(d) *Hydrological data and regime creation*: The role of uncontested basin-wide hydrological data in the establishment of a climate of trust is a distinct feature of the

Orange River basin. This highlights the significance of second-order resources as a factor in the negotiation and maintenance of a regime in an international river basin.

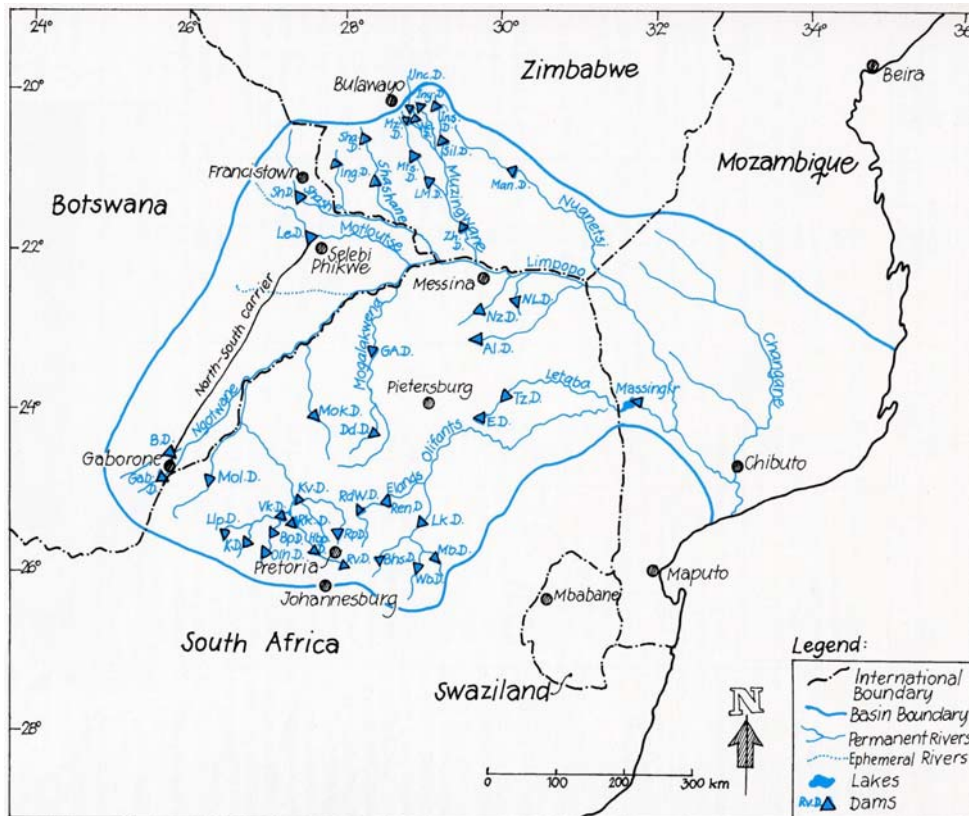
(e) *Second-order resources as an independent variable*: The prognosis for the stability and success of ORASECOM is good, given the fact that the membership is mostly distributed across the upper end of the adaptive security spectrum, thereby challenging the conclusion by Wolf *et al* (2003:47) that the Orange River basin is “at risk”.

4.6 The Limpopo River Basin

The Limpopo River basin is highly developed, containing more than forty-three dams with a storage capacity in excess of $12 \times 10^6 \text{m}^3$ each (3 in Botswana, 2 in Mozambique, twenty-six in South Africa and twelve in Zimbabwe) (see Map 12). No less than twelve of these dams have a storage capacity in excess of $100 \times 10^6 \text{m}^3$ each (1 in Botswana, 1 in Mozambique, 7 in South Africa and 3 in Zimbabwe) (Heyns, 1995:7). The largest reservoir in the basin is behind the Loskop Dam, which has a storage capacity of $348 \times 10^6 \text{m}^3$. Figure 17 shows the strategic importance of the Limpopo River basin for economic activities in the north of the country, with North West Province, Mpumalanga and the energy generation for Gauteng being serviced from that source. The Limpopo River basin is the second largest of all the international river basins in South Africa in terms of both surface area and MAR availability (see Table 15). The overall importance of this river basin is evident in the context of IBTs, with the Limpopo being a recipient basin for 4 IBTs; a donor basin for no IBTs; with 2 intra-basin transfers (see Table 16). The Limpopo River basin is considered to be “at risk” Wolf *et al* (2003:47).

4.6.1 Physical Description of the Limpopo River Basin

There are no major dams on the main stem of the river, a unique feature of this basin, which is also the border between South Africa and Botswana; and South Africa and Zimbabwe (see Map 12). The Limpopo has a total basin area of $183,000 \text{ km}^2$ with an annual MAR of $5,750 \times 10^6 \text{m}^3$. There are 4 riparians, with 20% of the basin area lying in Botswana (upstream riparian), 45% lying in South Africa, 15% in Zimbabwe and 20% in Mozambique (downstream riparian) (Basson, 1999) (see Table 15). Contribution to MAR by each riparian state is disputed, with between 66%-88% coming from South Africa, 3%-6% coming from Botswana, 7%-16% coming from Zimbabwe and 9%-12% coming from Mozambique, depending on the sources used (see Table 15).

Map 12. The Limpopo River Basin.

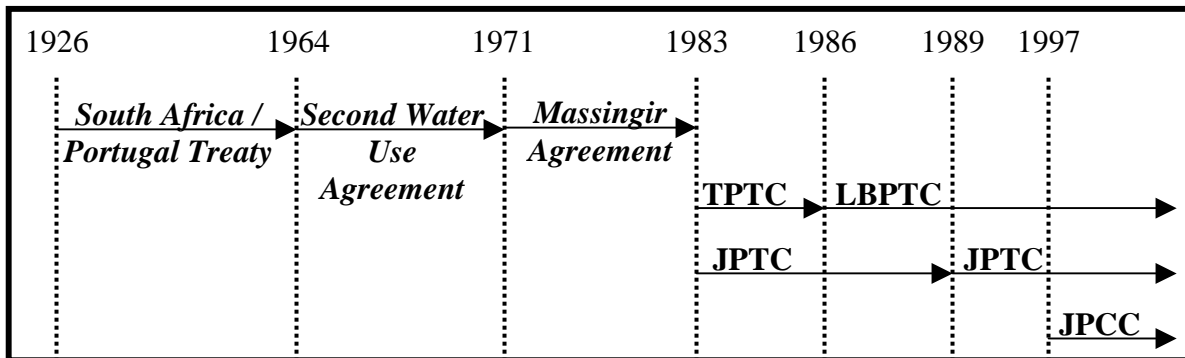
Source: Pallett *et al.*, 1997:83.

The water for Gaborone, the industrial hub of Botswana, was initially supplied from South Africa through the Molatedi Dam and associated pipeline, at a rate of $7.3 \times 10^6 \text{ m}^3 \text{ yr}^{-1}$, although the design parameters will allow for the delivery of $9 \times 10^6 \text{ m}^3 \text{ yr}^{-1}$ (Conley, 1995:13). A second source of supply has subsequently been developed through the NSC and the Letsibogo Dam on the Moutloutse River, which is a tributary of the Limpopo. The NSC can be extended northwards to receive water from the Zambezi River basin in future, with technical investigations currently under way (see Map 15). The basin is closed, with water use in the South African portion alone exceeding the yield potential by $800 \times 10^6 \text{ m}^3 \text{ yr}^{-1}$, which is made up by importing water from the Vaal River as potable water, with the return flow of treated effluent augmenting supply for downstream users (Basson, 1999:6; Conley, 1995:14; Conley, 1996b:35; Heyns, 2002:164). Heyns (1995:8) notes that South Africa already has the capacity to transfer $700 \times 10^6 \text{ m}^3 \text{ yr}^{-1}$ from various international river basins into the Limpopo as needed, giving an indication of the response to, and magnitude of, basin closure.

4.6.2 Historical Progression of Regime Creation in the Limpopo River Basin

Regime creation dates back to a general agreement in 1926 between South Africa and Portugal - known as the *South Africa / Portugal Treaty* - which laid the groundwork for the subsequent development of various river basins in Southern Africa, mostly to the benefit of the colonial powers at that time (Treaty, 1926) (see Figure 20).

Figure 20. Historic Overview of Regime Creation in the Limpopo River Basin.



During 1948 SARCCUS was established, with relevance to the Limpopo riparian states. A *Second Water Use Agreement* was signed in 1964 by South Africa and Portugal, building on the earlier *South Africa / Portugal Treaty*. The *Second Water Use Agreement* was a colonial agreement that spoke of rivers of “mutual interest” including the Cuvelai, Okavango, Limpopo, Maputo and Incomati, but which focused in detail on the Cunene (Heyns, 1995:5; Heyns, 1996:263; Treaty, 1964). Another formal agreement was reached between South Africa and Portugal in 1971 for the purposes of constructing the Massingir Dam 30-km downstream of the South African border in the Limpopo basin (Treaty, 1971). Known as the *Massingir Agreement*, it placed no restrictions on South Africa, recognizing that the inflow would decrease as South Africa developed more dams in the future (Conley, 1995:13). For the purposes of a detailed analysis, the basin has been divided into 3 distinct components - the upper, middle and lower basin - with international relations in the hydropolitical realm having been characterized by a series of attempts at creating a basin-wide regime, all of which have failed. Where functioning regimes do exist, they are strictly bilateral in configuration.

