"In the developing world ... the links between water and life are still so clear – resonating in the cry of a sick child, the daily struggle of a mother, or the despair of a farmer ruined by drought or flood," writes Mikhail Gorbachev in this book. Bringing contributions by a variety of authors together in one volume is part of an attempt to show that hydropolitics is a growing discipline in its own right. The prevailing definition of hydropolitics is widened to include the elements of scale and range. This is illustrated through a focus on theoretical and legal issues, case studies from Southern Africa and a proposed research agenda. The book is an important addition to the literature on hydropolitics.

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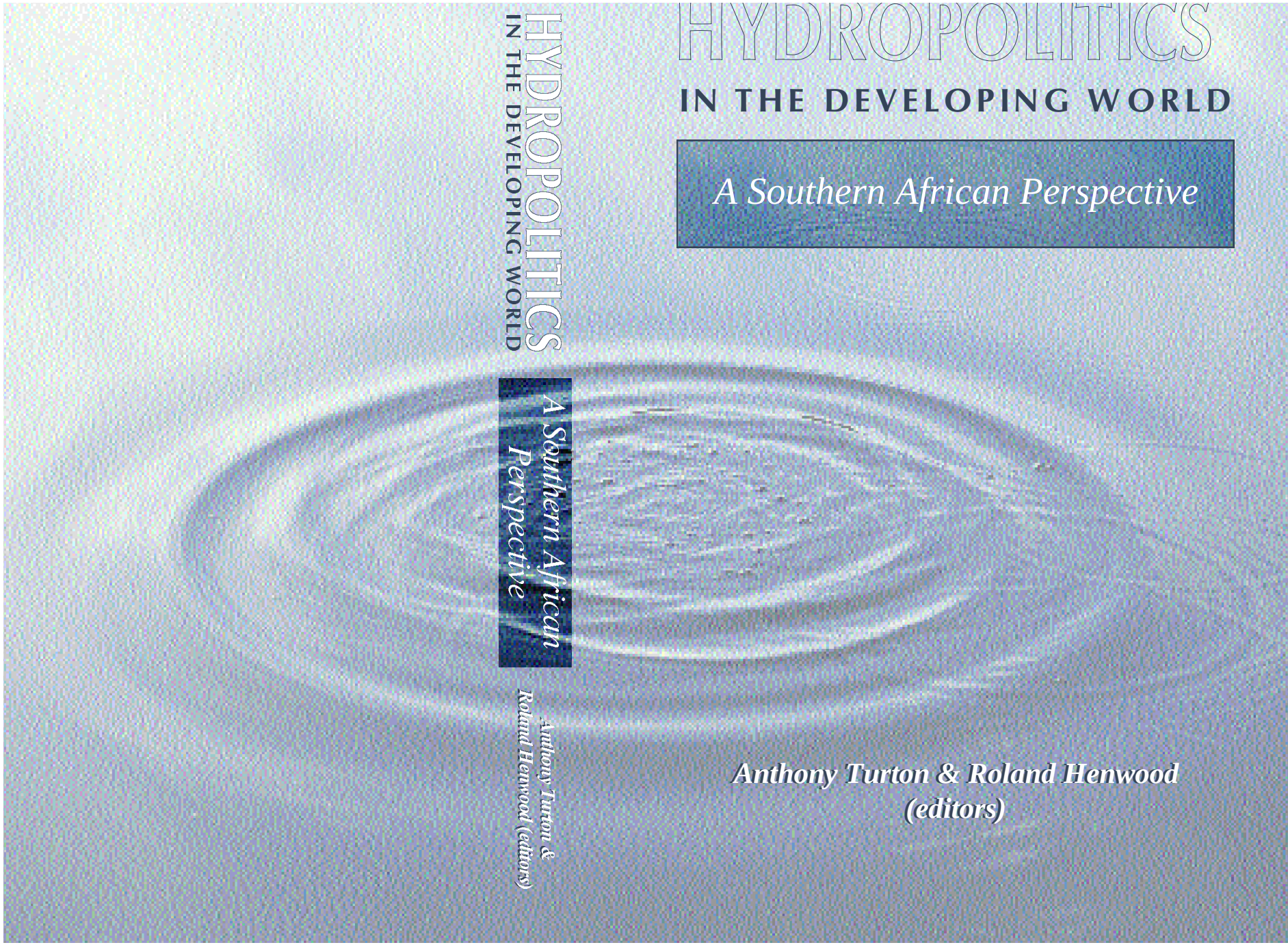

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# HYDROPOLITICS IN THE DEVELOPING WORLD: A SOUTHERN AFRICAN PERSPECTIVE

**Anthony Turton & Roland Henwood (editors)**

*In the world there is nothing more submissive and weak than water.*
*Yet for attacking that which is hard and strong nothing can surpass it.*
-Lao Tzu

# Contents

# Foreword

The Southern African Development Community (SADC) is a regional grouping of 14 countries in Southern Africa: Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. SADC is governed by its 1992 Treaty, which provides, among others, for cooperation (article 21) that will contribute to and foster regional development and integration on the basis of balance, equity and mutual benefit for all its members. These principles are central to the activities of SADC and the protocols that have so far been developed, negotiated and agreed upon by member countries under its auspices.

Areas of co-operation are agreed to by member countries on the basis of sectors. To co-ordinate activities within sectors, appropriate institutions are established to harmonise and rationalise policies, strategies, programmes and projects. A distinct and dedicated Water Sector was established by the SADC Council of Ministers and endorsed by the Summit of Heads of State and Government in August 1996. The overall objective of the Sector is to "promote co-operation in all water matters in the SADC region for the sustainable and equitable development, utilisation and management of water resources and contribute towards the upliftment of the quality of life of the people of the SADC region." When this objective is fully achieved it will contribute to the attainment of the Southern African Vision for Water in the 21st century of "equitable and sustainable utilisation of water for social, environmental, justice, and economic benefit for present and future generations" (adopted by SADC Sectoral Committee of Ministers in 1999).

The challenges facing the SADC Water Sector will require the concerted efforts of all involved to avert potential adversity. These include the provision of adequate quantities and quality of water and safe sanitation services to approximately 200 million people living mainly in rural areas in the region. The majority lack access to these basic services. The other pressing challenge is to prevent and avoid conflicts that may arise as result of competing demands for access to water and the possibly inequitable utilisation of water resources for a variety of uses. The region is characterised by a large number of internationally shared watercourses. One of the 15 major shared watercourses, the Zambezi, is shared by eight of the 14 SADC member countries. Shared watercourses account for about 70% of the available freshwater resources. This situation is made more pronounced by different water rights regimes in SADC countries, a fact which calls for the harmonisation of national policies, strategies, legal frameworks and institutions with regional instruments such as the Water Protocol across and among sectors. Floods and droughts that occur in the region with increasing frequency and intensity further prioritise the co-ordinated management and development of water in the SADC region.

To address some of these challenges, SADC has signed and ratified a protocol for the judicious management and utilisation of shared watercourses, in 1995 and 1998, respectively. The SADC Protocol on Shared Watercourse Systems was the first ever regional protocol and has since been revised to take cognisance of new developments in

international water law and the current socio-economic development in the region. In addition, SADC developed a sectoral Regional Strategic Action Plan for Integrated Management and Development of Water Resources in 1998. The Strategy (commonly referred to as the RSAP) identified seven issues and constraints in the sector and identified areas of intervention that will address these issues.

This timely book will play an important role in disseminating relevant information to highlight theoretical and legal issues in the water sector in the region. It will be a useful reference for policy makers and practitioners involved in the Water Sector in the region and beyond. Its contents will appeal to a wide spectrum of readers and should therefore assist in promoting the process of regional integration and co-operation in the water and related sectors. It is hoped that the book will generate dialogue around the issues of integrated water resource management, and will assist in avoiding conflict arising around water.

*Phera Ramoeli*
*Sector Co-ordinator, SADC Water Sector Co-ordinating Unit, Lesotho*

# Special message

‘Water is life’ is a chorus that echoes across the world. For many in the developed world, water comes from a tap, flows under a bridge or fills a swimming pool. People know that they need it as a drink, for hygiene and the preparation of food, but take it for granted as it is literally ‘on tap’. In the developing world, the idea of taking water for granted, quite rightly, is unimaginable, as the links between water and life are still so clear – resonating in the cry of a sick child, the daily struggle of a mother, or the despair of a farmer ruined by drought or flood.

Water is a symbol in many religions and cultures for purification and replenishment, and is regarded as something to rejoice over. But water is also a nightmare of untold proportions for millions of people. Since ancient times, people throughout the world have lived with these two sides of the water issue. So simple and beautiful in its different natural forms, and such an essential part of life, water also spreads disease, floods, takes hours to fetch, is expensive, breeds mosquitoes and, worst of all, is sometimes not available at all. But it is not merely as a result of bad luck, as humanity can positively act to change the flow of its ostensible fate.

