WATER AND SOCIAL STABILITY: THE SOUTHERN AFRICAN DILEMMA

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Introduction:

This paper will attempt to highlight some of the fundamental development-related problems that are confronting the Southern African region at present. The range of the problem is wide, but one aspect stands out as significant - the dilemma arising from the environmental sustainability of current economic development initiatives vis-à-vis social stability - making this an issue increasingly likely to affect regional stability in the early part of the 21st Century. In this regard water is a key indicator of where we have been and where we are headed. This paper will present some of the latest research that is being done at AWIRU regarding water and social stability. It will be argued that two potential future scenarios exist. The first results from an end condition that has been defined as 'water poverty' (Turton & Ohlsson, 1999), which is likely to result in ecological collapse in conjunction with a high level of social instability. The second results from an end condition that has been defined as 'structurally-induced water abundance' (Turton & Ohlsson, 1999), which is likely to result in ecological sustainability in conjunction with a degree of social stability. Clearly the latter is the policy objective that ought to be striven for, yet the current data available tentatively suggests that this is not the case.

Statement of the Problem:

If one performs an analysis of Southern Africa, one is immediately confronted by two significant factors (Turton, 1999a). These relate to precipitation and people, and it is the interaction of these two fundamental variables that essentially underpins the developmental dilemma of the region. Let us look at these in a little more detail.

Precipitation[1] is the first fundamental variable of which four distinct aspects are important. The first three of these are generally of a greater importance than the remaining two for the purposes of this paper however. Firstly, there is a marked spatial maldistribution of water, with a distinct latitudinal and longitudinal trend. There are generally higher precipitation levels in the north, decreasing progressively to the south. Superimposed onto this, there are also higher levels of precipitation in the east, decreasing dramatically to the west. This is shown in Table 1. Secondly, there is a temporal dimension to this maldistribution of water. This means that rainfall tends to be distinctly seasonal in pattern, but these seasons vary greatly over time. Thirdly, there is the volume aspect. This is shown in Table 1 under the average rainfall column. The amount of precipitation that falls is subject to a high degree of variation. This is shown in Table 1 under the rainfall range column. These three elements combine to cause a reasonably high level of stochasticity in the overall precipitation patterns. This has significant implications for aspects such as crop planning, surface runoff, soil erosion and river flows. These factors in turn impact on water management because it means that large storage reservoirs[2] have to be planned and built because the reliability or predictability of the precipitation patterns are of a low order of magnitude. The less important aspect of precipitation (at least for the purposes of this paper) is water quality, which is generally of a reasonably high standard except in certain specific areas where acid rain falls. Eutrophication and salinization do occur in impoundments due to the return flows of effluent and evaporative losses however.

Country	Rainfall range (mm)	Average rainfall		Potential evaporation range (mm)	Total surface runoff	
		(mm)	(km^3)		(mm)	(km^3)
Angola	25 - 1 600	800	997	1 300 - 2 600	104	130.0
Botswana	250 - 650	400	233	2 600 - 3 700	0.6	.35
Lesotho	500 - 2 000	700	21	1 800 - 2 100	136	4.13
Malawi	700 - 2 800	1 000	119	1 800 - 2 000	60	7.06
Mozambique	350 - 2 000	1 100	879	1 100 - 2 000	275	220.0
Namibia	10 - 700	250	206	2 600 - 3 700	1.5	1.24
South Africa	50 - 3 000	500	612	1 100 - 3 000	39	47.45
Swaziland	500 - 1 500	800	14	2 000 - 2 200	111	1.94
Tanzania	300 - 1 600	750	709	1 100 - 2 000	78	74.0
Zambia	700 - 1 200	800	602	2 000 - 2 500	133	100.0
Zimbabwe	350 - 1 000	700	273	2 000 - 2 600	34	13.1
TOTAL			4 665			599.27

Table 1. Rainfall and evaporation statistics for selected countries in Southern Africa, showing rainfall range and estimated surface runoff. (Pallett, 1997:14)

People are the second fundamental variable of which three aspects are important. Firstly, there is a spatial distribution of people in Southern Africa that is generally at variance with the availability of water. In other words, population distribution tends in general to be concentrated in areas that are far from supplies of water. Secondly, there is a significant temporal aspect to the population base in the sense that the whole of Southern Africa generally has a very high population growth rate. Thirdly, there is the aspect of migration patterns. This is a complex issue in its own right. Suffice it to say, for the purposes of this paper, that there are population migration pull-factors and push-factors. Pull-factors are aspects such as perceptions of better job opportunities in the larger urban areas, which tend to be focussed on places like the Gauteng area of South Africa (which is on a high plateau, far from water supplies and facing a significant water shortage as a result), Gaborone in Botswana, and Harare and Bulawayo in Zimbabwe (both on a watershed and with unique water supply problems of their own). Migration push-factors are aspects such as the loss of livelihoods due to overpopulation, poverty, declining levels of land per capita (which is significant for a subsistence farming economy) and drought.