In February 1983 the *Agreement on the Establishment of the Tripartite Permanent Technical Committee* (TPTC) was formalized between Mozambique, South Africa and Swaziland, with the purpose of making recommendations on the management of the

water shortages being experienced in the Limpopo, Incomati and Maputo Rivers at that time (Treaty, 1983c; Ohlsson, 1995b:60; Chenje & Johnson, 1996:164; Pallett *et al.*, 1997:70). The TPTC was the first attempt at establishing something like a basin-wide regime in Southern Africa (see the Incomati and Maputo case study), but it was flawed from its inception in the context of the Limpopo because it excluded Zimbabwe, a state that was somewhat belligerent towards South Africa at that time. Consequently the TPTC did not function from its inception, because of the deteriorating political situation, but also because it was not an inclusive regime in the context of the Limpopo basin (Heyns, 1995:7; Ohlsson, 1995b:60; Vas & Pereira, 1998:119-120; Vas, 1999:65). Vas & Pereira (1998:120) attribute this failure, at least in part, to “the passive attitude of [the] DNA” (the Mozambican National Department of Water Affairs). Vas (1999:65) also notes that the lack of diplomatic representation between Mozambique, South Africa and the then colony of Rhodesia (which was engaged in a war involving Mozambique at the time) hindered the process.

Negotiations around the need to establish a functioning basin-wide regime were again attempted, which resulted in an *Agreement on the Establishment of the Limpopo Basin Permanent Technical Committee* (LBPTC) being reached during 1986 with Botswana, Mozambique, South Africa and Zimbabwe as parties (Chenje & Johnson, 1996:164; Mohammed, 2003:221; Pallett *et al.*, 1997:69; Treaty, 1986c; Vas & Pereira, 1998:120). This became the first basin-wide regime to be established in Southern Africa. The LBPTC did not function well, much like its predecessor the TPTC, even though it included all of the riparian states (Ohlsson 1995b:59). Given the history of failures in the Limpopo River basin, bilateral negotiations became the preferred route, which resulted in the uneven development of regimes in different parts of the basin.

4.6.2.1 The Upper Basin: South Africa and Botswana

The initial failure of the TPTC, which became apparent almost immediately after its launch in February 1983, combined with the critical need to establish a working arrangement, triggered bilateral negotiations between South Africa and Botswana. This was driven by 3 factors.

(a) *Prevailing security climate*: The deteriorating security climate in South Africa, and the accompanying *Total National Strategy* paradigm that it spawned, determined the need to engage Botswana in a series of agreements that would hopefully improve the security

situation in that sector. The Botswana government also seemed to resist pressures, mostly from the newly independent and highly militant Zimbabwe, to become one of the Frontline States, which sent signals to South Africa that the “carrot” (incentive) aspect of the two-pronged *Total National Strategy* approach would be most appropriate in this case, even though the “stick” (disincentive) of Special Forces reprisal was used where deemed tactically necessary.

(b) *Riparian position*: Botswana is upstream of South Africa in that part of the Limpopo basin, so uncontrolled water resource development in that country could impact negatively on future South African resource aspirations.

(c) *Strategic aspirations of the hegemon*: South Africa had strategic aspirations to gain access to water from either the Okavango or the Zambezi River at some time in the future if their economic growth was to be ensured in the medium to long-term (Basson, 1995:46; Borchert & Kemp, 1985; Borchert, 1987; Heyns, 1995:15; Heyns, 2002:164; Scudder *et al.*, 1993:268; Trollalden, 1992:138; van der Riet, 1980; Williams, 1986). The only way that this objective could be reached would be to have an alliance with Botswana as all viable water delivery routes cross that country. Botswana also has a natural interest in investigating these projects, given the impact of water deficit on its own economic growth potential, so it could become a natural ally in such ambitious ventures.

An *Agreement on the Establishment of the Joint Permanent Technical Committee (JPTC)* was reached in November 1983 between the two countries to deal with matters of mutual interest (Treaty, 1983a; Chenje & Johnson, 1996:164; Pallett *et al.*, 1997:70). This functioned well and was consequently upgraded to a commission through the *Agreement on the Establishment of the Joint Permanent Technical Commission* on the Limpopo River basin as far as it constitutes the border between the two countries in June 1989 (Treaty, 1989; Chenje & Johnson, 1996:164; Pallett *et al.*, 1997:70). The JPTC is functioning well and has been responsible for the Joint Upper Limpopo Basin Study (JULBS), which is investigating a range of issues including 3 possible new dams at Cumberland, Martins Drift and Pont Drift (Heyns, 1995:7; JPTC, 1991).

Bilateral relations between South Africa and Botswana were further strengthened in 1997 with the *Agreement on the Establishment of the Joint Permanent Commission for Cooperation (JPCC)* (Treaty, 1997). This is a broad inter-governmental agreement aimed specifically at fostering closer cooperation in the following fields:

- Agriculture and livestock.
- Water affairs.
- Trade, industry and mining.
- Environmental cooperation.
- Monetary and financial arrangements.
- Transportation, roads, communication and other infrastructural development.
- Joint development and utilization of natural resources and energy.
- Health, education, development and utilization of human resources.
- Institutional development.
- Security and migration.

4.6.2.2 The Middle Basin: South Africa and Zimbabwe

There are no known bilateral agreements in existence between South Africa and Zimbabwe. This has been driven by 3 factors.

(a) *Nature of bilateral relations:* Relationships between the two countries, at least during the 1980s when agreements were being negotiated, were frosty at best, and openly hostile at worst. The newly independent Zimbabwe, with a self-confident and defiant Robert Mugabe as the Prime Minister, came as a surprise to the South African government. Zimbabwe's continued support for the liberation movements in South Africa, and its key role in launching SADCC as a structure to unite the Frontline States against the joint scourge of colonialism and apartheid, made negotiations difficult (Baynham, 1989:88; Treaty, 1992a:3-5).

(b) *Pattern of dam construction:* There has been relatively little dam construction on the main-stem of the Limpopo River, which forms the border between the two countries. All significant water resource development has taken place on the respective tributaries, and given the fact that in the middle reach of the river, South Africa and Zimbabwe are neither upstream nor downstream relative to one another, dam development in either country has not been seen to be a major threat, thereby negating the need for a specific agreement. In fact, dam construction in the Limpopo River basin in Zimbabwe will impact negatively on Mozambique, by reducing the available runoff, rather than on South Africa.

(c) *Sequencing of political transitions*: In post-apartheid South Africa, when the political climate favoured the normalization of inter-state relations, Zimbabwe was in a phase of political decay. The policies of the Mugabe government were controversial, and saw a steady implosion of the economy, accompanied by an erosion of governmental capacity to negotiate agreements. Seen from the perspective of a contemporary Zimbabwean political elite, the negotiation of a regime on an international river basin is low down the list of priorities.

4.6.2.3 The Lower Basin: South Africa and Mozambique

Unlike the case with the Upper Limpopo basin, there is no history of functioning bilateral regimes between South Africa and Mozambique. This can be attributed to 2 key factors, although a third is emerging that is likely to change this situation.

(a) *Revolutionary ideology*: During the political turmoil of the 1980s when regimes were actively being negotiated, Mozambique was one of the Frontline States in the war against apartheid and colonialism. Given the *Total National Strategy* thinking that was dominant in South Africa at the time, and the two-pronged approach that was central to this paradigm, the balance of outcomes tilted in favour of seeing Mozambique as a problem rather than a solution. Although poor, the Mozambique government stuck to its revolutionary ideals and continued to support the liberation movements in Rhodesia and South Africa, systematically refusing to be entrapped by offers of development assistance. This resulted in a number of Special Force reprisals, but the Mozambique government remained true to its ideals and maintained a hostile stance towards South Africa.

(b) *Riparian position*: Mozambique is a low-order riparian state *vis-à-vis* South Africa. This makes Mozambique hydropolitically weaker and more vulnerable to actions taken upstream, allowing South Africa to do as it wished. The Limpopo River basin is regarded as being one of the two most important water resources in Mozambique (the other being the Incomati) (Vas & Pereira, 1998:112). This made Mozambique more vulnerable, a fact that was actively exploited by the political elites in Pretoria at the time.

(c) *The WSSD as an emblematic event*: This situation is starting to change however. Mozambique has expressed concern over reduced runoff if the proposed new dams in the Upper Limpopo basin that the JULBS is investigating go ahead (Vas & Pereira,

1998:117). As a result, renewed attempts are being made to revive the defunct LBPTC, with meetings having been held between Mozambique and Zimbabwe on the issue (Heyns, 1995:7; Vas & Pereira, 1998:117). Commentators have noted that this is “clearly an opportunity that DNA must use to have ... serious involvement and ... active participation” in the development of functioning regimes (Vas & Pereira, 1998:120). This may herald in a new phase of cooperation and regime creation in the basin, having been encouraged by the *Resolution of the Tripartite Permanent Technical Committee on Exchange of Information and Water Quality* in the Incomati and Maputo River basins, and the subsequent signing of the *Incomaputo Agreement* during the WSSD (Treaty, 2002a; Treaty, 2002b).