Water can also be regarded as a source of universal shame, because three million children will die and millions more will become blind this year alone as a result of preventable water-borne diseases; over one billion people do not have access to safe drinking water; almost three billion do not have the means for adequate sanitation; while people thoughtlessly continue to pollute and exploit natural sources of freshwater throughout the world. For those responsible for international, national and local policies that have failed to rectify, and have exacerbated this situation in many cases, these appalling figures are an indisputable call to reassess current paradigms for water management and to implement the necessary changes as a top priority. For the people whose lives are reflected in these statistics, it is crucial to seek – and that they are assisted in achieving – empowerment through co-operation, access to information and active participation in community water management and decision-making.

Water is one of the most important ingredients for development and stability. Without access to basic water supplies, disease and ill-health, poverty, environmental degradation and even conflict may be the result – all of which lead, in turn, to greater water stress. Water-related conflict does not have to take on the attributes of war in order to be debilitating – it can fester between ethnic groups, ignite between neighbouring farmers or industrialists, and can cause the loss of trust between people and their governments. When water conflict erupts between sovereign states, the victims may not perish on any clearly discernible battlefield, but the people and the watercourse itself will suffer the consequences of the absence of either co-operation or communication between those sharing a basin.

The developing world and sub-Saharan Africa, in particular, face a huge number of challenges: uncontrolled population growth, urbanisation, the effects of climatic changes, wars, refugee movements, cultural erosion, the resurgence of old diseases such as malaria,

cholera and tuberculosis, and the devastation of the HIV-Aids pandemic. All of these factors will affect and will be affected, in turn, by the way water is managed. Water considerations should therefore be integrated into the measures taken to meet these enormous challenges from the very beginning. Hydropolitics, though it is a specialised pursuit, is not isolated from the political mainstream. Like water itself, hydropolitics defies easy categorisation and, in some way or another, touches upon every aspect of life. Every individual is touched by the availability or lack of water, and everybody should thus have a voice, a role – and the information and means to put these into effective action.

Those charged with making decisions regarding water have an awesome responsibility to their constituents. A good water decision can improve the lives of everyone in a community, boost the economy and safeguard the natural environment. A poor water decision can wreak havoc on nature, exacerbate poverty and disease, and create conflict. As a politician and former leader of my country, I have seen first-hand the effects when social and long-term environmental consequences are put aside for more immediate gains. The Soviet Union hosted the origins of the world's worst environmental catastrophe, directly caused by the mismanagement of the rivers in the Aral Sea basin, which has resulted in decades of human misery, economic and political turmoil, and a natural disaster that has so far resisted any solution.

The Aral Sea is an extreme and unusual example, as the causes and consequences of problems experienced there are so starkly clear. More often water problems are caused by myriad different factors, and their solutions must be seen to be equally multifaceted. Decision makers and the public must beware of expecting miracles or 'quick-fix'remedies for improved water services – whether blanket privatisation or big infrastructural projects – that do not take into account the needs of all people, or the wider consequences to the environment. The call for integrated water resource management may not sound very dramatic, but it reflects the very important realisation that we must respect water and fully understand its power to transform our lives for the better.

The United Nations has pledged, as one of its Millennium Development Goals, to reduce by half the number of people in the world without access to safe drinking water by 2015. Achieving this will take an estimated US $23 billion per year. At the beginning of the new millennium, developed countries should understand that they are part of an interdependent world. Any financial support or technical assistance provided by the developed world should be seen not as an act of charity, but in recognition of this interdependency.

Southern Africa is one region that will have to be targeted, and while the solutions must be home-grown and locally managed, there is clearly a need for greater support from the north and the international community. Africa's destiny lies firmly in its own hands, but many of its problems can be traced at least partially to the hands of others. There must therefore also be interdependence behind the continent's struggle for a brighter future.

*Mikhail Gorbachev*
*President, Green Cross International, Geneva, Switzerland*

# Special message

It is commonly believed that water is life. Yet, on closer examination, this is clearly an oversimplification. Water is more than this. No civilisation has ever succeeded without developing a sustainable water management strategy, and where this has failed, the civilisations that were spawned slowly faded away. It can thus be said that water is also development. Nowhere is this more relevant than in member countries of the Southern African Development Community (SADC). Without a secure supply of water, no industry can develop. Without a clean supply of potable water, community health is compromised, as well as the health of a nation and a region. Without adequate water supply to ecosystems, these will start to collapse with detrimental effects on human populations who depend on such ecosystems. All of these problems are present in Southern Africa and usually affect the poorest segment of the population. The three countries in SADC that are economically the most developed – Namibia, Botswana and South Africa – are also the most arid countries in the region. It can therefore be argued that access to water can have an impact upon economic growth potential, making this a strategically important issue for all countries in SADC.

There is a popularly held belief in parts of the developed world that water scarcity will inevitably lead to conflict. This notion is often nurtured by the available literature, which tends to be dominated by geographic areas like the Middle East and other international river basins that lie in conflict-ridden settings. This idea is flawed and its perpetuation continues to undermine investor confidence in the developing world.

As almost no literature has been generated from an African perspective to show that this is not universally true, this book is particularly relevant. The efforts by the editors and authors to lay the foundation for an African perspective to an African problem are laudable. Although the views expressed here are not necessarily aligned to the approaches of the South African government on international water issues, the contents of the book certainly emphasises the importance, particularly politically, of water in developing countries. This work can rightly be regarded as a contribution to the Millennium Partnership for the African Recovery Programme (MAP)* that grew from President Thabo Mbeki's African Renaissance initiative. MAP is a pledge by African leaders based on a common vision and a shared conviction that they have a pressing duty to eradicate poverty in order to place their countries, both individually and collectively, on a path of sustainable growth and development, and to participate actively in the world economy and body politic. It is anchored in the determination of Africans to extricate themselves and their continent from the malaise of underdevelopment and from exclusion in a rapidly globalising world.

The resources – capital, technological and human skills – required to end the scourge of underdevelopment that afflicts Africa and to launch a global onslaught on poverty and underdevelopment are abundant. These resources are often unequally distributed, just like the water resources of Africa. Africa needs to mobilise and use these resources properly

through bold and imaginative leadership genuinely committed to a sustained effort at human upliftment and poverty eradication. Through these endeavours, a new global partnership should be established, based on joint responsibility and mutual interest.

While there may be conflict over scarce water resources in other parts of the world, this is not the case in Southern Africa. On the contrary, Africa views water as a potential mechanism for enduring peace, economic prosperity and regional integration. As proof of Africa's commitment in this regard, it is interesting to note that some of the key priorities of MAP are 'peace, security and governance'. There are, after all, 15 river basins that are shared between two or more countries, as well as 25 existing water transfer schemes, many of which involve more than two countries, within the SADC region. Significantly, the first protocol ever to be adopted by SADC was the Protocol on Shared Watercourse Systems. In Africa, therefore, water means much more than life. It is the very foundation upon which social, political and economic stability is based.

*Ronnie Kasrils*
*Minister of Water Affairs and Forestry, Republic of South Africa*

* This message predates the evolution of MAPinto the new Partnership for Africa's Development (NEPAD).

# PART I: INTRODUCTION

# Chapter 1
# Hydropolitics: The concept and its limitations

**Anthony Turton**

## Introduction

The study of hydropolitics is a relatively new academic pursuit. As with any new endeavour, there is much fuzziness around the edges of concepts, which are, in most cases, poorly formulated and invariably used indiscriminately in the literature. This creates confusion and adds little to the overall development of the discipline. It is contended here that hydropolitics is emerging as a specific discipline, largely as a result of the increased awareness that water-related issues are important, and possibly due to a growing north-driven environmental consciousness. For these reasons, a greater focus on the development of conceptual clarity has become essential.

As scholars and researchers become involved in studies of water-related issues, they quickly realise that water is a multifaceted resource. As life is in fact impossible without water, the latter is increasingly acknowledged as an extremely valuable resource. What is even more pertinent is the fact that the human species has inhabited every possible ecological space on the planet, probably in an unsustainable fashion. This is the fundamental driving force behind hydropolitics as more people compete for and rely on declining water resources. Because water is scarce, and because it is essential for life, health and welfare, it has become a contested terrain and therefore a political issue. For this reason, studies focused on water invariably touch on the many different facets of life, thus providing them with a clear multidisciplinary character. Yet, multidisciplinary approaches to issues are not really being fostered in universities and professional environments. This creates a dilemma: as specialists in a particular field start studying water issues by utilising other disciplinary methodologies and epistemologies, a new conceptual register starts to emerge that is both necessary, but may also be confusing to the uninitiated.

## Hydropolitics: A brief literature r eview

Hydropolitics, as it is currently presented in most of the relevant literature, shows a certain bias that this book seeks to challenge. A detailed analysis of the literature reveals that there are four main elements that seem to be present. Each of these impacts on the literature as a form of bias, giving that specific section of the literature a distinctive pattern, context or focus.

### *Water and conflict*

The first bias inherent in the current literature is that of water and conflict. Aglance at the burgeoning literature in this regard is instructive (see box). In these writings, the state or components of the state are mostly used as the unit of analysis, or they focus on conflict

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and co-operation within the framework of the state. There are some notable exceptions to this tendency. Swatuk and Vale (2000) challenge the notion of state centrism in a refreshing but not yet mainstream approach. Allan (2000:233) criticises prevailing International Relations theorists for failing to consider the dampening effect of the trade in water-rich products – what he calls 'virtual water' (Allan 1998) – that has been responsible for preventing the once confidently predicted water wars from occurring (Bulloch & Darwish 1993; Gruen 1992; Starr 1991).