This leads logically onto the third fundamental variable. If the water is concentrated in areas that are spatially distant from the population centres, then effectively what needs to happen is to bring the water to the people (or vice versa). This is where the heart of the political ecology dilemma lies. In order to move water over long distances **pipelines**[3] are employed. Appendix "A" shows the current state of play regarding water pipelines in Southern Africa. For the purposes of the political ecology discourse it is these pipelines that make the debate lively. Because pipelines bring life-giving and job-creating water[4] to areas where the demand for water is high, they perform a function that can be regarded in its broadest sense as being allocative. In short, pipelines allocate a given volume of water to a specific spatial entity. It is precisely this allocative aspect of pipelines that results in the next variable, **power**[5]. In its crudest form, power[6] is derived from the privilege or the relative advantage[7] that the receiving entity derives from having been favoured over the non-receiving entity. Seen in this way, pipelines become conduits of power because they allocate water from an area of relative abundance, to an area of relative scarcity. The water so allocated therefore has an economic cost, whether this aspect is actually reflected in the final price that is charged for the water or not; and the water so allocated results in a relative advantage of one form or another.

This raises two distinct new aspects of the problem however. Firstly, the water supplied by these large pipeline schemes comes at a high ecological cost, opening the debate on sustainability. Secondly, in many cases there is simply no more water left for further mobilization in readily accessible river basins. This means that the pipeline projects are becoming increasingly complex, costly, international in nature and therefore prone to political factors beyond the control of any one government. Appendix "A" shows the number of pipeline projects in Southern Africa along with the number of countries involved.

Theoretical Aspects:

Recent work that has been conducted (Turton & Ohlsson, 1999) shows that in terms of water and social stability, two possible scenarios are likely to be relevant to developing countries in semi-arid regions. In this regard, by linking different combinations of a first-order natural resource scarcity (water) with a second-order social resource scarcity (adaptive capacity), the authors have developed some key concepts. Of these concepts, the most important for the purposes of this paper are those relating to the definition of 'water poverty[8]' and 'structurally-induced water abundance[9]'. Taking these as two possible end-conditions for future scenario planning purposes, a set of policy options can be generated. 'Water poverty' is the end condition that is likely to result in significant environmental collapse in conjunction with a high level of social instability. This is the condition that rational policymakers would logically choose to avoid. 'Structurally-induced water abundance' is the end condition that is likely to result in economic sustainability, and probably even a degree of environmental sustainability, coupled with a higher degree of social stability. This is the condition that rational policymakers would choose as a desirable end goal. This is illustrated graphically in Figure 1.