4.6.3 The Limpopo River Basin within a Broader Regional Setting

The Limpopo River basin, like the Orange River basin, is an extremely important source of water for 3 of the 4 most economically developed states in the Southern African region - South Africa, Botswana and Zimbabwe - all of which face limitations to their future economic growth potential as the result of localized water deficit. The Limpopo basin is also critically important for Mozambique, particularly as it struggles to meet the needs of post-war reconstruction. Significantly, Botswana, Zimbabwe and Mozambique are also riparian states in the Zambezi River basin, but in all cases, the development of the resource is problematic. For Botswana, the absence of suitable geological features means that dam development is not practical; while Zimbabwe has a shortage of foreign currency to fund new projects, at the same time being confronted by geological complications that inhibit the easy development of the Zambezi; and Mozambique is still deeply indebted to Portugal and South Africa for the Cahora Bassa Dam, constraining any future aspirations in that basin. South Africa has had historic plans to gain access to the Zambezi River (Basson, 1995:46; Borchert & Kemp, 1985; Borchert, 1987; Heyns, 1995:15; Heyns, 2002:164; Midgley, 1987; Scudder *et al.*, 1993:268; Trollaldalen, 1992:138; van der Riet, 1980; Williams, 1986).

This means that the Limpopo River basin cannot be seen in isolation, because it has links with so many other political, economic and hydrological parameters in the broader Southern African region. There are already physical linkages in the form of IBTs with other international river basins such as the Incomati and Maputo, all of which impact negatively on downstream Mozambique (see Table 16 & Map 11). The proposed new linkages to the Zambezi have strategic advantages to Botswana and Zimbabwe, because

both could receive water from such a project, while opening the door to South Africa to also become a partner in such a grand scheme (see Map 15) (Heyns, 2002:164). This means that the Limpopo River basin is likely to become increasingly important in the context of regional economic growth and integration - something that is central to the SADC spirit, having been clearly laid out in Paragraph 1(a) of Article 5 of the *Declaration Treaty and Protocol of the Southern African Development Community* (Treaty, 1992a).

4.6.4 Critical Hydropolitical Issues within the Limpopo River Basin

From the perspective of regime creation, there are 4 critical issues to note within the context of the Limpopo River basin.

(a) *Fundamental driver of regime creation:* While basin closure is a key factor, it is not the only driver of regime creation over time. A significant component of the need to create a regime was related to the South African *Total National Strategy*, which was primarily state security in orientation. This has shaped the nature of international relations, with patterns of amity and enmity in the Limpopo River basin mirroring the broader regional political struggle, and indeed, also the Cold War rivalry. As such the Limpopo basin is an interesting case study of the hydropolitical dynamics of conflict and cooperation. There are two distinct sub-elements to this aspect, both of which impact significantly on the contemporary situation:

(i) *Hydrological data and regime creation:* Disputed hydrological data is a salient feature of the basin, with each riparian state offering a version that suits their own national political aspirations. This acts as a source of potential conflict and undermines attempts at developing a cooperative posture. This also hints at the relevance of second-order scarcity, because the state that is most impacted (Mozambique), also has the least capacity to provide data of sufficient quality in order to counter South African (and even Zimbabwean) claims.

(ii) *Liberation struggle:* The early history of cooperation was between a colonial power and what was to become the South African Apartheid State, both of which are central elements in the founding of SADCC, acting as an ongoing unifying force between the Frontline States. This allowed Zimbabwe to oppose the South

African *Total National Strategy*, and kept Mozambique in the equation as a key ally in what was an ideological struggle linked to the Cold War.

(b) *Pattern of regime creation*: There is uneven regime creation within the Limpopo River basin. The bilateral regime between Botswana and South Africa has functioned well, and is in a healthy condition having grown in depth and sophistication over time. There are no other functioning bilateral regimes, with Mozambique being arguably in a weaker position today than it would have been had it chosen instead to cooperate with South Africa in the 1980s. This was not to be however, so it can be said that contemporary Mozambique is paying the price for having taken a principled political stance during the war on colonialism and apartheid. This is recognized by Vas (1999:66) who notes that one factor in the increased conflict potential within the basin is “the widespread feeling among the Mozambican population that they consented to enormous sacrifices for the radical political changes required in Zimbabwe and [South Africa] and, instead of gratitude, they receive less and less ... water”. There is a rudimentary basin-wide regime in existence in the form of the LBPTC, but this has never truly functioned from its inception. This begs the question as to what the likely outcome will be? Clearly the JPTC is not going to be abandoned, so the likely result will be an arrangement such as ORASECOM, where existing bilateral arrangements are recognized while the larger basin-wide regime gets off the ground.

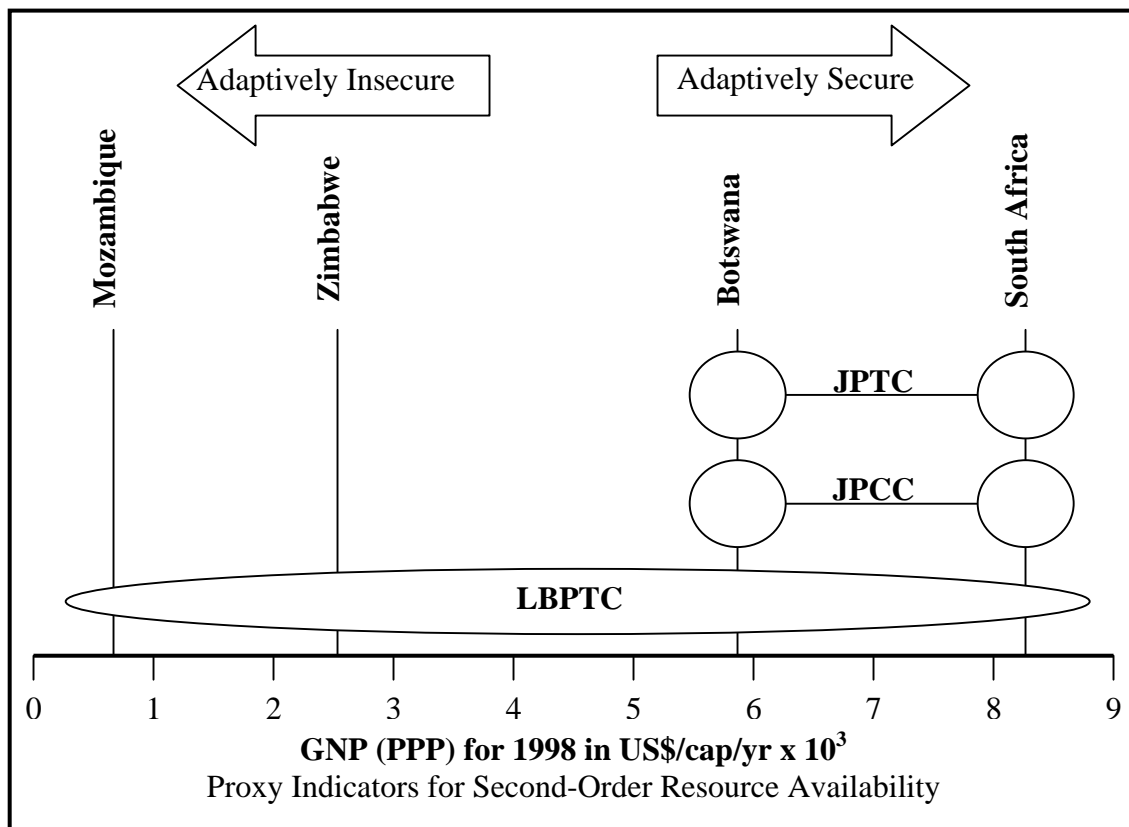
(c) *Emergence of a hydropolitical complex*: The Limpopo River basin is clearly an important component in a growing set of crosscutting linkages with other international river basins in the region. This is more so than the Orange River case, which lacks the deeper experience of the broader political conflict that was the manifestation of both the colonial experience and Cold War overlay. The relevance of this is likely to become more pertinent as plans to develop the Zambezi River for the purposes of supplying water to the city of Bulawayo in Zimbabwe, and linking into the existing NSC in Botswana, become more advanced. At least one permutation of this plan is for South Africa to become a joint developer, mobilizing both capital and expertise, to the possible mutual benefit of all 3 countries (see Map 15) (Heyns, 2002:164). The existing climate of mistrust is an important factor in the attainment of this objective, as downstream riparian states like Mozambique - already deeply suspicious of the intentions of Zimbabwe with whom it shares 3 other basins (Buzi, Pungué and Save), and South Africa with whom it has a long history of lopsided outcomes - continue to remain skeptical of the benefits to themselves.

(d) *Pattern of dam construction:* Given the fact that most of the water resource development is on the tributaries rather than on the main-stem of the river, the management of the dams is uncoordinated (Basson, 1999:16). The devastating impacts of this became abundantly clear during the flooding that occurred in 2000, where upstream developments and the resultant denudation of wetlands in South Africa, Zimbabwe and Botswana, were at least one factor that exacerbated the situation (Christie & Hanlon, 2001:118). The need for closer coordination, combined with the point raised in the above paragraph, suggest that there is significant impetus to regime creation at the basin level.