Allan 1994; 1996a; 1998; 1999; Amery 1997; Anderson 1988; Ashton 2000c; Baskin 1993; Boronkay & Abbott 1997; Brooks 1994; Bulloch & Darwish 1993; Choucri 1986; Choucri & North 1975; 1989; Cleaver 1994; Corell & Swain 1995; Diehl & Gleditsch 2001; Duna 1998; Elhance 1997; Falkenmark 1986; 1989; 1994a; Frey 1993a; 1993b; Gleick 1990b; 1990b; 1991; 1992a; 1992b; 1992c; 1993a; 1993b; 1993c; 1994a; 1994b; Gruen 1992; Güner 1997; Gustafsson 1985; Haftendorn 2000; Hirji & Grey 1998; Homer-Dixon 1999; Hudson 1996; Hultin 1995; Isaac & Zarour 1993; Isaac & Shuval 1994; Isaac 1995; Kinzer 1999; Kliot 1994; Libiszewski 1995; Lindholm 1995; Lonergan 1991; Lowi 1990; 1992; 1993a; 1993b; Medzini 1996; Meissner 1999; 2001; Morris 1997; Nachmani 1997; Naff 1990a; 1990b; 1994; Naff & Matson 1984; Neff 1994; Nijim 1990; Öjendal 1995; Ohlsson 1992; 1995a; Pearce 1991; Plant 1995; Sadat 1985; Salman & De Chazournes 1998; Salmi 1997; Samaddar 1997; Schiff 1993a; 1993b; Schulz 1995; Shuval 1992; 1993; Shuval & Isaac 1993; Starr 1991; Starr & Stoll 1988; Swain 1993; Swatuk 1996a; 1996b; Tamimi 1991; Trottier 1999; Turton 1999c; 2000a; 2000b; 2000c; 2001a; 2001b; Turton et al 2000a; Verghese 1997; Vines 1996; Waterbury 1979; Weatherbee 1997; Whittington & Haynes 1985; Widstrand 1980; Wolf 1995; 1998; Wolf & Ross 1992.

### *Water and the environment*

The second body of literature is growing rapidly and seeks to place water within a broader environmental setting. As such, water is seen as being a component of the environment, with a variety of inherent conflict drivers. In this context, the scholars concerned see environmental goods as scarce resources, which are, in turn, contested. There is also a strong north/south component to this literature with elements in it of what may best be described as 'reflexivity'(Giddens, 1990). Aglance at this body of work is therefore also equally instructive. Significantly, new drivers and actors are identified within these writings. It should also be noted that some of the authors have straddled the first and second bodies of literature. Most obvious among these are Allan, Falkenmark, Lonergan and Turton.

Allan 1996a; Allan & Karshenas 1996; Bächler 1993; 1994; Biswas 1978; 1983; Böge 1992; Bottrall 1978; Burton & Chiza 1997; Coetzee & Cooper 1991; Dessler 1994; Ekins 1993; Falkenmark 1994a; 1994b; 1995a; 1995b; 1995c; Gleick 1991; Homer-Dixon 1990; 1991; 1994a; 1994b; 1996; 2000; Homer-Dixon et al 1993; Homer-Dixon & Percival 1996; 1998; Isaac & Twite 1994; Leiss 1974; Libiszewski 1992; Lonergan & Kavanagh 1991; Myers 1987; 1989; 1991; 1992; 1993a; 1993b; Ohlsson 1998; 1999; Okidi 1992; Percival & Homer-Dixon 1995; 1998; Porter 1990; Renner 1989; 1991; Renner et al (undated); Rubenson 1991; Sachs 1993; Smil 1992; Suhrke 1992; 1993; Suliman 1992; Tinker & Timberlake 1985; Turton 2000e; Warburg 1995; Westin, 1986; 1988; 1991.



### *Water and security*

The third main focal area of hydropolitical writing aims at drawing attention to the element of crisis within the water sector (or in its broader environmental setting), and as a result seeks to politicise, and possibly even to 'securitise' the management of water (Turton 2001c). Elements of this can be understood (Turton 2001b) when the expanded concept of security is used as suggested by Buzan (1991; 1994) and Buzan et al (1998). A glance at this literature consequently shows a different pattern of interest.

Bächler & Spillman 1995; Clarke 1991; Falkenmark & Lindh 1993; Falkenmark & Lundqvist 1995; Gleick 1992d; 1993c; Gruen 1992; Huss-Ashmore & Katz 1989; Jaradat 1993; Kolars 1993; Lundqvist 1998; Pearce 1992; Postel 1993; 1999; Redclift 1994; Saeijs & Van Berkel 1997; Schiffler 1997; Sexton 1992; Turton & Warner 2000; World Bank 1989; Yamskov 1989.

### *Water, society and culture*

There is also a fourth category of literature that seeks to explore the social and cultural components of water and water-related issues, and as such tends to examine water in a more abstract and less empirically defined sense. While this literature is probably quite big, a few selected examples serve to represent the tendency.

Académie de l'eau 2000; Bennett 1974; Buil & Bergua 1998; Fereres & Ceña 1997; Franks et al 1997; Ghimire & Pimbert 1997; Goldblatt 1996; Goldsmith & Hildyard 1986; Guyer & Richards 1996; Harvey 1993; Lichtenthäler 1996; 1999; 2000; Lichtenthäler & Turton 1999; Lowi & Rothman 1993; Ohlsson 1998; Ohlsson & Turton 1999; Redclift 1985; Rogers et al 1998; Turton 1999f; Turton & Ohlsson 1999; Turton et al 2000b; 2000c; 2001; Warner & Turton 2000; Widstrand 1978; Yamskov 1994.

## Conceptual clarity: Definitions and issues of scale and range

Where does this leave those interested in and concerned with hydropolitics? Clearly, water is a complex issue and, as a result, it could be expected that hydropolitics will reflect this complexity. Yet, one of the problems is the lack of clarity in definitions of crucial concepts. For example, one of the few definitions of hydropolitics is provided by Elhance (1997:218), who noted that it is the systematic analysis of interstate conflict and co-operation regarding international water resources. In unpacking this definition, it becomes evident that hydropolitics is about:

- conflict and co-operation;
- involving states as the main actors; and
- taking place in shared international river basins.

Yet, a glance at the literature mentioned above shows that such a state-centric focus on conflict and conflict mitigation in shared international basins is not the only focal point of hydropolitical interest. If this is so, then clearly the definition must be flawed or inadequate. Meissner (1999:4-5) has also tried to define hydropolitics. He sees the study of hydropolitics as the systematic investigation of the interaction between states, non-state actors and a host of other participants, like individuals within and outside the state,

regarding the authoritative allocation and/or use of international and national water resources. Unpacking this definition shows that hydropolitics is:

- an investigation into the interaction between state and non-state actors;
- which includes individuals and other participants both within and outside of the state;
- about the authoritative allocation or use of water; and
- with the water in question potentially being both international and national in its origin, thereby implying some kind of sovereignty over this water.

Whereas Elhance's (1997) definition is very narrow and precise (thus not covering all forms of political interaction over water), it seems as if Meissner's (1999) definition is somewhat wider but also fuzzier. Significantly, both imply sovereign control over water in some form. While both these definitions are useful, neither hits the nail on the proverbial head. Clearly, some of the literature can be categorised according to either of these definitions, but there is no single definition that covers all hydropolitical analysis. It may therefore be instructive to return to some first principle basics. Easton (1965:21) defined politics as the authoritative allocation of values in society. In scrutinising his definition, the following becomes apparent:

- Politics is a dynamic and ongoing process.
- Central to this process is the allocation of values via laws and policies.
- This implies decision-making of some kind.
- Decision-making favours some over others.
- This implies an element of contestation as no universal set of values exists.
- These values are being applied in an authoritative manner.
- This implies contestation over the legitimacy of the authority concerned.
- This also means that some are favoured whereas others are not, so who gets what, when, where and how becomes relevant.

While Easton's definition is not universally accepted in political science literature, it is certainly widely acknowledged and is consequently a good starting point. The value of Easton's definition is that it is simple, clear-cut and easy to understand. His definition also embraces the essential elements of political dynamics, making it highly suited to hydropolitics. Seen in this way, hydropolitics is the authoritative allocation of values in society with respect to water. This definition builds on the time-proven fundamental principles of politics that were developed by Easton in 1965 and makes them relevant to water. One of the central purposes of this book is to develop this definition a little further.

Taking this as the point of departure, this book seeks to develop the discipline of hydropolitics in a manner that is beneficial to a wide range of roleplayers. This range includes scholars, researchers, water resource managers, water service providers, political decision makers, non-governmental organisations (NGOs), aid agencies, development institutions, engineers, environmentalists, human rights activists and others. In fact, the range is almost infinitely wide. If this is the broad goal, then this book has two specific objectives.

Firstly, the book is an attempt to gain an intellectual understanding of what hydropolitics is about. To this end, a definition has been offered in which hydropolitics is seen as the authoritative allocation of values in society with respect to water. This will hopefully develop the discipline further by embracing a wider range of issues than simply conflict in shared international river basins.