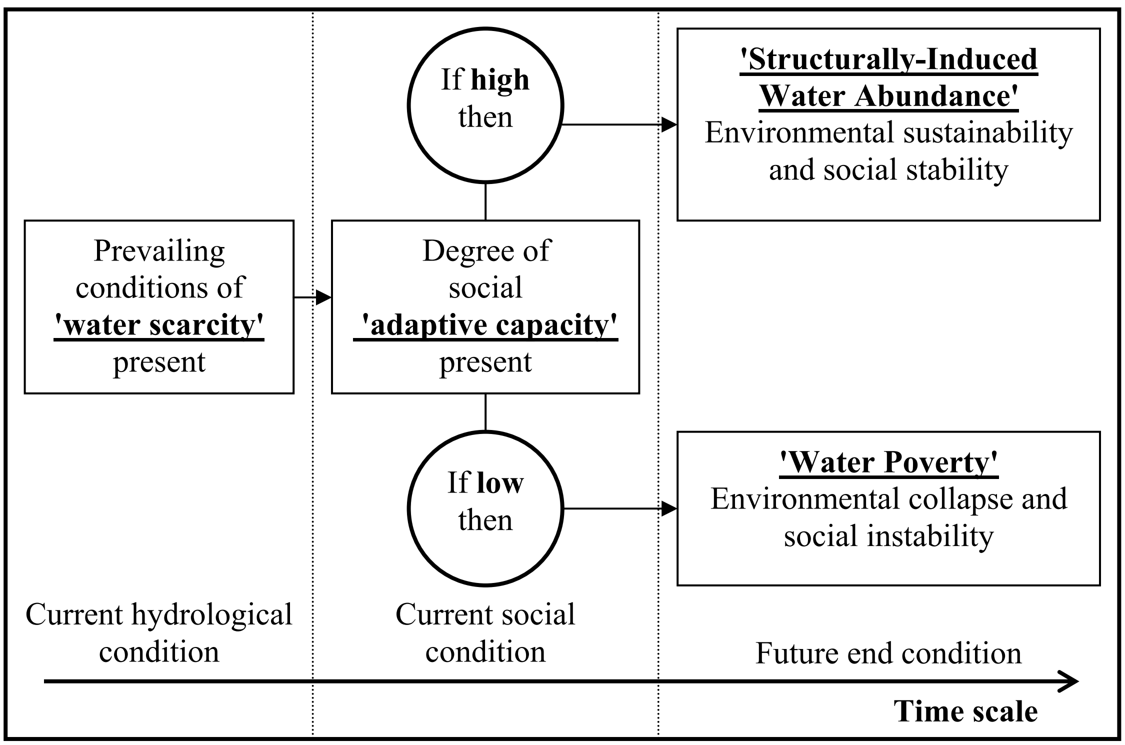

Figure 1. Schematic representation showing the hypothesized two end conditions that are likely to occur when combining both a first-order and second-order resource in the definition of key variables.

Thus in terms of this theoretical conceptualization, the interceding variable between 'water scarcity' and either 'water poverty' or 'structurally-induced water abundance' is the existence of social 'adaptive capacity[10]', loosely defined by Ohlsson (1998;1999) as the ability of a social entity to adjust to the increasing levels of 'water scarcity'. 'Adaptive capacity' is a nebulous concept to quantify however, prompting Turton & Ohlsson (1999:11) to hypothesize that Water Demand Management (WDM) is an empirically testable manifestation of the 'adaptive capacity' of a given social entity. To this end, the existence of reflexivity[11] in the total water consumption curve of a country can be taken to indicate a relatively high level of effective coping strategies. This enables case studies to be interrogated with the specific intention of determining the degree of 'adaptive capacity' in existence. In this regard, the existence of a reflexive water demand curve, specifically with regards to agriculture, can be assumed to be a precursor of 'natural resource reconstruction' and therefore empirical evidence of environmental sustainability.

Some Empirical Evidence:

The first piece of evidence comes from Israel, where reflexivity has been achieved as a result of the judicious use of 'inter-sectoral allocative efficiency[12]'. This is a classic example of 'structurally-induced water abundance' and illustrates the very real difference between 'water scarcity' and 'water poverty'. Israel is 'water scarce', but due to the high levels of 'adaptive capacity' present, it has managed to avert the debilitating conditions of 'water poverty' (Feitelson, 1999). This case is illustrated in Figure 2.