4.6.5 The Adaptive Security Spectrum in the Limpopo River Basin

The relative distribution of second-order resources within the Limpopo River basin has been reflected in the overall experience of regime creation. The adaptive security spectrum as it applies to the Limpopo River basin is presented in Figure 21.

Figure 21. The Adaptive Security Spectrum in the Limpopo River Basin.



Source: Drawn from World Bank 2000:42-43 data used in Turton & Warner 2002:65.

It is evident that the one bilateral water regime (JPTC) involves two of the most adaptively secure states in the entire SADC region. This is supported by the JPCC, which is a broader agreement that embraces more than just water resource management. This regime is working well, which is to be expected given the fact that it lies entirely in the adaptively secure end of the spectrum.

Membership of the multilateral LBPTC spans the entire spectrum, with two member states lying deep within the adaptive insecurity portion. Historic experience has shown that the LBPTC has been dysfunctional from its inception, with the prognosis for success being poor given the fact that the two riparian states with the highest level of second-order scarcity in the region need to be accommodated. Consequently, it seems prudent to predict that the bilateral JPTC will continue to be the main vehicle for cooperation in the Limpopo River basin, with a very real chance that the dynamics of desecuritization will not be easily invoked. This suggests that the finding by Wolf *et al* (2003:47) that the Limpopo is a basin “at risk” is indeed valid, given the history of regime failure in the basin, and the high level of second-order resource scarcity that is endemic.

4.6.6 Conclusion Regarding the Limpopo River Basin

The Limpopo River basin has a longer history of regime creation than the Orange River case, but these attempts correlate with South Africa’s changing internal security situation more so than mere water deficit suggests. Therefore, like the Orange River case, attempts at regime creation in the Limpopo basin have been a reflection of the strategic needs of the hegemonic riparian state (South Africa). While the need to gain access to water for purposes of economic growth was a factor, it can be argued that this was never the major driver of the process. The flurry of negotiations in the 1980s coincided with a marked worsening of the internal security situation in South Africa, and the failure to reach agreement with 2 of the riparian states (Zimbabwe and Mozambique) can be directly attributed to their stance *vis-à-vis* the broader political struggle for the demise of colonialism and apartheid. The Limpopo River basin illustrates 5 distinct hydropolitical tendencies.

(a) *Fundamental driver of regime creation:* National interest is a key driver of regime creation. In this regard, hegemonic states seek to entrench their position of dominance, but this can be resisted, as occurred with both Mozambique and Zimbabwe. This has long-term implications for those states however.

(b) *Broader political context:* There is a strong linkage between regime creation and the broader political arena in which the given international river basin is enmeshed. Sometimes this political struggle supports regime creation, but this is usually when such a condition suits the national interest of the non-hegemon. The water supply to Gaborone through the Molatedi Dam can be seen in this context. It can therefore be concluded that patterns of regime creation reflect the broader political dynamics in which the respective riparian states are engaged, and is not merely a hydropolitical manifestation occurring in isolation.

(c) *Emergence of a hydropolitical complex:* Given that the Limpopo River basin is closed, combined with the fact that 3 of the riparian states are facing water deficit constraints to their future economic growth potential, it can be concluded that a hydropolitical complex is emerging as a distinct component of the broader Southern African Regional Security Complex originally identified by Buzan (1991:210).

(d) *Hydrological data and regime creation:* The correlation of the existence of disputed hydrological data with the non-functioning of a regime is noteworthy. This dispute over data simply reflects the existence of other, more profoundly political differences between the various riparian states. Significantly, where regime creation is at it's most advanced (JPTC) there have been joint country studies (JULBS) yielding uncontested data that has acted as a central focal point for confidence-building efforts. This also highlights the role of second-order resources as an important factor in stimulating the development, and subsequent maintenance of a regime. It can therefore be tentatively concluded that a second-order scarcity within a given riparian state can mitigate against effective and sustainable regime creation, because such a scarcity merely perpetuates the political environment of mistrust and inequity.

(e) *Second-order resources as an independent variable:* The wide spread of riparian states across the adaptive security spectrum suggests an inherently polarizing dynamic that is at work within the Limpopo River basin, with a critical mass of second-order scarcity in two of the riparian states remaining a stumbling block to the generation of uncontested basin-wide data. The likelihood of desecuritization occurring under these conditions is therefore unlikely in the short-term. This has implications for the classification by Wolf *et al* (2003:47) that the Limpopo River basin is “at risk” because these impediments will have to be overcome before a reclassification can occur. This has

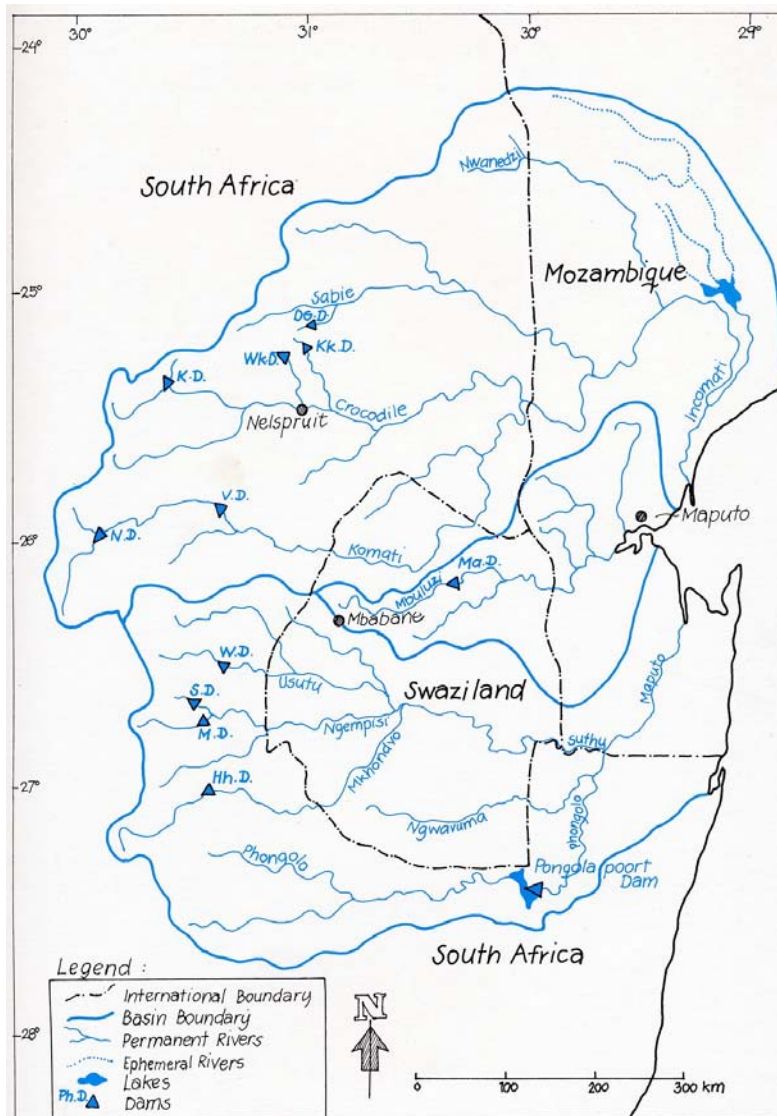
wider ramifications than just the water sector however, as this perception of risk feeds into the financial markets and undermines investor confidence in the SADC region as a whole, making it an issue that is relevant to the New Partnership for Africa's Development (NEPAD).

4.7 The Incomati and Maputo River Basin

The Incomati and Maputo River basins are managed as one entity, because the riparian states in both international river basins are the same (see Map 13). This fact is reflected in the signing of the *Incomaputo Agreement* during the WSSD, which served to formalize this natural arrangement (Treaty, 2002b). The Incomati is highly developed, but the Maputo (known at the Phongolo in South Africa) is the least developed of all international river basins to which South Africa is a riparian state, making it a logical target for future resource capture (see Map 8) (Basson, 1999:9). The Incomati and Maputo River basins are strategically important as a foundation for economic activities in the east of the country (see Figure 17). The Incomati and Maputo River basin is the smallest of all the international river basins in South Africa (see Table 15). The Maputo in particular has been identified as a source for future water transfers to adjacent basins in water deficit (see Map 8). The Incomati River is a recipient basin for no IBTs; a source basin for 1 IBT; with no intra-basin transfers; while the Maputo River is a recipient basin for no IBTs; a source basin for 2 IBTs; with no intra-basin transfers of any magnitude (see Table 16). After the Limpopo River, the Incomati is the second most important resource for Mozambique (Vas & Pereira, 1998:114). The Incomati basin in Mozambique lies in an area that is classified as being semi-arid, and the streamflow arising from endogenous water is equivalent to about 5% of the MAR, (Vas, 1999:62-64). This means that Mozambique is highly dependent on exogenous water that crosses the border from South Africa. Both the Incomati and Maputo basins are of great importance to Swaziland. The Incomati River basin is considered to be “at risk” (Wolf *et al.*, 2003:47).

4.7.1 Physical Description of the Incomati and Maputo River Basin

The Incomati River has a total basin area of 50,000 km² with an annual MAR of 3,600 x 10⁶m³ (Basson, 1999). There are 3 riparians, with 62% of the basin area lying in South Africa (upstream riparian), 5% lying in Swaziland, and 33% in Mozambique (downstream riparian) (see Table 15 & Map 13).