Secondly, this definition implies, among others, two issues that are of cardinal importance and in need of further research:

- Central to any understanding of hydropolitics is the issue of *scale*, ranging from the individual, to the household, village, city, social, provincial, national and international level with a number of undefined levels in between. In short, the writer and consumer of hydropolitical literature should always be acutely aware of the issue of scale, best depicted as a vertical axis within any given study.
- Another critical element in the understanding of hydropolitics is the *range of issues* that are covered. These can best be understood as a horizontal dimension of the discipline of hydropolitics. In reality, the range is infinitely wide, including issues such as conflict and its mitigation, states and non-state actors, water service delivery, water for food, the social value of water, the political value of water, the psychological value of water, water demand management (WDM), water as a target of aggression, water as an instrument of peace, water and gender, water and ecosystems, and water as a critical element in sustainable development.

## Book presentation

What this book seeks to achieve, is a widening of the concept of hydropolitics by developing the issues of scale and range in a systematic manner. As such, the book is divided into five sections. The first introduces the issues of scale and range, along with a simple new definition of hydropolitics.

The second section deals with theoretical dimensions of hydropolitics and discusses the notions of scale and range in more detail. This is not exhaustive and is also not purely theoretical, but the selected chapters are predominantly of a theoretical nature, even if some also present case studies. The chapter by Allan exposes the reader to one of the central issues of scale, namely the shift in mindset from the river basin level where water scarcities occur, to the global trade in cereals where the politically silent remedies for water deficits can be found. This opens up a range of strategically relevant issues such as the political acceptability of an increased dependence on food importation. This is important in Southern Africa where states that recently achieved independence tend to guard their newfound sovereignty with considerable zeal, but where this is challenged by water deficits. In turn, this means a shift in policy from national self-sufficiency in food production to food security. The chapter by Turton and Meissner introduces the concept of a hydrosocial contract as the basis of all institutional development in the water sector. Significantly, the hydrosocial contract changes over time, implying that institutions need to change as well. The hydrosocial contract also introduces issues of sustainability and the second order social resources needed to achieve this, the holy grail of policy makers in developing countries. The chapter by Wester and Warner is a provocative challenge to the emerging dominant discourse that maintains that river basins should be managed as integral units through one river basin organisation (RBO). Jägerskog's chapter looks at regime theory as an underlying component of co-operation in shared international river basins.

The third section focuses exclusively on the role of legislation in the water sector and builds a little more on the notions of scale and range. Eckstein unpacks the development of the Convention on the Law of the Non-Navigational Uses of International Watercourses, as this is relevant to most modern water-sharing agreements between states.

As such, it deals mainly with the international scale. Akweenda builds on this by delving into some of the historical precedents of international law, focusing specifically on what has come to be known as the Helsinki Rules. Ramoeli gives an introduction to the history and status of the SADC Protocol on Shared Watercourse Systems. This uses the Helsinki Rules and is the basis for regional co-operation in Southern Africa. It takes the issue of scale down to the regional level. Stein examines the national scale and illustrates how some key water sector reforms have occurred in Namibia, South Africa and Zambia. Stein's chapter also deals with range in the sense that water legislation is seen as a remedy for the historical inequality that is endemic to Southern Africa.

The fourth section is designed to take the reader through some of the scale and range issues in more detail. The chapter by Schreiner, Van Koppen and Khumbane opens up a number of key issues that are relevant to Southern Africa. Central to this at the range level are gender and poverty issues, but these are also situated in terms of scale as an interaction between the grassroots level and the national level of decision-making. This specific chapter also touches upon other key range-related issues such as resource capture, land reform, household-level economic security, the Dublin Principles (water is seen as an economic good), law as a remedy and institutional development. Molden and Merrey discuss the issue of scale in more detail, covering the individual farmer's field to the entire river basin. Within this discussion, issues of range are also evident, such as institutional development as a function of scale. Implicit within this is also the linkage to virtual water trade as a strategic remedy for local water scarcity as discussed by Allan in section two. Heyns deals with the strategically important but environmentally controversial issue of inter-basin transfers (IBTs) of water. This has a scale dimension in the sense that it impacts upon different levels of society, but it also represents an element of range because it opens up other issues such as ecological integrity versus development, rights versus needs and national sovereignty and state vulnerability caused by water deficits. Henwood and Funke deal with the management of water in shared international river basins from a political science perspective by exploring the linkage between foreign policy and international relations. Most shared international water is managed by engineers through technical commissions, who are actually engaged in international relations at the same time, probably without being fully aware of it. This issue is relevant to both range and scale and has hardly been explored in the available literature. It is thus highly relevant to Southern Africa given the large number of shared river basins found there. Ashton and Haasbroek focus on water demand management as a central issue. This is expanded upon by Schachtschneider who looks at water demand management in the tourist industry in Namibia, thus focusing on an aspect of hydropolitics that has received little attention in the mainstream literature, but that will become increasingly important to Southern Africa in future. Ashton and Ramasar undertake a pioneering exploration of water and HIV/Aids from a strategic perspective. The chapter is offered as an important example of the range of hydropolitical writing, but is also included because HIV/Aids is such a crucial issue in Southern Africa. Its water-related ramifications therefore deserve better research coverage in future. The HIV/Aids issue also has an important element of scale that needs to be explored further.

The fifth section offers a conclusion to the book, and suggests a research framework that is applicable to Southern Africa (and possibly other developing regions of the world)



using the definition of hydropolitics offered in the introduction, and taking into consideration the elements of scale and range.

To ensure the reader-friendliness and scientific value of this volume, all references provided by individual authors have been combined in one complete bibliography that appears at the end of the book. Where endnotes have been used, these are placed at the end of the particular chapter.

## Conclusion

This book does not attempt to have the final say on hydropolitics. Quite the opposite is true. Hydropolitics – as it is currently being written about in the mainstream literature – tends to focus on conflict at the international level in shared river basins. It is often not entirely relevant to Southern Africa, a region that does not have any high level of conflict at present. This leaves a gap in the hydropolitics literature that the book seeks to address by focusing on elements of scale and range. It is hoped that, by using this approach, a new generation of literature will be spawned that is applicable to developing countries that are facing water scarcity as limitations to their economic growth potential and are thus looking for sustainable and equitable solutions.

This collection of essays is also an attempt to encourage and develop new authors. For this reason, each chapter represents a distinctive writing style that has not been artificially harmonised by the editors, simply because each style is unique to the cultural and professional background where each author comes from. Some of the authors are already well established with an impressive publishing record, whereas others have never been published before. This is their chance to test ideas in the hydropolitical laboratory offered by Southern Africa. It is also hoped that the book will contribute meaningfully to the knowledge-base of the SADC Water Sector as it will play an increasingly important role in the functional integration of the region in future.

Finally, this book is offered as a contribution to the debate on sustainable development that will take on a new life at the forthcoming World Summit on Sustainable Development in South Africa to be held in 2002, and the 3rd World Water Forum planned for 2003 in Japan.

## Acknowledgements

Special thanks go to the SADC Water Sector. Mr Mikhail Gorbachev of Green Cross International is thanked for his willingness to sanction the project. Mr Ronnie Kasrils is also thanked for his time and guidance. Euníce Reyneke is acknowledged for her vital role as language editor and Janice Berg as designer and layout artist. The authors are lauded for their tireless support, without which the project would never have been possible in the first place. Finally, the UK Department for International Development (DFID) is acknowledged as the main financial supporter of the project. It is through the combined interaction of these people and elements that this book has grown and come to fruition.

# PART II:
# SOME THEORETICAL DIMENSIONS

# Chapter 2
# Water resources in semi-arid regions: Real deficits and economically invisible and politically silent solutions

**Tony Allan**

## Introduction

This chapter outlines the strategic water deficits first encountered by two semi-arid regions – the Middle East and North Africa, as well as Southern Africa – during the second half of the 20th century. Firstly, the trajectories of water demand in relation to the availability of water are outlined. Secondly, it is shown that neither region has sufficient local water resources to meet current and future needs.

Thirdly, hydropolitical crises, which most analysts presumed would be associated with worsening water deficits, are shown to have been spectacularly ameliorated by 'virtual water'. Virtual water is the water required to produce water-intensive commodities such as grain. At least 1 000 tonnes (cubic metres) of water are required to produce a tonne of wheat. Importers of a tonne of wheat do not have to mobilise 1 000 cubic metres of water locally. The importer also wins significantly because the tonne of wheat is put on the world market at about half of its production cost. The politicians struggling with water deficits in semi-arid countries are the major winners. Virtual water is the dream solution for politicians in water-stressed economies. It provides an extremely effective operational solution with no apparent downside. Virtual water is economically invisible and politically silent.

Furthermore, the virtual water solution has a major impact on the way water deficits can be perceived and manipulated. The usefulness of risk theory is examined by highlighting how the economic, security and environmental risks implicit in water deficits can be conveniently put aside. This is achieved through the combined effect of virtual water imports and the social capital that enables water deficits to be addressed. Finally, the importance of water policy reform to achieve economically efficient and environmentally considerate policy is regarded as a consequence of the availability of virtual water in the hydropolitics of semi-arid regions.