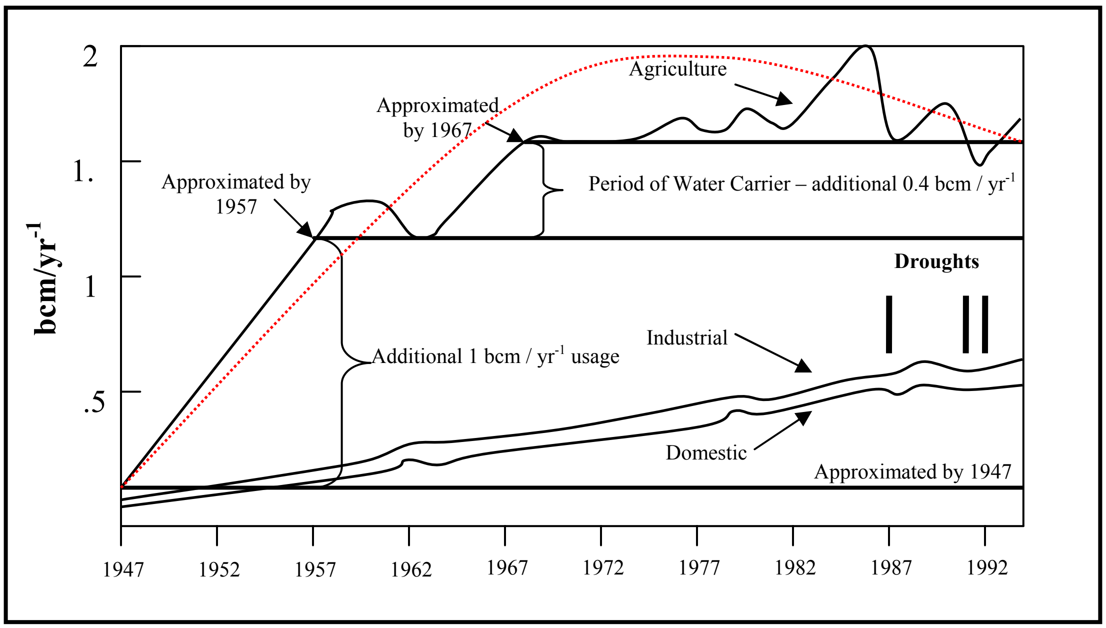

Figure 2: Israeli water consumption from 1947-1993 showing the effect of the National Water Carrier (after Allan, 1996b:85). The dotted line illustrates the reflexive nature of the agricultural demand curve.

The second piece of evidence comes from Namibia. This is a country with a high level of 'water scarcity' and no perennial rivers flowing across its soil, with the only exception of a small area known as the Caprivi Strip (where the Okavango and Kwando River are under Namibian sovereignty for a short duration only). Figure 3 shows the direct correlation between population growth and water demand in the city of Windhoek (Jacobson *et al.*, 1995:57). This illustrates the demographically-induced water consumption curve that has been hypothesized by Turton & Ohlsson (1999:5 & 14). Attention is drawn to the fact that no form of reflexivity is evident, so this trajectory is clearly unsustainable in the long-term, suggesting 'water poverty' as a possible end condition if all things remain equal. Major supply sided solutions are being suggested to meet this growing demand. The Eastern National Water Carrier (ENWC) brings water

South from Grootfontein. A pipeline is planned from the Okavango River at Rundu (Ramberg, 1997) to augment the ENWC. A series of pipelines are being planned to take water from the mouth of the Zaire River, through Angola and ultimately into the Kunene, Okavango and Zambezi River Basin's (Heyns, 1999; Ashton, 1999) (Appendix "A").

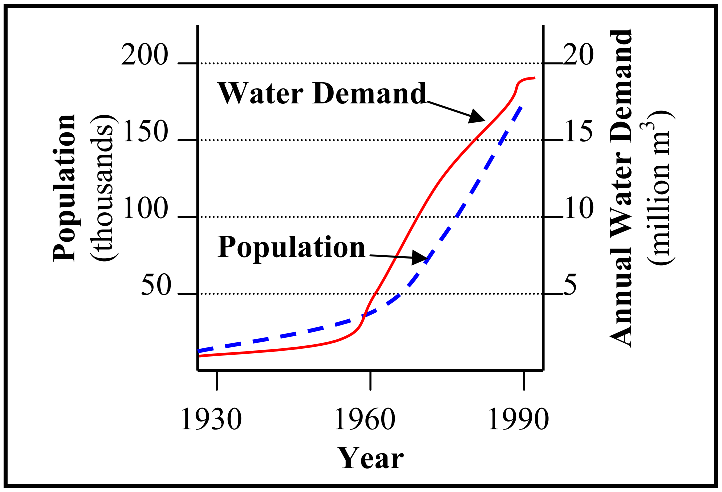

Figure 3. Example of Demographically Induced Water Consumption for the City of Windhoek (after Jacobson *et al*., 1995:57).

Significant insight into the typical Southern African dilemma is given in Figure 4, which shows the distribution of water demand as a function of income category in the city of Windhoek (Jacobson *et al*., 1995:57). This shows graphically that informal settlements use less water per capita than more affluent cohort groups.