Map 13. The Incomati, Maputo and Umbeluzi River Basin.

Source: Pallett *et al.*, 1997:91.

Contribution to MAR by each riparian has been disputed, with 64%-81% coming from South Africa, 13%-20% coming from Swaziland, and 6%-16% coming from Mozambique, depending on whose data is being used (Basson, 1999; Savenije & van der Zaag, 1998:30) (see Table 15). This is partly because Mozambique did not get fully involved in the Joint Incomati Basin Study (JIBS) due to institutional problems and political tensions at the time (Vas & Pereira, 1998:119; Vas, 1999:64). Annex I of the *Incomaputo Agreement* has stipulated the various hydrological parameters in great detail, so the disputed nature of the data presented in Table 15 is likely to decline in

hydropolitical relevance. It is simply too early to predict with any degree of certainty however, given the history of basin-wide regime dysfunction in this international river basin. The recent instruction from the TPTC for an Integrated Scoping Study of the Maputo River basin suggests that there is a serious attempt to remove the obstacle caused by incomplete or disputed hydrological data (TPTC, 2003).

The Incomati basin is of great strategic importance to South Africa, because it supports a large amount of economic activity in that country. One of the key elements of this basin is the fact that an IBT is used to sustain the generation of electricity in the adjacent Olifants catchment (a tributary of the Limpopo River) on which a significant portion of the South African economy is dependent (Ohlsson 1995b:51). There are consequently a number of dams in this basin, with 10 in excess of $12 \times 10^6 \text{m}^3$. The combined storage capacity of twenty-two dams in the basin is $400 \times 10^6 \text{m}^3$, with 2 new dams under development, or having just been completed (Maguga and Driekoppies). The Sterkspruit Dam in South Africa has a storage capacity of $167 \times 10^6 \text{m}^3$. The streamflow in this basin is highly variable, ranging in recorded time from $4,926 \times 10^6 \text{m}^3 \text{yr}^{-1}$ during the 1954/55 hydrological year, to $28 \times 10^6 \text{m}^3 \text{yr}^{-1}$ during the 1982/83 hydrological year (Conley, 1995:22; Heyns, 1995:6). One of the tributaries is the Sabie River, which sustains the Kruger National Park and is probably the most biologically diverse river in South Africa (Davies *et al.*, 1993:179). In Swaziland water is diverted into the Umbeluzi River in order to irrigate sugar cane (Heyns, 1995:7). An unusual aspect of this basin is that South Africa is both an upstream and downstream riparian relative to Swaziland, so dams built in that country increase the yield for subsequent release downstream, and are therefore to South Africa's advantage.

The Maputo River has a total basin area of $35,000 \text{ km}^2$ with an annual MAR of $3,900 \times 10^6 \text{m}^3$ (see Table 15) (Basson, 1999). There are 3 riparians, with 56% of the basin area lying in South Africa (upstream riparian), 34% lying in Swaziland, and 10% in Mozambique (downstream riparian) (see Table 15). Contribution to MAR by each riparian is not disputed, with 56% coming from South Africa, 38% coming from Swaziland, and 6% coming from Mozambique (see Table 15). There are 6 dams with a storage capacity in excess of $12 \times 10^6 \text{m}^3$, with the largest being Pongolapoort Dam in South Africa that inundates part of Swaziland. Ironically, the water that this dam stores has never been used for the purpose for which it was originally intended, but it serves to stake a claim over the resource for future development as a manifestation of the realist-styled hydropolitics during the *Total National Strategy* era in South Africa. Plans are

currently under consideration in South Africa to divert this water to other inland basins in water deficit, but no final decision has yet been taken. There is a significant IBT from the Usuthu catchment for industrial use and the cooling of the Electricity Supply Commission (ESCOM) power stations in the Limpopo and Orange River basins (Heyns, 1995:8). Given the overall importance of stable energy generation to the effective functioning and long-term growth of the national economy in South Africa, the Maputo River is considered to be a strategic resource by South African planners. The Maputo River can therefore be regarded as having been captured by South Africa for transfer elsewhere as the strategic need dictates (see Maps 8 & 9 and Table 16).

4.7.2 Historical Progression of Regime Creation in the Incomati and Maputo River Basin

Regime creation within these two basins is somewhat similar to that of the Limpopo, because of the historic legacy of Portuguese colonial rule (see Figures 20 & 22). There is evidence of close bilateral cooperation between South Africa and Swaziland, similar to that in existence between South Africa and Botswana in the Limpopo case. Regime creation in both the Incomati and Maputo River basins dates back to the *South Africa / Portugal Treaty* (Treaty, 1926). During 1948 SARCCUS was established, with relevance to the Incomati and Maputo riparian states. A *Second Water Use Agreement* was signed in 1964 by South Africa and Portugal, which spoke of rivers of mutual interest including the Cuvelai, Okavango, Limpopo, Maputo and Incomati, but which focused in detail on the Cunene (Treaty, 1964; Heyns, 1995:5; Heyns, 1996:263). Swaziland acceded to this agreement in 1967. During 1983 the TPTC became the first basin-wide regime in Southern Africa (see the Limpopo case study) applying to the Incomati and Maputo River, but this did not function because of institutional incapacity and political tension in Mozambique (Ohlsson, 1995b:60; Vas & Pereira, 1998:119; Vas, 1999:65). Significantly, this regime was negotiated during a time of heightened security risk for the South African government, when the *Total National Strategy* approach was at its zenith. This fact needs to be taken cognizance of in any analysis of the effectiveness of the TPTC. Vas (1999:65) notes that “the TPTC ... did not meet regularly ... due to the degradation of the political situation in Mozambique”.

During 1989 an attempt was made to revive the TPTC when negotiations were again resumed between all 3 riparian states. Driving this revival process was South Africa's intention of building the Driekoppies Dam, and Swaziland's intention of commencing

work on the construction of Maguga Dam (Vas, 1999:65). On 15 February 1991 the TPTC arrived at what became known as the *Piggs Peak Agreement*, which accepted the following (Treaty, 1991; Vas & Pereira, 1998:119; Vas, 1999:65):

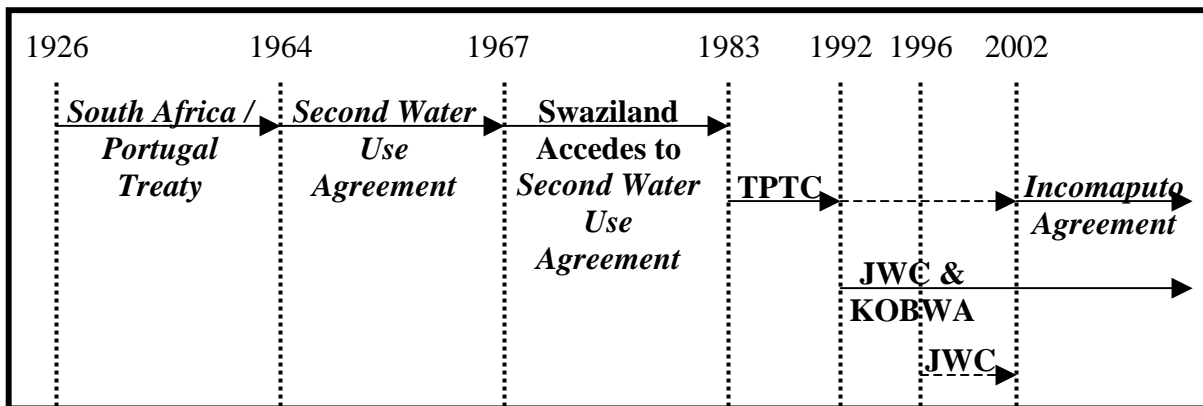
- Mozambique agreed to the construction of the Driekoppies and Maguga Dams.
- A study, known as the Joint Incomati Basin Study (JIBS), would be launched by all 3 riparian states to serve as a basis for future negotiations on water sharing.
- South Africa would refrain from constructing any major storage works upstream of Mozambique's Corumana Dam without prior consultation with the TPTC.
- As an interim water sharing measure South Africa would guarantee a minimum flow of $2\text{m}^3\text{s}^{-1}$ at the Ressano Garcia border.

The JIBS, which was conducted by a South African consultant initially in conjunction with a Mozambican counterpart, considered many alternatives, all of which “indicated that the water available to Mozambique would be insufficient to fully develop its potential in the basin if all considered developments in [South Africa] and Swaziland would take place” (Vas, 1999:64). This alarmed the Mozambican representatives to the TPTC. Mozambique consequently withheld its approval of the JIBS report, which seriously affected the collection of data from Mozambique (Poulsen, 2001:6.6). In the midst of this period of vacillation, South Africa announced its intention to construct the Injaka Dam, which the Mozambican officials interpreted as being a violation of the *Piggs Peak Agreement* (Vas, 1999:66). This saw the demise of the TPTC as a functioning entity, although it continued to exist as an intergovernmental structure.