## Strategic water issues in arid regions

"The comparative disadvantage in economic terms of the Middle East and North Africa [and of much of Southern Africa] with respect to water are extreme and classic cases" (Allan 2001). The Middle East and North Africa (MENA), as well as Southern Africa encountered water resource deficits during the second half of the 20th century. Following below is an outline of the scale and trends in the strategic water deficits of these two semi-arid regions, the first major regions in the world to encounter water deficits.

A water deficit economy is one that has insufficient water to meet the requirements of its agricultural sector to raise the food needs of its national population. It may seem a risky generalisation, but all economies can meet the water needs of their domestic and

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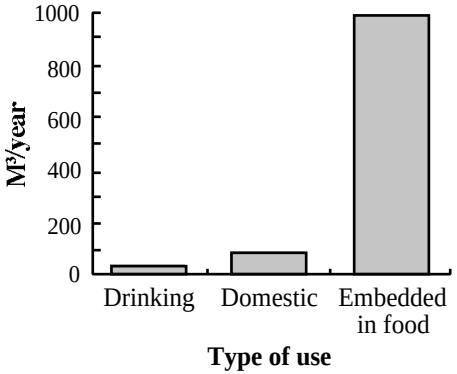
industrial/service sectors. It is the water required to raise food needs that is the challenge. This generalisation has become less risky as the costs of desalinating sea water have decreased during the past decade. Domestic and industrial sector needs are not challenging because they amount to only 10% of the national water demand for a food self-sufficient political economy. Of the water budget of a food self-sufficient national economy, 90% has to be devoted to agriculture, including food production. Figure 1 shows the comparative annual water needs for drinking and domestic use, as well as for the production of food to satisfy the needs of an individual.

*Figure 1: Water needs of an individual by sector*




The allocation of water to agriculture takes water that may have been flowing through the environment and providing essential environmental support for millennia. The strategic importance of environmental demands for water have been given prominence in the northern hemisphere since 1980. Environmental priorities have been recognised and have found a place in water policy and national water laws in Southern Africa. The MENA region has not been as environmentally reflexive in its water policy or in its management of water.

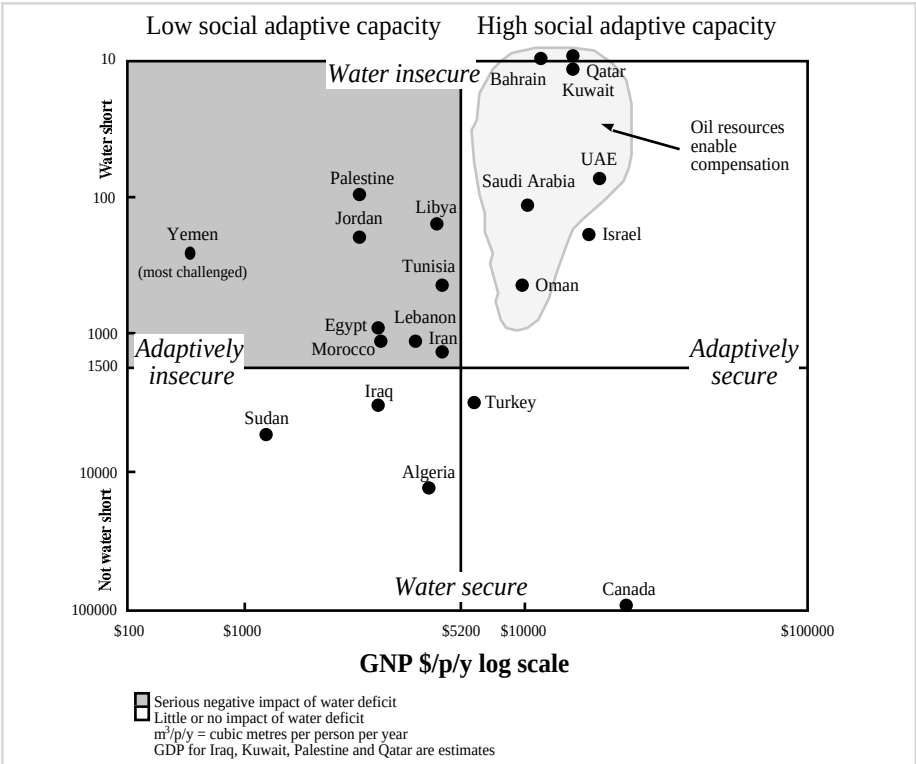
In regions enjoying temperate and humid climates, almost all water for agriculture comes from the soil profile. Rain infiltrates the soil profile after periods of rainfall and remains there for long enough to enable seeds to germinate, crops to mature through their 100 or more days' growing season, and to provide harvests of consumable commodities. In such temperate environments, only small volumes of freshwater from rivers and groundwater storage are used as supplementary irrigation. Of national freshwater, 10% may be used for supplementary irrigation, representing much less than 1% of the total national water budget – dominated as it is by soil water. In contrast, in the semi-arid and arid MENA and Southern Africa, soil water fed by infiltrated rainfall can amount to less than 5% of the national water budget. For these regions, the freshwater taken from surface flows and storage and from groundwater aquifers comprises over 90% of the national water budget.



If those managing a political economy in a semi-arid region decide to adopt a food self-sufficiency policy, the competition for water will be serious and the main competition will be between those wanting water for agriculture and those wanting water to provide environmental services as they existed in the past.

Sustainable water policies are not achieved through the adoption of sound environmental principles alone. Nor are they achieved by efficient water use based on principles of economic efficiency. Sustainable water use is achieved in the political arena. National hydropolitics is a mediating discourse. The voices of society, the economy and the environment impose their often conflicting priorities and demands on the national water resource. In the political economies of Europe and the US, environmental and economic priorities were recognised in the 1980s and in the 1990s, respectively (Allan 2001). These principles have not been recognised by all the political economies of Southern Africa and they have only gained currency in one Middle Eastern economy.

*Figure 2: Sustainability and the water sector, with reference to the role of discursive politics*



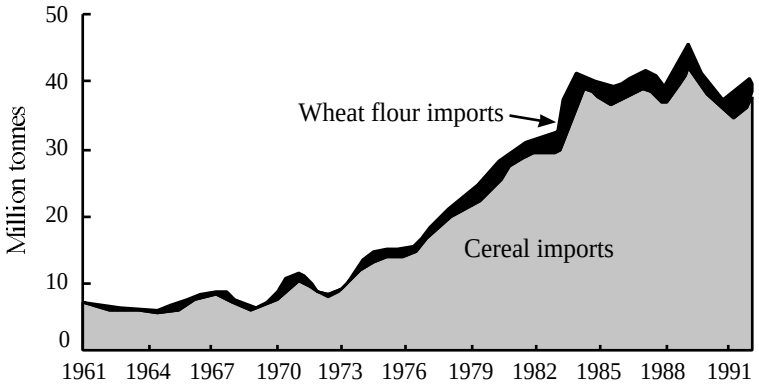

Sourcce: Concepts author and Ohlsson and Turton (1999). Data World Bank Atlas (2000).

Figure 2 conceptualises the discursive, that is the political nature of sustainable water management and the central role of political processes in bringing about actual water policy outcomes. The power of the different voices changes over time. Water professionals managing water and developing water policy are reluctant to recognise the political nature of water policy-making. They prefer to assume that information on meteorology, hydrology, the cost of delivering water and the value of the commodities produced with water will be sufficient to guide policy makers. In the MENA region and in Southern Africa, it is the voices of rural communities which use very high volumes of water needed for irrigated agriculture that tend to be determining in the water policy discourse.

## Water deficits – the driving force of rising demand and limited new water supply options

The MENA region – extending from Morocco to Afghanistan and from Turkey to the Sudan – had about 300 million inhabitants at the close of the 20th century. Its renewable freshwater resources amounted to about 200 billion cubic metres per year (FAO 1997a; 1997b). As each individual needs more than 1 000 cubic metres of water per year, the region needed approximately 50% more water than was available, unless its unmonitored soil water was sufficient to raise its food needs. Figure 3 shows regional production and trade data for the major grain crops of the MENAregion. Grain imports rose from about 1970 (FAO 1961-2000). By 2000, imports totalled 50 million tonnes per year, which would require 50 billion cubic meters of freshwater annually. Egypt's annual share of the flow of the Nile is 55.5 billion cubic metres of water. The Nile is the region's major freshwater resource.

*Figure 3: Grain imports in the MENA region, 1961-1992*

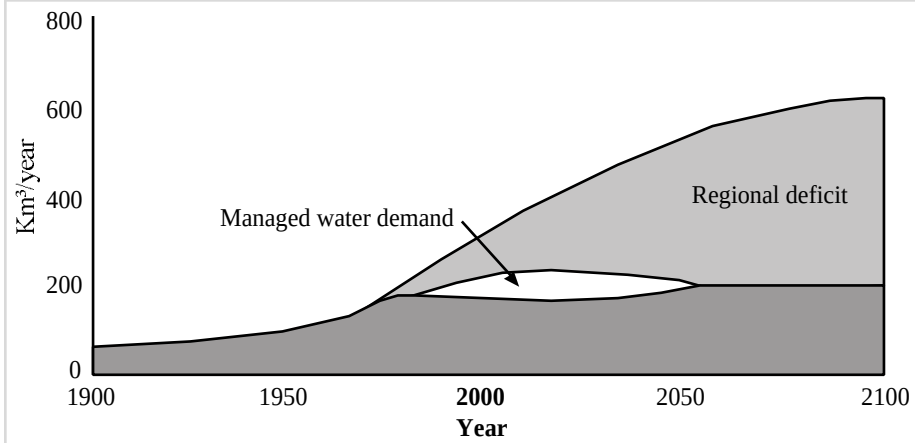



Source: FAO trade statistics.