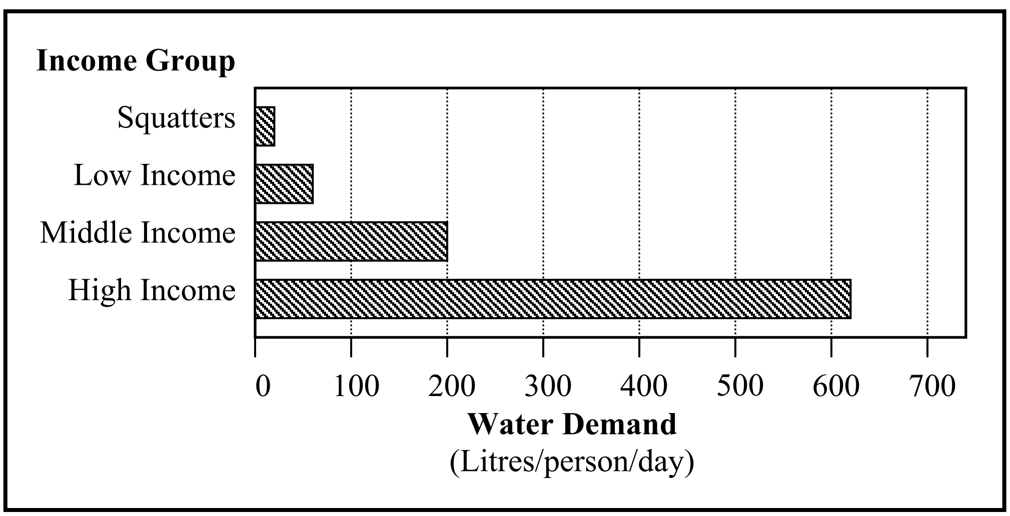

Figure 4. Graph Showing Daily Water Consumption per Person Expressed as a Function of Income for the City of Windhoek (after Jacobson *et al*., 1995:57).

The third piece of evidence is from South Africa. This illustrates the dilemma that was first shown in Figure 4, but this time on a national scale. These data offer a unique insight into the problems confronting developing countries in arid regions. South Africa has recently undergone a major political transformation. Prior to 1994, the form of government was an oligarchy with a low level of legitimacy. In this case, a high level of 'resource capture' occurred (Homer-Dixon & Percival, 1996), resulting in institutionalized or structural scarcity (Percival & Homer-Dixon, 1995:8). It has been shown that this institutionalized form of 'resource capture' was one of the subtle forms of power that propped up the otherwise insecure South African regime prior to 1994 (Turton 1999a). After 1994 the first democratically elected government under the presidency of Nelson Mandela, sought to right these wrongs of the past. One of the policy vehicles for this was the Reconstruction and Development Programme (RDP) which actively sought to redistribute scarce water throughout society in a more equitable manner. The effects of this policy are shown dramatically in Figure 5.

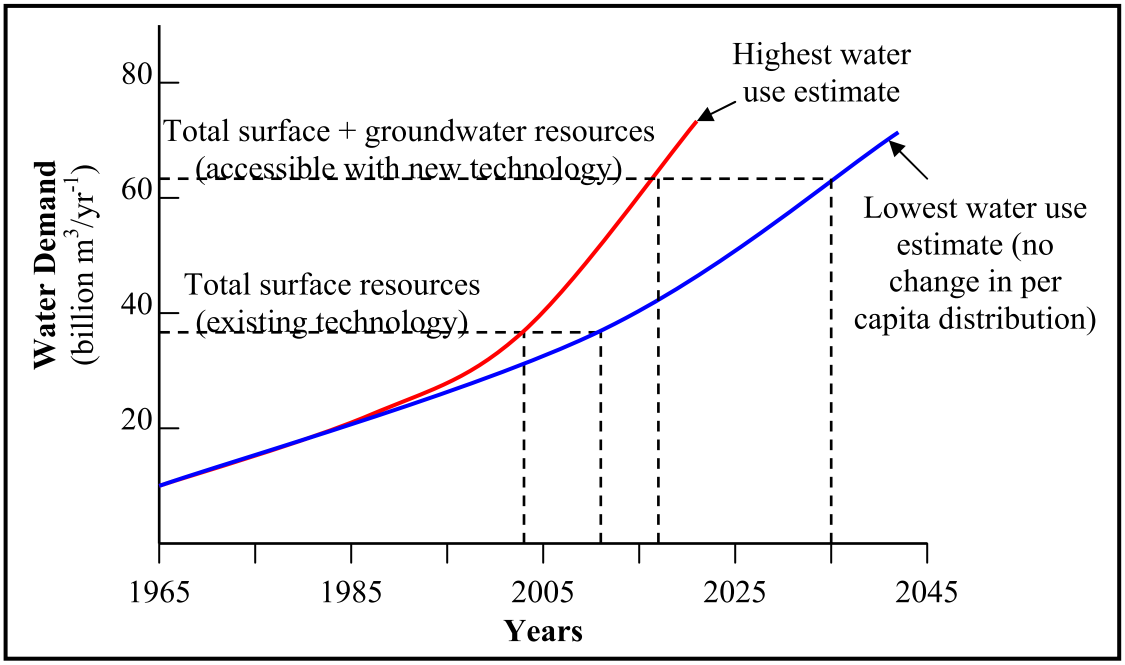

Figure 5. The Water Supply Dilemma in South Africa (after Ashton, 1999).

Two scenarios are sketched on Ashton's (1999) data series. It should be noted that the total surface and groundwater resources have been inflated under the assumption that new technology would make additional resources available. This projection is thus more optimistic than the prevailing reality.