The collapse of the TPTC into dysfunction saw a bilateral regime being negotiated between South Africa and Swaziland, which resulted in the Joint Water Commission (JWC) and the Komati Basin Water Authority (KOBWA) being formed through the *Joint Water Commission Agreement between South Africa and Swaziland* and the *KOBWA Agreement* respectively (Treaty, 1992d; Treaty, 1992e). A similar *Joint Water Commission Agreement between South Africa and Mozambique* failed (Treaty, 1996). Mozambique and Swaziland also entered into a bilateral arrangement on the Umbeluzi River (that lies between the Incomati and Maputo basins but in which South Africa has no direct interest - see Map 13), which was a mere one and a half pages in length with significant technically relevant omissions (Treaty, 1996; Treaty, 1999c; Vas, 1999:65). Both of these bilateral agreements became dysfunctional.

An overview of regime creation is presented in Figure 22. For the purposes of a detailed analysis, the two basins will be treated as one, and has been divided into 2 distinct components - the upper and lower basin - with international relations in the hydropolitical realm having been characterized by the creation of 1 functioning bilateral regime, and the initial failure and subsequent attempts to revive a basin-wide regime involving all 3 riparian states.

Figure 22. Historic Overview of Regime Creation in the Incomati and Maputo River Basin.



The ending of the Cold War and the collapse of the South African Apartheid State closed an important period of overlay, which allowed for a gradual normalization of relations between all riparian states. The *Incomaputo Agreement* that was signed during 2002 thus became an important milestone in the development of a potentially functioning basin-wide regime, but the effectiveness of this cannot be determined at this early stage. Of major importance however, the *Incomaputo Agreement* achieved 3 key breakthroughs:

(a) *Revival of the TPTC*: It served to revive the relevance of the TPTC, which had collapsed into dysfunction but had not ceased to exist as an intergovernmental structure, by passing a *Resolution of the Tripartite Permanent Technical Committee on Exchange of Information and Water Quality* (Treaty, 2002a). This created some confidence between all negotiators, thereby paving the way for an ending of the *impasse* over the *Piggs Peak Agreement*.

(b) *Hydrological data and regime creation*: It allowed agreement to be reached on the previously disputed hydrological data (see Table 15). As such it has removed a significant stumbling block that will probably allow for more confidence to be built between negotiators from all of the riparian states.

(c) *Agreed water sharing formula*: Annex I of the *Incomaputo Agreement* provides an agreed basis for the determination of water sharing between all of the riparian states. Of great significance in terms of confidence building for all delegations, Paragraph 4 of Article 9 of the *Incomaputo Agreement* recognizes the strategic importance of water from the Incomati and Maputo River basins for all riparian states (Treaty, 2002b:11). Arguably the most important breakthrough in terms of confidence building for the Mozambican delegation is the explicit recognition that the future augmentation of the water supply to the city of Maputo (which currently sources its water from the Umbeluzi River) must be secured, and has been reserved (see Map 13).

The *Incomaputo Agreement* suggests that the TPTC is likely to become more relevant again, with a good prognosis for its normalization as a water regime, serving the strategic needs of all riparian states. This also suggests that the basin may be in a transition phase out of the “at risk” category in which Wolf *et al* (2003:47) have placed it.

4.7.2.1 The Upper Basin: South Africa and Swaziland

The 1980s was a period of heightened political tensions in the Southern African region, with a dramatic resurgence in the activities of the various liberation movements. The South African approach to this set of problems was the dual policy of the “carrot” incentive and “stick” disincentive that was implicit in the *Total National Strategy*. Therefore, in response to the growing need to develop the water resources, and in recognition of the failure of the TPTC, two bilateral water-related agreements were reached between South Africa and Swaziland in 1992. A treaty was signed between South Africa and Swaziland establishing the Joint Water Commission (JWC) on 13 March 1992 acting as an advisory body for matters of common interest (Treaty, 1992d; Chenje & Johnson, 1996:165; Pallett *et al.*, 1997:70). KOBWA was established at the same time, but as a separate institution, and is responsible for the implementation of the Komati River Basin Development Project (Treaty, 1992e; Chenje & Johnson, 1996:165; Pallett *et al.*, 1997:70). A subsequent agreement between South Africa and the now defunct Bantustan Government of Kangwane forms a component of the *KOBWA Agreement*, and focuses on water resource development in the South African portion of the Incomati River basin that was formally part of the so-called “independent homelands” during the apartheid era (Treaty, 1992f). In keeping with the *Total National Strategy* approach of the South African government, these regimes were underscored by another infrastructural agreement involving the construction of a railway line in Swaziland

(Treaty, 1983b). These were designed to offer sufficient incentive to the Swaziland government not to allow their territory to be used by guerilla forces of the various liberation movements at the time.

The *KOBWA Agreement* is functioning well and is responsible for the construction of the Maguga Dam in Swaziland, which is part of a more complex water management scheme involving the recently constructed Driekoppies Dam. The renewed cooperation between all riparian states has opened up the thorny issue of water allocation between the various countries, but given the detailed attention to this complex problem in the *Incomaputo Agreement* - officially designated as an “interim agreement” - indications are that this matter will be resolved to the reasonable satisfaction of all riparian states.

4.7.2.2 The Lower Basin: South Africa and Mozambique

As previously noted, the 1980s was a period of heightened political tension in the Southern African region, particularly between South Africa and Mozambique, largely because of the support by the government of the latter for armed guerillas of the various liberation movements intent on toppling the Apartheid State. It is in this light that the bilateral relations between the two governments should be evaluated. The formation of the TPTC as a basin-wide regime in February 1983 was intended to be a foundation for inter-state cooperation, and in keeping with the *Total National Strategy* approach then in vogue, this was supported in rapid succession by two other significant agreements. During March 1984, the *Nkomati Peace Accords* - a non-aggression pact between South Africa and Mozambique - was followed by an agreement on the revival of the Cahora Bassa project, which had fallen into disuse as a result of ongoing sabotage to the power lines (Treaty, 1983c; Treaty, 1984a; Treaty, 1984b). This represented the incentive side of the two-pronged *Total National Strategy* approach, designed to induce the Mozambican government into a less threatening posture towards the embattled Apartheid State.

The *Piggs Peak Agreement* that established a flow rate of $2\text{m}^3\text{s}^{-1}$ at the border between South Africa and Mozambique was simply insufficient for Mozambique's needs. Mozambican delegates interpreted the subsequent announcement by South African delegates that they were proceeding with the construction of the Injaka Dam, despite their previous agreement to the contrary, as being in violation of the spirit of the *Piggs Peak Agreement* (Vas & Pereira, 1998:120; Vas, 1999:66). In addition to this, the Mozambican

delegates became alarmed when the initial JIBS study indicated that the water available to Mozambique would be insufficient to develop its potential in the basin if all considered developments in South Africa and Swaziland would take place (Vas & Pereira, 1998:120; Vas, 1999:64). In the face of these issues, the TPTC collapsed as a functioning entity, and remained in name only.

As a result of the collapse of the TPTC, and given Mozambique's critical need to secure the strategic supply of water to the capital city Maputo, a bilateral agreement creating the Joint Permanent Technical Water Commission (JPTWC) between Mozambique and Swaziland was finalized in 1999, but it failed (Chenje & Johnson, 1996: 164; Ohlsson, 1995:60; Pallett *et al.*, 1997:70; Treaty, 1999c). Vas (1999:65) attributes this collapse to the inexperienced DNA staff at that time, with many of the institutional resources having been drained by the ongoing civil war. To compound this situation, salinization of the Incomati estuary in Mozambique became a serious problem during periods of low flow, impacting negatively on ecological and socioeconomic aspects (Breen, 2000; Fakudze *et al.*, 2000; Peter *et al.*, 2000).

The renewed interest by Mozambican officials in reviving the TPTC should be interpreted in light of the fact that water resource scarcity in that country has now become an acute problem. If economic growth is not ensured, then post-war reconstruction could well be jeopardized, which in turn could trigger insecurity again for neighbouring Swaziland and upstream South Africa in the form of illegal immigrants and cross-border criminal activity such as drug trafficking and arms smuggling.

4.7.3 The Incomati and Maputo River Basin within a Broader Regional Setting

The Incomati River basin is relatively small when compared to either the Orange or Limpopo, but is extremely complex given the high reliance on this resource by all riparian states. The Maputo River basin, while less developed than the other international river basins under South African sovereign control, is strategically important as a source of future augmentation to inland rivers facing basin closure. It is therefore necessary to understand the Incomati and Maputo River basins as being part of a regional water resource that is increasingly becoming the subject of dispute, with resource capture being highly relevant as one of the fundamental hydropolitical drivers. There are already IBT links with both the Limpopo and Orange River basins (see table 16), with every indication that the magnitude of these transfers will grow in the future. The main

relevance of the Incomati and Maputo River basins therefore becomes evident in light of their respective role as donor basins (see Table 16 and Maps 8 & 9), and the basic clash of interests as national developmental priorities remain uncoordinated.

4.7.4 Critical Hydropolitical Issues Within the Incomati and Maputo River Basin

From the perspective of regime creation, there are 5 critical issues to note within the Incomati and Maputo River basin.

(a) *TPTC and existing bilateral regimes*: The relationship of the historically older but largely dysfunctional basin-wide regime (TPTC) with the more recent but highly functional bilateral JWC is not clear. Ideally, the bilateral regime should be incorporated into the multilateral regime if the latter is to be given a realistic chance of becoming effective, but the history of failures is likely to undermine this eventuality in the short-term. This means that the JWC will continue to exist, and probably even be broadened and deepened over time, simply because of the lower level of hydropolitical complexity being dealt with at the bilateral level, and the greater degree of harmonization of interests between the two riparian states. This has implications for Wolf *et al's.*, (2003:47) classification as being a basin “at risk” because one of the criteria in that classification is the absence of suitable basin-wide institutional structures.