The history of the MENA region's use of water between 1900 and the present, with projections for 2001, is shown in figure 4. Until about 1970, it was possible to mobilise new water, increasingly at the expense of environmental services, to meet the growing demand for water.



*Figure 4: Freshwater demand and supply in the MENA region, 1900-2100, and the emerging deficit since 1970*




Source: UN demographic data and author's estimates.

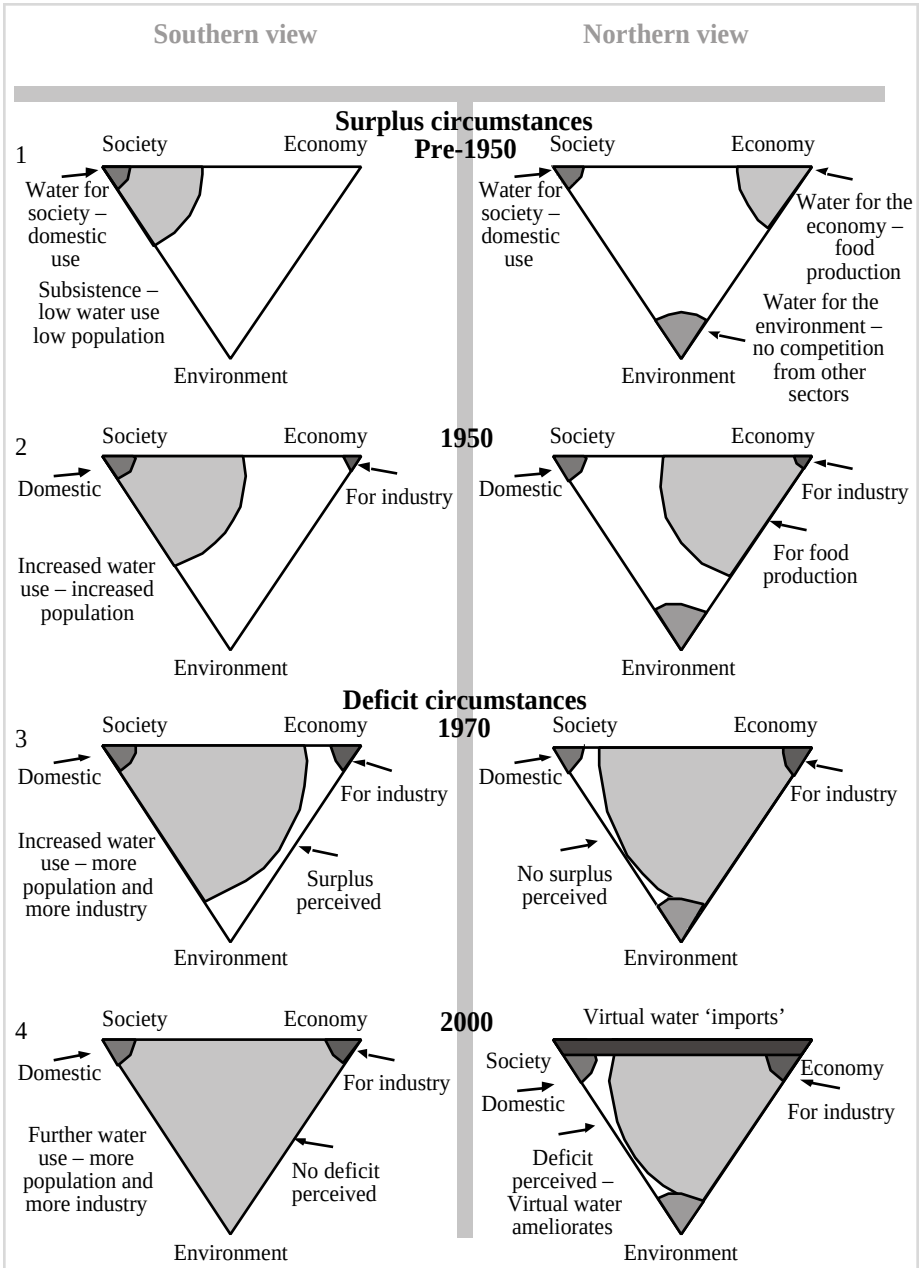
Since 1970, the region's water needs have been met by overdrawing groundwater reservoirs and by importing water-intensive commodities such as grain. Fortunately, the MENA region has other environmental capital from which it can draw. Its oil and gas reserves mean that half of the population of the region live in oil economies with an enhanced gross domestic product (GDP). The remaining population of the region benefit indirectly from the oil-rich economies through participation in their job markets. All the region's economies have been able to afford the advantageously priced grain commodities on the world market in the last decades of the 20th century. They will be able to afford such staple food imports in future.

The position is similar in Southern Africa. Part of the region – Botswana and Namibia – encountered water deficits by about 1970. South Africa, Swaziland and Zimbabwe felt water deficits by the 1980s. The economies further north – Angola, Mozambique, Malawi and Zambia – still have a water surplus.

The dry countries of Southern Africa – South Africa, Namibia, Botswana. Swaziland, Lesotho and Zimbabwe – have a combined population of about 60 million and annual renewable freshwater resources of about 140 billion cubic metres, even though all of this is not accessible, especially in Namibia (FAO 1995a; 1995b). The humid part of Southern Africa – Angola, Zambia, Malawi and Mozambique – has a population of about 80 million and water resources of 630 billion cubic metres per year. Clearly, the water predicament of Southern Africa, even of its dry economies, is not as serious as that of the MENAregion (FAO 1995a; 1995b).

Figure 5 illustrates important features of the progression to water deficit in the MENA region. In Southern Africa, only the six dry countries of the region have had a similar experience, but about two decades later. Figure 5 also illustrates the way hydropolitics has been perceived in the MENA region by ordinary people, water professionals and politicians. The major water allocation is seen to benefit society, mainly the livelihoods of

*Figure 5: Northern and southern perceptions of water use*






people in the rural sector. Professionals from outside the region have a different interpretation. They regard water allocated to agriculture as an economic input. They also advocate that water for environmental services is an essential priority. Local and external professionals operate with different assumptions in different water discourses. They often perceive the virtual water solution differently. External professionals emphasise the virtual water solution, while local experts effectively de-emphasise it for reasons explained below.

## Ameliorating the regional water deficit – global solutions

More water flows into the MENAregion annually as virtual water than flows down the Nile into Egypt. Hydropolitical crises, presumed by most analysts to be associated with worsening water deficits, have been successfully avoided by the presence of 'virtual water'. This is the case for the economies of both the MENAregion and Southern Africa.

Virtual water is the water required to produce water intensive commodities such as grain. It requires at least 1 000 tonnes (cubic metres) of water to produce a tonne of wheat. Importers of a tonne of wheat do not have to mobilise 1 000 cubic metres of water locally. It is a welcome option for regions that are experiencing deteriorating water deficits not to have to mobilise water locally.

The wheat importer has also gained substantially. In the last two decades of the 20th century, a tonne of wheat was available on the world market at about half of its production cost. Not since the end of the 19th century has it been possible for Middle Eastern wheat producers to get the crop to market at prices as low as those achieved by US producers (Lancaster et al 1999).

Politicians struggling with water deficits in semi-arid countries are the major winners. Virtual water is the dream solution in water-stressed economies. It provides an extremely effective operational solution with no apparent downside. Virtual water is economically invisible and politically silent. Those politicians struggling with challenging politics welcome solutions that are economically invisible. They especially welcome those that are politically silent and devoid of political costs.

Water self-sufficiency and the resulting food self-sufficiency are highly charged national political issues in the MENA region. These were also highly sensitive issues in South Africa during its pre-1994 isolation. In the MENAregion, people and governments have experienced water surpluses and food self-sufficiency for about six millennia. In the Roman era, farms in North Africa and especially in the Egyptian delta exported wheat and other food crops to Rome. Dependence on other countries for water and food is subconsciously unacceptable to people who have assumed that their water security will be eternal. Nor do they readily connect this deficit with the social driving force of rising population numbers.

There are three remedies to the water deficits in the MENA region and in Southern Africa. Two are social and one is socio-economic. None of these remedies is concerned with supply management – that is the building of structures to store and manage water. Some supply management will be needed and there will also be substantial resort to desalination for domestic and industrial use. But supply management is not among the major solutions.

The first social solution is the reduction in population growth rates. Secondly, patterns of food consumption should change, which will impact upon the regions' water deficits.

Any increase in the consumption of animal products will have a serious impact on the real and virtual water budgets of national economies. It requires sixteen times as much water to produce a kilogram of meat as to produce a kilogram of wheat. These driving forces are much more powerful than the local constraints of hydrological endowment or even the manipulation of such endowments by engineers. It is the productive capacity of distant farmers working land and water resources in better endowed regions and traders who transport the output of such farmers that provide the food security of water deficit regions.