The lowest water estimate assumes that existing per capita consumption remains the same as it was under apartheid, but that consumption is extrapolated in keeping with the population growth projections. Significant in this scenario is the fact that structural scarcities from the apartheid era will not be redressed so the balance of privilege in society would remain roughly unchanged. Two aspects of this scenario are significant. Firstly, it would de-legitimize the existing regime, which would result in long-term political instability. Social stability will thus not be achieved as 'resource capture' will not be addressed to any significant extent. Secondly, it would be ecologically unsustainable in the long-term, with all surface water having been mobilized by around the year 2012.

In other words, at this time, no river water would flow into estuaries and increasing volumes of groundwater would have to be abstracted. By the year 2035 all groundwater and surface water resources will have been mobilized in this scenario.

The highest water estimate assumes that all of the RDP projects will deliver water as promised by the government. This greater availability of water, coupled with increased security of tenure of the consumers, will result in a dramatic increase in consumption, along the lines of the phenomenon illustrated in Figure 4. Significant in this scenario, the structural scarcities of the apartheid era will be addressed and the balance of privilege will change in society. Two aspects in this scenario are significant. Firstly, the current regime will derive a high level of legitimacy from this policy. It will also result in a greater degree of social stability than was the case under conditions of 'resource capture' during the apartheid era. Secondly, it will be ecologically unsustainable, with significant levels of environmental collapse to be expected in the short-term. This is at odds with the new water legislation, which aims at 'natural resource reconstruction' by granting ecosystems the legal right to sufficient water for their own use. The effects of this environmental unsustainability may be felt as soon as during the next election cycle, introducing a sense of urgency into the problem.

Thus the South African government is in a serious water supply dilemma. If they supply the water as promised in terms of the RDP, then ecological collapse is almost surely imminent, with the early effects being felt within the next election cycle. If they choose instead to fall short of the RDP promises, then social stability will become an acute issue in the short-term, but with environmental collapse only being a reality in the medium to long-term. This is like being caught between the proverbial rock and a hard place.

What is absent from this data set is any indication of reflexivity at the national level. This is worrying, as it implies unsustainability over time. The window of opportunity is open however, but is likely to remain that way for only a short period of time. The high level of regime legitimacy enables far-reaching water sector reforms to be implemented in the short-term. Major reforms have already taken place, but these seem to have resulted in an increase in demand for water, thereby hastening the ecological collapse that seems to be imminent. Clearly what now needs to happen is for South Africa to actively develop a series of water-related development policies aimed specifically at averting 'water poverty' and encouraging 'structurally-induced water abundance'.

Is this likely to happen within the desired time frame? Barbara Schreiner, in her capacity as the Chief Director: Water Use and Conservation at the South African Department of Water Affairs and Forestry (DWAF) noted that there is a major capacity problem at present, and she cautioned participants at the IUCN WDM workshop in terms of their expectations of DWAF (IUCN, 1999:44). This implies that while government intentions are noble, in reality South Africa may be incapable of mobilizing the necessary social resources to cope with the problem of 'water scarcity', and thereby avoiding the debilitating effects of 'water poverty'. This is the reason why it is being hypothesized that social stability will be a function of the magnitude of second-order resources available to a society facing long-term 'water scarcity' (Ohlsson & Turton, 1999; Turton & Ohlsson, 1999). This is the scope of a new research programme being conducted by Ohlsson & Turton with a Southern African regional focus.

Quo Vadis SADC?

Given the magnitude of the task at hand, coupled with the fact of the interconnectedness of the entire Southern African region, SADC as the regional structure should play a crucial role in fostering 'structurally-induced water abundance'. To this end, there is a Protocol on Shared Water Systems in existence. It is very weak, but efforts are under way[13] to strengthen this legal instrument. WDM is also being actively spoken about and implemented by various countries in the region. The IUCN have played a significant role in getting stakeholders[14] together, but there is still a long way to go before these policies start to impact on water consumption. What is needed is a concerted research effort, specifically aimed at determining the social implications of inter-sectoral allocative mechanisms. It is only by taking advantage of the gearing effect inherent in allocating water from economic activities or sectors with a low return to water, to activities with a higher efficiency ratio, that reflexivity is likely to be achieved at the national or regional level. This is socially disruptive however, and opens the politically sensitive debate on food security versus national self-sufficiency amongst other issues.