(b) *Impact of basin closure*: Basin closure is an important issue, and in particular the increasing levels of insecurity that this condition unleashes for low-order riparian states such as Mozambique. Significantly, it is not so much the fact that the Incomati or Maputo basins are closed in their own right - the Maputo basin has a relatively large volume of unallocated water - but rather the fact that other basins inside South Africa are facing water deficit, with the Incomati and Maputo systems becoming the target of resource capture (see Maps 8 & 9). The cascading of insecurity that arises from water deficit, either downstream within a given river basin, or into adjacent international river basins that have been linked through IBTs, is thus a salient feature of the Incomati and Maputo River basin case study. This factor is therefore likely to become a fundamental driver of hydropolitical conflict in the future that will need to be dealt with if any regime is to be truly effective. This is an example of demand-induced scarcity in South Africa, impacting negatively on Mozambique in the form of structural scarcity.

(c) *Water and economic growth potential of the state:* The role of water as a basic necessity for any sustained economic growth and development is clearly highlighted in the Incomati and Maputo River basins. This raises the complex issue of SWE. Clearly there is insufficient water to meet the current needs of all 3 riparian states, particularly in the Incomati basin, based as they are on irrigated agriculture for job creation purposes. It is plainly evident that South Africa will need to downscale its aspirations by introducing inter-sectoral allocative efficiency policies if Mozambique is to have a realistic chance of meeting its own post-war reconstruction needs. This in turn raises the very complex issue of sovereignty, and in particular the right of government to choose its own developmental priorities without outside interference.

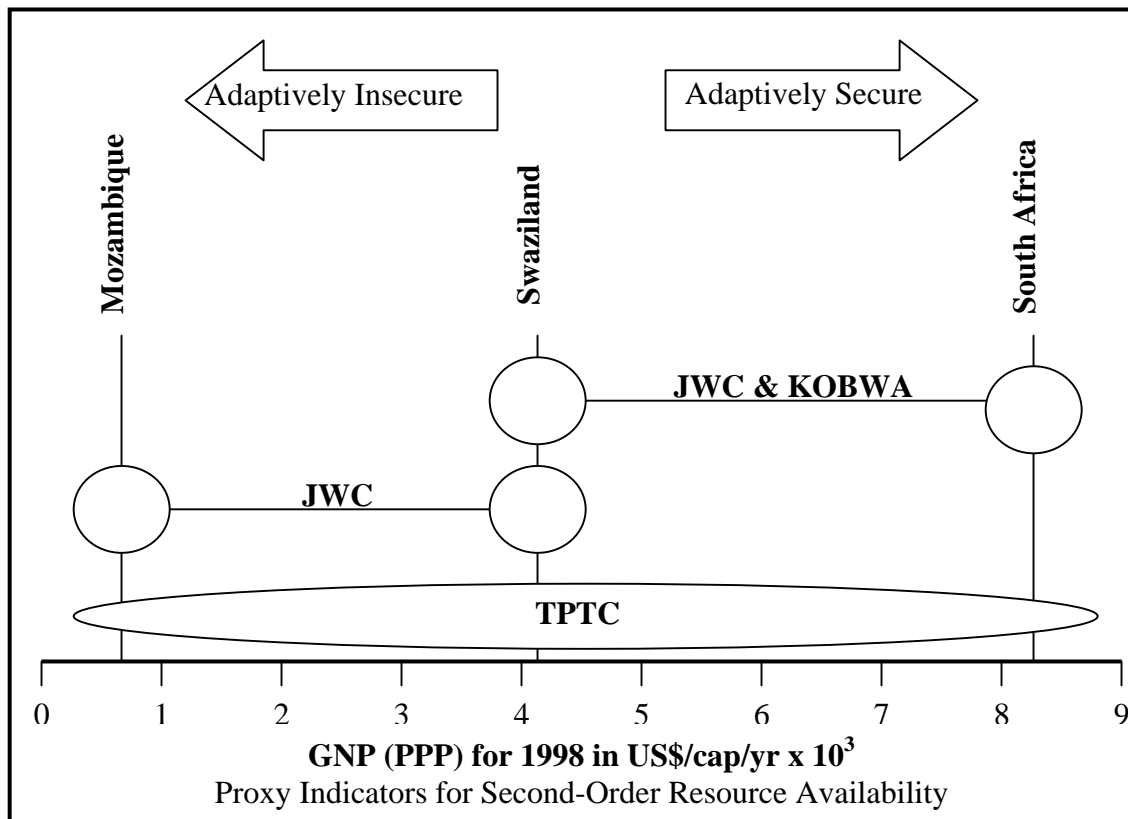
(d) *Equity as a fundamental driver of conflict:* The previous point raises the issue of equity within any given international river basin. It is plainly obvious that South Africa as the hegemonic riparian state has monopolized its access to the water. While this is a hydrological fact, it is not necessarily morally correct, but what role does morality play in international relations? The answer to this question is complex indeed, and will not even be attempted here because it is outside the scope of this research, save to say that the perpetuation of inequity will in all likelihood remain a fundamental driver of conflict potential, and as such needs to be addressed by any regime if that structure is to remain effective. This means that a major challenge facing any water regime in the Incomati and Maputo River basin is the harmonization of currently conflicting national interests and national development priorities.

(e) *Second-order resources as an independent variable:* The Incomati and Maputo basin case study illustrates the relevance of second-order resources in the maintenance of a water regime. Mozambique has been ravaged by a long war of liberation, followed by decades of civil war, and it can be considered a classic example of a riparian state that is confronted with both a first-order scarcity and a second-order scarcity simultaneously. This is a debilitating situation called water poverty (WP) (see Figure 13). It is this second-order scarcity that prevented Mozambique from fully participating in the JIBS project, and it is this same form of scarcity that has prevented them from effectively articulating their interests within the TPTC. It is also this form of scarcity that has resulted in the basin being classified as being “at risk” (Wolf *et al.*, 2003:47). This will have major consequences for the maintenance of the water regime over time.

4.7.5 The Adaptive Security Spectrum in the Incomati and Maputo River Basin

The relative distribution of second-order resources between the respective riparian states in the Incomati and Maputo River basin reflects somewhat of a mixed pattern. Mozambique, as the most second-order resource poor riparian state in the entire SADC region had a dysfunctional bilateral regime with Swaziland (JWC), itself at the threshold of adaptive insecurity (see Figures 14 & 23). Even more significantly, but unfortunately beyond the scope of the current analysis, Mozambique has also been involved in a failed arrangement with Zimbabwe on the Pungué River (Granit, 2000:9). Interpreted in light of the adaptive security spectrum, this is consistent with the broad thrust of the model.

Figure 23. The Adaptive Security Spectrum in the Incomati and Maputo River Basin.



Source: Drawn from World Bank 2000:42-43 data used in Turton & Warner 2002:65.

Membership of the multilateral TPTC covers the two extremes of the adaptive security spectrum. This suggests that while the apparent resuscitation of the TPTC as a result of the *Incomaputo Agreement* is encouraging, it does not necessarily mean that the regime will automatically become functional. On the contrary, the severe second-order scarcity

problem confronting Mozambique is likely to remain a significant impediment to the development of equitable water sharing arrangements for the foreseeable future, suggesting that the dynamics of securitization have not yet been fully attenuated. This supports the classification by Wolf *et al* (2003:47) that the Incomati River basin is “at risk”.

4.7.6 Conclusion Regarding the Incomati and Maputo River Basin

The Incomati and Maputo River basin presents an interesting profile, making it an excellent case study in hydropolitical dynamics. The experience with the establishment of a basin-wide regime has been checkered, with initial failure of the TPTC. Recent developments, particularly regarding the *Incomaputo Agreement*, indicate the emergence of what is potentially a relatively sophisticated regime that embraces complexities not found in any other basin-wide regime in existence in Southern Africa at this time. This suggests that there is institutional learning taking place as the respective negotiators use expertise gained elsewhere. The Incomati and Maputo River basin thus illustrates 6 distinct hydropolitical tendencies.

(a) *Definition of national interest*: National interest is a key driver of regime creation. Significantly, those national interests are more broadly defined than merely cooperation over water resource management. The initial creation of the TPTC was closely linked with, and subsequently supported by, other security and economic cooperation agreements. When the TPTC failed, the JWC and KOBWA were negotiated on a bilateral basis and were also linked with, and supported by, other security and economic cooperation agreements.

(b) *Range of complexity*: Bilateral regimes are easier to manage and sustain than multilateral regimes, because they present a greater chance for the harmonization of national interests, and the smaller range of issues being dealt with increases the likelihood of reaching consensus.

(c) *Role of the hegemonic power*: While regime creation is driven by the national interest of the hegemonic riparian state within any given basin, the success of that regime is not guaranteed. The regime succeeds only when the non-hegemonic power perceives that its own national interest is being served by such an arrangement.