The third and the most important solution for water deficit economies is socio-economic development. With socio-economic development comes the adaptive capacity to deal with the challenge of water scarcity. Water scarcity has two orders. First-order water scarcity is the scarcity of water. Second-order scarcity is that of the capacity to adjust to the scarcity. First-order scarcity of freshwater is much less important than second-order scarcity that lies in the adaptive capacity to deal with such scarcity (Ohlsson 1999; Turton & Ohlsson 1999). It is the availability of second-order adaptive capacity that determines economic outcomes. First-order scarcity does not determine economic outcomes. Figure 6 illustrates the significance of socio-economic strengths with which to address first-order water scarcity.

Only poor economies are significantly hampered in their social and economic development by first-order water scarcity. Poor economies are also more likely to have communities within them that face serious conflicts over water. In poor economies, for example, settled communities can be at odds with herders who need water and feed in the dry season and during periods of drought. In such economies, farmers may also be at odds with one another over irrigation shares. Armed conflict over water between national entities has not occurred, however, in either region since the early 1960s. Even these early events in upper Jordan were minor conflicts that have not recurred. The period is remembered selectively by those inclined to construct the notion of water wars.

In Southern Africa, the complex arrangements to enable South Africa to bring water from Lesotho to the water-short Gauteng province were model institutions in the era of the certainties of the hydraulic mission before the 1980s (Swyngedouw 1999a; 1999b). South Africa is an economy with the adaptive capacity to engineer interbasin water transfers. It also has the capacity to install institutions to manage water that have achieved economic efficiency and, more recently, environmental services goals. By the 1980s, the green movement had questioned the certainties underpinning the hydraulic mission. The control of nature brought uncertainties rather than certainty (Reisner 1993). These ideas have spread from the US and Europe and have gained a global profile. In these changed circumstances, it has been necessary to re-evaluate the last phases of the Lesotho Highlands Project so that the environmental services provided by the surface water resources are not as impaired as they would have been in the original 1980s design.

## Social and political consequences of the virtual water solution

It is a paradox that the water pessimists are wrong while their pessimism is a very useful political tool that can help the innovator to shift the eternally interdependent belief systems of the public and their politicians. The water optimists are right, but their optimism is dangerous because the notion enables politicians to treat water as a low policy priority and thereby please those who perceive that they are prospering under the old order.



Thirty years is a rather short transitional period for the necessary major adjustments in water policies to be developed in response to limited water availability.

Those purveying the economic and environmental facts of life that contradict the deeply held belief systems of whole populations will be ignored if they do not shape their message and pace its delivery to comply with political realities.

### *Impact of virtual water on hydropolitics and water policy reform*

The virtual water solution plays a major role in the way water deficits can be perceived and manipulated. Ideally, water policy should be aligned with economic and environmental principles. In practice, it is very difficult to set out on the long and politically hazardous road of water policy reform when the virtual water solution is available. In the MENAregion, only one economy has made major strides in recognising the economic and environmental value of water. But even Israel has shown itself susceptible to the dominance of social and strategic priorities other than the recognition of the economic and environmental values of water. Israel reversed its hard-won water policy reforms of the mid-1980s in the changed negotiating and hydrological circumstances of 1992. The Jordan Basin countries experienced a major rainfall event in this year. A few weeks of heavy rain returned the region's major aquifers to higher levels than in 1967. At the same time, the peace process started involving Israel, Jordan and Palestine in unprecedented negotiations over freshwater resources. Downstream riparian countries, such as Israel on the major West Bank Aquifer, prefer to negotiate from an assumed high level of use. A negotiated share of a large assumed annual flow will provide a proportionally higher entitlement for the downstream party.

Economists argue that when consumers are aware of the value of an input or commodity, preferably through price signals in a market, then they will change their consumptive behaviour. Markets are the means to optimise the use of scarce resources. Sadly, there are numerous impediments to such optimised outcomes. The major one is the resistance from users, especially from the users of the major volumes of water used in irrigated agriculture. Water for livelihood is a major issue, especially in communities living in or close to poverty. Water for livelihood is as emotionally significant to rural communities as drinking water. Threats to livelihood water can generate as much political stress as shortages of drinking water. The salience of the politics of threats to livelihood water dwarfs that of drinking water problems because the volumes of water needed for livelihood are so much larger. Livelihood water for a community or nation can require a thousand times the volume needed for drinking.

Political leaders are risk avoiders. They have to concentrate on dealing with immediate challenges. They have no inclination, nor do they have the time and resources to deal with issues that are generating little political heat. Those problems that concern economic and environmental principles, but are silent in the current political discourse, will receive little discursive attention and no legislative resources. Water policy reform is such an issue.

Rational economists and environmentalists have a sound case. The immediate and especially the long-term health of society, the economy and the environment requires that water is used in ways that reflect its value in the economy and the environment. Rational politicians see a different optimisation where the avoidance of political costs loom large.

That which is an optimum solution for a politician often presents a suboptimal outcome for the economist and the environmentalist.

Economists' concept of the 'second best'is helpful (Lipsey et al 1956). Half a century ago, studies of trade revealed that economic optimisation is a slippery concept when applied to normal complex political economies. Lipsey and others showed that, in economic transactions in which one 'condition' was suboptimal, all the 'other conditions' would be suboptimised, and the outcome would be suboptimal. Since virtual water is such a key condition in a political economy, an important question is whether virtual water is an optimising or suboptimising condition in terms of water policy and water policy reform.

There are at least two levels where the notion of optimisation with respect to water policy should be examined. Initial analysis tends to focus on the irresistible features of virtual water for managers of national economies. There are real economic advantages in importing virtual water. Virtual water overcomes the serious regional disadvantage of water deficits in the MENA and Southern Africa regions. In the MENA region, it masks the unacceptably bad news that the region has run out of water. Virtual water allows millions of people and their political leaders to sustain the illusion that they are self-sufficient where water is concerned. With careful information management, it has also been possible to keep the issue of food insufficiency out of the discourse. Virtual water movements into the MENA region and into Southern Africa have determined the level of politicisation of water issues and especially of water scarcity. The subsidised prices of water-intensive commodities on the world market, such as wheat, reinforce the idea that the virtual water solution is economically appropriate.

A second and more critical examination of the virtual water solution reveals complications arising from its ability to reduce the politicisation of regional water scarcities in the MENA and Southern African regions. Virtual water imports address the very serious, big water problem closely associated with rural livelihood politics.

This second perspective on virtual water suggests that it contributes to a 'second best' outcome by slowing down the reform of water policy. Water policy reform is integral to the sustainable socio-economic development of political economies based on the best use and development of five forms of capital: natural (water), manufactured, human, social and financial. Through the lack of awareness of the status of the environmental capital of water, distortions have led to a politically comfortable pace in water policy reform. The comfort is enjoyed by current populations and their leaders. However, they are not considering the impact of their weak approach to water policy reform on future generations.

An analysis of the problem based on political theory would conclude that the direction and pace of water policy reform in the MENA region and in Southern Africa is entirely rational. Politicians implement policies according to their political feasibility. Confronting deeply entrenched cultural beliefs that underpin rural interests is bad politics. Water is just such an issue. In the MENAregion, water was a secure resource for millennia. That which may be second best for an economist or environmentalist is the only 'best' available to water policy makers and the political leadership.

### *Risk perception, risk theory and water policy*

In the discursive political process that leads to water policy-making and reform, the perception of risk plays an important role. It has been shown above that whole national



populations can be unaware of the part played by virtual water in solving regional water deficit problems. So silent and invisible is the virtual water solution that the absence of evidence of the water deficit can be used by politicians and peoples to converge on the comfortable perception that there is no problem. There is no risk from regional water deficits.

It is argued by risk theoreticians (Beck 1995; 1999) that societies and political discourses in northern industrialised political economies have become reflexive (Allan 2001). They show a greater awareness of risk, especially since the mid-1970s. Former certainties have been replaced by uncertainty, by a greatly enhanced awareness of environmental risks and especially of risks 'manufactured' by industrial society. Environmentalists have been very successful in persuading civil society, as well as governments of the disadvantages of environmental interventions such as dams. Even large multinational enterprises have been made aware of the uncertainties resulting from engineering, industrial and commercial interventions in the environment. Such interventions have been shown seriously to impair the ability of the environment to provide essential environmental services.

Risk theory can also be useful in highlighting how the economic, security and environmental risks implicit in water deficits can be conveniently pushed to the background (Douglas 1986). Risk can be emphasised and ignored according to the political energy devoted to promoting the risk. Political discourse then sorts out which risk is prominent and which is consigned to the background. Virtual water imports have been very important in enabling the de-emphasis of the water deficits of the MENA region and of the economies of Southern Africa. The lesser focus on water policy reform to achieve economically efficient and environmentally considerate policy is partly a consequence of the existence of virtual water and its silent impact on the hydropolitics of such semi-arid regions.

## Conclusion

The MENA region and Southern Africa are both short of freshwater. The economic histories of these regions during the second half of the 20th century have shown that both have coped with the economic challenges of their water deficits. Both regions have been fortunate as the invisible economic solution of virtual water significantly ameliorated the political stress that would have attended the radical water policy reforms that otherwise would have been necessary.