Conclusion:

Although South Africa is intuitively considered to have a higher level of technological resources available relative to other Southern African states, this may create the wrong impression and misguide researchers. A more fruitful research direction is related to the existence of 'second-order scarcities' of the social resources needed to adapt to increasing levels of 'water scarcity'. This type of approach opens up various research horizons, necessitating the development of new definitions, concepts and models. In terms of this, Turton & Ohlsson (1999) have hypothesized two end conditions. The first is 'water poverty' with a low level of social stability combined with ecological unsustainability. The second is 'structurally-induced water abundance' with a high level of social stability combined with ecological sustainability. Existing data tentatively suggests that various states in Southern Africa are not necessarily headed for the latter. This suggests that the interaction between water scarcity and social stability is likely to become a significant threat to regional security in the early part of the 21st Century. A concerted effort needs to be launched now if social stability is to be maintained over time. This effort will of necessity involve cooperation between research partners, stakeholders, foreign donor agencies, SADC and various national governments in a common approach that has been hitherto impossible to achieve.

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Appendix "A"
Major Water Transfer Schemes in Southern Africa

Name of water transfer scheme	River basin involved	Countries directly involved	Other basin states indirectly involved
Kunene - Cuvelai	Kunene - Cuvelai	Namibia	Angola
Eastern National Water Carrier	Okavango - Swakop	Namibia	Angola, Botswana
Komati Scheme	Incomati - Limpopo	South Africa	Swaziland, Mozambique, Botswana, Zimbabwe
Usuthu Scheme	Maputo - Limpopo	South Africa	Swaziland, Mozambique, Botswana, Zimbabwe
Usuthu - Vaal Scheme	Maputo - Orange	South Africa	Swaziland, Mozambique, Lesotho, Namibia
Grootdraai Emergency Augmentation	Orange - Limpopo	South Africa	Mozambique, Botswana, Lesotho, Namibia, Zimbabwe
Vaal - Crocodile	Orange - Limpopo	South Africa	Mozambique, Botswana, Lesotho, Namibia, Zimbabwe
Tugela - Vaal Scheme	Tugela - Orange	South Africa	Lesotho, Namibia
Mooi - Umgeni Scheme	Tugela - Mgeni	South Africa	
Umzimkulu - Umkomaas - Illovo Scheme	Umzimkulu - Umkomaas - Mgeni	South Africa	
Amatole Scheme	Kei - Buffalo & Nahoon	South Africa	
Palmiet River Scheme	Palmiet - Steenbras	South Africa	
Riviersonderend - Berg River Project	Breë - Berg & Eerste	South Africa	
Orange River Project	Orange - Great Fish	South Africa	Lesotho, Namibia
Orange - Riet	Orange	South Africa	Lesotho, Namibia
Caledon - Modder	Orange	South Africa	Lesotho, Namibia
Orange - Vaal	Orange	South Africa	Lesotho, Namibia
Lesotho Highlands Water Project	Orange	Lesotho, South Africa	Namibia

Vaal - Gamagara Scheme	Orange	South Africa	Lesotho, Namibia
Springbok Water Scheme	Orange	South Africa	Lesotho, Namibia
Vioolsdrift - Noordoewer	Orange	South Africa, Namibia	Lesotho
Molatedi Dam - Gaborone	Limpopo	South Africa, Botswana	Zimbabwe, Mozambique
North - South Carrier	Limpopo	Botswana	South Africa, Mozambique, Zimbabwe
Turgwe - Chiredzi	Zambezi	Zimbabwe	Angola, Botswana, Mozambique, Namibia, Tanzania, Zambia, Malawi
Zambezi - Bulawayo	Zambezi	Zimbabwe	Angola, Botswana, Mozambique, Namibia, Tanzania, Zambia, Malawi
Zambezi - Gauteng	Zambezi - Orange	Zimbabwe, Botswana, South Africa	Angola, Lesotho, Mozambique, Namibia, Tanzania, Zambia, Malawi

Source: Pallett (1997:56)

Note: Pallett's data makes no mention of the Zaire River schemes. This is because at the time of drafting the document, the Democratic Republic of the Congo (DRC) was not a member of SADC. This has since changed and the DRC is now a member. Significantly, the DRC has the highest volume of water available to any country in the entire SADC area. The main river involved in the DRC is the Zaire that is about 5.5 times larger than the Zambezi, which was the largest river in SADC prior to the admission of the DRC. There are at least two water transfer schemes that are being touted from this source.

1) The Lualaba - Zambezi Inter-Basin Transfer was the subject of discussion between the then South African Minister of Water Affairs and Forestry, Prof. Kader Asmal, in Washington during July 1996 (Africa Analysis, 26/7/96:14). This scheme would allegedly transfer water from the Lualaba River in the Zaire River Basin, via the Zambezi, to Gauteng in South Africa by means of the Trans-Kalahari Aqueduct.