(d) *Hydrological data and regime creation*: The role of shared and uncontested hydrological data in forming a foundation of future consensus between riparian states should not be underestimated. As with the Orange River case, the existence of shared basin-wide data served to provide the political climate in which an agreement could ultimately be reached, even if the *Incomaputo Agreement* is only an interim arrangement as the formal name implies. Even though the JIBS was initially a contested process with Mozambique withdrawing its support, the data that was yielded ultimately became a key factor in breaking the *impasse* created by the failure of the *Piggs Peak Agreement*, and became a vital component of the *Incomaputo Agreement*. This brings the relevance of second-order resources into clear focus, with an excellent correlation between second-order scarcity and regime collapse. Mozambique has been unable to sustain any of the bilateral regimes it had entered into between both South Africa and Swaziland (a situation that is also found in the Pungué and Save River basins that it shares with Zimbabwe but that are not part of the current research focus). Conversely, the capacity of the hegemonic state to develop data that supports its own national interest, and thereby sustain its dominance within any set of negotiations, is nothing more than a manifestation of the power configuration within any given international river basin.

(e) *Basin closure as a driver of insecurity*: Basin closure can be closely linked with increasing levels of insecurity, particularly for low-order riparian states that are also confronted by a second-order scarcity situation. In this regard, the lack of capacity to generate data with which to counter the claims of the hegemonic state increases the perceptions of insecurity, and ultimately becomes one of the drivers of conflict potential within the basin. The natural outcome of this is a gradual process of securitization in a number of fields, including water resource management.

(f) *Second-order resources as an independent variable*: The spread of riparian states across the adaptive security spectrum suggests that the natural dynamics of securitization are likely to persist while one (or more) of the actors are confronted by a chronic second-order resource scarcity. This supports Wolf *et al's.*, (2003:47) classification of the Incomati River basin as being “at risk”, and the mere existence of the *Incomaputo Agreement* on its own is unlikely to change the *status quo* until the impact of the debilitating scarcity of second-order resources has been overcome.

4.8 Conclusion

Arising from the South African case study 9 conclusions can be reached.

(a) *Hydropolitics as a sub-set of international relations*: There is a linkage between the creation of a water regime within any given international river basin and the broader political processes at work between the respective riparian states outside the realm of hydropolitics. It can thus be concluded that hydropolitics remains subordinate to those broader political dynamics. It therefore becomes a meaningless exercise to try and analyze hydropolitical processes on their own as if they were occurring in a vacuum. This is an oversimplification that results in false conclusions. This also means that the securitization of water resource management in international river basins occurs as the result of the broader political setting in which those river basins are embedded. In this regard, there is clear evidence of the securitization of water resource management in South Africa's international river basins, particularly those in which one or more of the riparian states were perceived to be a threat by virtue of their support for guerilla forces of the respective liberation movements during the anti-colonial and anti-apartheid struggle. In fact evidence from the South African case study suggests that the initial desire to create a water regime was closely correlated with threat perceptions inside the hegemonic state, which in this case, chose to adopt a *Total National Strategy* as a policy choice. All water regimes, whether bilateral or multilateral, were initially created during a period of heightened political stress, and the increasing international isolation of South Africa. While it cannot be determined from the available data if this is merely a coincidence, when viewed within the broader picture of the international relations of that time, the balance of probability suggests that the creation of water regimes was driven more by security considerations than by a more narrowly defined water deficit situation.

(b) *Basin closure as a driver of insecurity*: Basin closure can result in feelings of insecurity, particularly for a low-order riparian state that is being confronted with a second-order scarcity simultaneously. Given the linkage between hydropolitics and the broader set of political dynamics in which it is enmeshed, this sense of hydropolitical insecurity therefore feeds into the overall threat perception of the state. Seen in this light, basin closure can become a factor that contributes to the securitization of water resource management, but is not the sole driver of that process.

(c) *Securitization dynamics*: Where the securitization of water resource management starts to occur, a zero-sum outcome is likely. For example, Mozambique and Zimbabwe are arguably worse off from a hydropolitical perspective now than they could have been, had they chosen to cooperate with the regional hegemon in the creation of a basin-wide water regime two decades ago. Given the nature of the complex linkage between hydropolitics and the broader range of political processes, this zero-sum outcome is not only the result of hydropolitical dynamics, but also the result of factors such as internal political upheaval and civil war. Conversely, Botswana and Swaziland are arguably better off from a hydropolitical perspective than they could have been, had they chosen not to cooperate with the regional hegemon in the creation of the respective water regimes in which they are involved. In fact it can be argued that Botswana in particular, has succeeded in expanding its range of future strategic options as a direct result of participation in regime creation. Significantly too, Botswana is adaptively secure, thereby able to create strategic opportunities to its own advantage.

(d) *Desecuritization dynamics*: The role of data as a fundamental driver of the desecuritization of water resource management is clearly evident. The correlation of functioning regimes with the existence of uncontested data is high, and the role of joint efforts such as the ORRS, JULBS and JIBS in creating a climate conducive to consensus building cannot be overemphasized. It can be argued that where uncontested basin-wide data exists, a plus-sum outcome is more likely to occur.

(e) *Hydrological data and regime creation*: Given the important role that uncontested hydrological data plays as a builder of consensus between different riparian states, the correlation between the existence of contested data and regime failure is more than mere coincidence. It takes a considerable range of second-order resources to generate uncontested data in the first place, and the existence of a second-order scarcity is nothing more than one manifestation of the broader configuration of political power. Where regime failure has occurred, one of the riparian states involved was always being confronted by institutional failures outside of the water sector. Mozambique, and increasingly contemporary Zimbabwe, provide examples of institutional failure in one form or another. This is manifest as the inability to generate hydrological data, which is translated to a weaker negotiating position and consequently to the probability of regime failure and a minus-sum outcome.

(f) *Second-order resources as an independent variable:* The adaptive security spectrum offers a potentially useful analytical tool in the field of hydropolitics. In this regard historic evidence supports the fact that adaptively secure riparian states have systematically been able to create strategic opportunities for themselves - this is after all what being a hegemon is all about - thereby increasing their range of long-term options. Historic evidence also shows that adaptively insecure riparian states are unable to dictate the terms of negotiation, and can only defect from any arrangement when the situation becomes politically intolerable. Adaptively insecure riparian states are merely reactive to events such as basin closure, while adaptively secure riparian states are proactive to the point of using basin closure to their long-term strategic advantage.

(g) *Comparative hydropolitics:* When compared with the Jordan River case study, there are both similarities and differences.

(i) Similarities relate to the linkage with hydropolitics and the broader political environment in which the respective role-players are embroiled. This means that the securitization of water resource management has occurred as a result of other issues of a high politics nature, and not only because of a first-order resource scarcity.

(ii) Differences relate to the level of securitization. In the South African case, even at the height of perceived threats to national security, water resource management was less securitized than the Jordan River case. While the SSC was an important institution that defined the overall parameters in which the various regimes were created, it did not issue direct decrees such as those in existence in the Jordan basin. Similarly, hydrological data, while being regarded as being extremely sensitive, was not classified as secret in the South African case.

(h) *Pattern of regime creation:* The sequencing of regime creation has had an impact on regime viability in the South African case study.

(i) Where multilateral basin-wide regimes have been created before successful bilateral experiences in any given international river basin, they have simply failed. This is manifest in the Limpopo basin, where the LBPTC has never managed to live up to expectations, and in the Incomati and Maputo River basin where the TPTC has had a patchy history of failure. A factor contributing to this

failure could be the element of broader securitization that was evident in both these cases, which could have made the non-hegemonic riparian states reluctant to cooperate, and prone to defection.

(ii) Where bilateral regimes have been successful in any given international river basin, the prognosis for the creation of a subsequent multilateral basin-wide regime seems to be better. This is manifest in the Orange River basin where ORASECOM was formed after the successful creation of two other bilateral regimes (LHWC and PWC); and in the Incomati and Maputo River basin, where the revival of the TPTC follows after the successful launching of the JWC and KOBWA. This suggests that the role of institutional learning is an important factor in regime maintenance over time.

(i) *Basins “at risk” classification:* The results from this more detailed analysis of the various South African international river basins than that conducted by Wolf *et al* (2003) has shown that:

(i) The Orange River *cannot* be considered to be a basin “at risk” because it has the most comprehensive set of regimes in the study area, and arguably in the entire SADC region (although this is strictly beyond the scope of the current study). There is also a solid history of regime creation and evolution with no evidence of regime failure of the type or magnitude evident elsewhere in the study area. The adaptive security spectrum in this basin also suggests that the second-order resource capacity is there with which to deepen and broaden the regimes that already exist.

(ii) The Limpopo River *can* be considered to be “at risk” because it has a long history of regime failure, and of all the international river basins that are the subject of this study, displays the least movement towards a more optimistic prognosis. The adaptive security spectrum in this basin also suggests that the second-order resource capacity is lacking, so existing regimes are unlikely to be deepened or widened until this condition has been effectively resolved.

(iii) The Incomati River *can* be considered to be a basin “at risk”, but the recent developments regarding the *Incomaputo Agreement* are an encouraging *caveat*. This suggests that the basin may be going through a transition of sorts, but the

adaptive security spectrum in the basin indicates that the second-order resource scarcities that exist are likely to remain serious threats to this transition. This opens the door to third party involvement, which in this case may be appropriate.