2) The Zaire - Kunene/Okavango/Zambezi Inter-Basin Transfer is currently being investigated by the Namibian Ministry of Agriculture, Water and Rural Development (Heyns, 1999). This proposed scheme, called for by President Sam Nujoma of Namibia, would deliver water from the mouth of the Zaire River, through Angola, into the headwaters of the Kunene, Okavango and a tributary of the Zambezi. According to Heyns (1999), the main thrust of the project is to deliver more water into the Okavango River however, in order to strengthen the case for further abstraction downstream by Namibia.

Endnotes:

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[1] For the purposes of this paper, the variable called "precipitation" will be taken to mean water in whatever form it is found in the hydrological cycle. This is not strictly in accordance with other definitions of precipitation. Essentially, the water found in the lower Zambezi River that is being allocated to the generation of hydro-electric power in Mozambique, is the same water that fell as precipitation (in the strict hydrological sense of the word) over the highlands of Angola.

[2] This in itself is a problem due to the prevailing levels of evapotranspiration. For example, evaporation from Lake Kariba accounts for 20-25% of the annual flow of the Zambezi River at that point (Sir. Mott Mac Donald & Partners, 1990:2.7). Evaporation from the Omatako Canal, a component of the Eastern National Water Carrier (ENWC) in Namibia, accounts for 70% of the water carried by this scheme at that point (Davies *et al.,* 1993: 163).

[3] It must be noted that the term 'pipeline' is being used in the widest possible context. Huge schemes such as the Lesotho Highlands Water Project tend to transfer water from one river basin to another. Strictly speaking, it is incorrect to assume that the water stays in pipelines for the entire distance of the transfer. Normally the water is pumped via pipeline either over a watershed, or through a mountain (by tunnel) until the next river basin has been reached, where the water is discharged into the receiving river. For this paper, the variable called 'pipeline' will be used to mean any form of water transfer scheme, be it reservoir, canal, tunnel or pipeline.

[4] Conventional wisdom in SADC, the regional development structure for Southern Africa, propagates the idea that "more than anything else, availability of water, whether from the natural environment or an artificial supply, determines how and where development can take place" (Pallett, 1997:1). This means that competition for the resource is likely to rise in direct relation to its increasing scarcity, elevating it to an issue of strategic significance for the various governments in Southern Africa in the near future.

[5] Bryant (1993) offers a useful conceptualization by stating that "power is reflected in the ability of one actor to control the environment of another". This will be used as a definition for purposes of this paper.

[6] Refer to Bryant & Bailey (1997: 38-47) for a more detailed analysis of power vis-à-vis political ecology.

[7] In India, for example, water distribution in irrigation systems is regarded as "an inherently political activity" (Mollinga & van Straaten, 1996).

[8] 'Water poverty' is defined as the existence of both a first-order natural resource scarcity (water) and a second-order social resource scarcity (adaptive capacity) simultaneously (Turton & Ohlsson, 1999:4).

[9] 'Structurally-induced water abundance' is defined as the condition that exists when a social entity has both a first-order resource scarcity (water) and a second-order social resource abundance (adaptive capacity) simultaneously (Turton & Ohlsson, 1999:4). The nearest example of such a condition is Israel which is 'water scarce' but not 'water poor' (Feitelson, 1999).

[10] For a deeper analysis of the concept of 'adaptive capacity' refer to Turton (1999b:7).

[11] Beck (1999:79) defines reflexivity as being concerned with the unintended risks, consequences and foundations of society. In this regard, environmental sustainability is a key indicator. A reflexive water demand curve therefore means a curve that moves from a condition of 'water deficit' to the sustainability level of supply, which coincides with the maximum volume that can be effectively mobilised by pipelines without significant degrees of environmental destruction. This is illustrated in Turton & Ohlsson (1999:14).

[12] This is defined by Turton & Ohlsson (1999:16) as allocating water away from an economic sector or activity that has a low 'return to water', usually agriculture, to another economic sector that has a higher 'return to water', usually industry. This can be described as the "more jobs per drop" option.

[13] To this end a regional conference is being planned for the year 2000. This will seek to determine, via a high level of stakeholder participation and consultation, what is necessary to empower the SADC Water Protocol.

[14] The IUCN hosted a workshop on Water Demand Management in conjunction with Rand Water, the Department of Water Affairs and Forestry and the Council for Scientific and Industrial Research (CSIR) from 20 - 21 July 1998.