Both regions have taken advantage of the virtual water option. This option has balanced water budgets. Most important, in the more difficult situation faced by the MENA region, virtual water has allowed the peoples and political leaders of the region to avoid a confrontation with the belief systems of their large rural populations who are dependent upon freshwater for their livelihood. Water policy reform is one of the most risky political projects. Users of the high volumes of water needed to irrigate semi-arid tracts are usually numerous and they use water in ways hallowed by tradition and legitimised by rural livelihoods. Growing crops came before workshops to make textiles or computer chips. No body of evidence that industrial jobs are more water efficient can move the beliefs of such large rural populations or the politicians who depend on their goodwill.

Virtual water in the global system should be sufficient to meet the needs of a doubled world population (Allan 2001). The two regions that depend the most on the global system

– MENA and the dry part of Southern Africa – need leaderships who are alert to their dependence on the global hydrological system. The capacity of the global hydrological system to meet the needs of the MENAregion and of Southern Africa, as well as those of other regions that might in future compete for virtual water – occasionally or systematically – is of crucial strategic significance. The subject merits intensive study and continuous monitoring by research groups in the MENA region and in Southern Africa.

*Figure 6: Population and freshwater availability in the Middle East and North Africa*

| MENAfreshwater resources | | | |
|---|---|---|---|
| | **Population** | **Freshwater ($m^3$)** | **Water ($m^3$)/capita** |
| **Mid-East** | | | |
| **Humid'Middle East** | | | |
| Iran | 61 947 000 | 82 947 033 000 | 1 339 |
| Iraq | 22 328 000 | 77 053 928 000 | 3 451 |
| Turkey | 63 451 000 | 203 614 259 000 | 3 209 |
| Syria | 15 277 000 | 44 700 502 000 | 2 926 |
| **Total** | **163 003 000** | **408 315 722 000** | **2 505** |
| **Dry'Middle East** | | | |
| Israel | 5 963 000 | 1 097 192 000 | 184 |
| Jordan | 4 563 000 | 903 474 000 | 198 |
| Kuwait | 1 866 000 | 20 526 000 | 11 |
| Lebanon | 4 210 000 | 4 799 400 000 | 1 140 |
| Oman | 2 302 000 | 1 010 578 000 | 439 |
| Saudi Arabia | 20 739 000 | 2 405 724 000 | 116 |
| UAE | 2 724 000 | 198 852 000 | 73 |
| Yemen | 16 599 000 | 4 216 146 000 | 254 |
| **Total** | **48 440 000** | **12 651 226 000** | **261** |
| **Total Middle East** | **211 443 000** | **420 966 948 000** | **1 991** |
| **North Africa** | | | |
| Algeria | 29 922 000 | 14 302 716 000 | 478 |
| Egypt | 61 401 000 | 58 269 549 000 | 949 |
| Libya | 5 302 000 | 800 602 000 | 151 |
| Tunisia | 9 335 000 | 4 098 065 000 | 439 |
| Morocco | 27 775 000 | 29 997 000 000 | 1 080 |
| **Total North Africa** | **133 735 000** | **107 467 932 000** | **804** |

Source: World Bank Atlas 2000. Based on 1998 figures.



| Southern African freshwater resources | | | |
|---|---|---|---|
| | **Population** | **Freshwater ($m^3$)** | **Water ($m^3$)/capita** |
| **Region 1** | | | |
| Botswana | 1 562 000 | 14 703 106 000 | 9 413 |
| Lesotho | 2 058 000 | 5 200 566 000 | 2 527 |
| Namibia | 1 662 000 | 45 493 926 000 | 27 373 |
| South Africa | 41 402 000 | 50 013 616 000 | 1 208 |
| Swaziland | 989 000 | 4 501 928 000 | 4 552 |
| Zimbabwe | 11 689 000 | 19 999 879 000 | 1 711 |
| **Total** | 59 362 000 | 139 913 021 000 | 2 357 |
| **Region 2** | | | |
| Angola | 12 001 000 | 189 411 783 000 | 15 783 |
| Malawi | 10 534 000 | 18 697 850 000 | 1 775 |
| Mozambique | 16 947 000 | 216 006 462 000 | 12 746 |
| Tanzania | 32 128 000 | 88 994 560 000 | 2 770 |
| Zambia | 9 666 000 | 116 001 666 000 | 12 001 |
| **Total** | 81 276 000 | 629 112 321 000 | 7 740 |

Source: World Bank Atlas 2000. Based on 1998 figures.

*Figure 7: Population and freshwater availability in Southern Africa*

| Southern African freshwater resources | | | |
|---|---|---|---|
| | **Population** | **Freshwater($m^3$)** | **Water ($m^3$)/capita** |
| **Region 1 – Semi-arid and/or arid countries** | | | |
| Botswana | 1 562 000 | 14 703 106 000 | 9 413 |
| Lesotho | 2 058 000 | 5 200 566 000 | 2 527 |
| Namibia | 1 662 000 | 45 493 926 000 | 27 373 |
| South Africa | 41 402 000 | 50 013 616 000 | 1 208 |
| Swaziland | 989 000 | 4 501 928 000 | 4 552 |
| Zimbabwe | 11 689 000 | 19 999 879 000 | 1 711 |
| Total | 59 362 000 | 139 913 021 000 | 2 357 |
| **Region 2 – Countries with major tracts with high annual rainfall** | | | |
| Angola | 12 001 000 | 189 411 783 000 | 15 783 |
| Malawi | 10 534 000 | 18 697 850 000 | 1 775 |
| Mozambique | 16 947 000 | 216 006 462 000 | 12 746 |
| Tanzania | 32 128 000 | 88 994 560 000 | 2 770 |
| Zambia | 9 666 000 | 116 001 666 000 | 12 001 |
| **Total** | 81 276 000 | 629 112 321 000 | 7 740 |

Source: World Bank Atlas 2000. Based on 1998 figures.

| MENAfreshwater resources | | | |
|---|---|---|---|
| | **Population** | **Freshwater ($m^3$)** | **Water ($m^3$)/capita** |
| **Mid-East** | | | |
| Iran | 61 947 000 | 82 947 033 000 | 1 339 |
| Iraq | 22 328 000 | 77 053 928 000 | 3 451 |
| Israel | 5 963 000 | 1 097 192 000 | 184 |
| Jordan | 4 563 000 | 903 474 000 | 198 |
| Kuwait | 1 866 000 | 20 526 000 | 11 |
| Lebanon | 4 210 000 | 4 799 400 000 | 1 140 |
| Oman | 2 302 000 | 1 010 578 000 | 439 |
| Saudi Arabia | 20 739 000 | 2 405 724 000 | 116 |
| Syria | 15 277 000 | 44 700 502 000 | 2 926 |
| Turkey | 63 451 000 | 203 614 259 000 | 3 209 |
| UAE | 2 724 000 | 198 852 000 | 73 |
| Yemen | 16 599 000 | 4 216 146 000 | 254 |
| **Total** | 221 969 000 | 422 967 614 000 | 1 906 |
| **North Africa** | | | |
| Algeria | 29 922 000 | 14 302 716 000 | 478 |
| Egypt | 61 401 000 | 58 269 549 000 | 949 |
| Libya | 5 302 000 | 800 602 000 | 151 |
| Tunisia | 9 335 000 | 4 098 065 000 | 439 |
| Morocco | 27 775 000 | 29 997 000 000 | 1 080 |
| **Total** | 133 735 000 | 107 467 932 000 | 804 |

Source: World Bank Atlas 2000. Based on 1998 figures.

# Chapter 3
# The hydrosocial contract and its manifestation in society: A South African case stud y

**Anthony Turton and Richard Meissner**

## Introduction

The notion of a hydrosocial contract was first mooted by Turton and Ohlsson (1999) at the 9th Stockholm Water Symposium. It has subsequently been referred to by Warner (2000a; 2000b) in a manner that shows conceptual development. The notion has also been written about in a book entitled the *Social Charter for Water* that was released at the Second World Water Forum (Académie de l'eau 2000), but the actual concept was not given a formal name. In addition, the World Water Vision has as two of its key elements, in the first place, a tripartite alliance in the water sector between government, civil society and the private sector (World Water Commission 2000:14), as well as the notion of 'water user parliaments' that would ensure that "all stakeholders have a voice in decision-making" (World Water Commission 2000:28). These two components of the vision are nothing other than a manifestation of the existence of a hydrosocial contract. The importance of the concept is such that it encapsulates the normative values present within the hydropolitical environment, and thus forms the basis on which institutional arrangements are subsequently built. By understanding this concept in a more profound manner, it is anticipated that water resource managers will be better equipped to deal with the issues that are emerging from a rapidly changing water sector. The purpose of this chapter is therefore to develop this concept further in such a way that it would be available for further empirical testing, as well as for further use by water resource managers and hydropolitical researchers.

## Definition of key concepts

### *Discursive élite*

The discursive élite comprise those persons who are in a dominant position within bureaucratic entities and who can determine the nature, form and content of the prevailing discourse, also known as the *sanctioned discourse*. The discursive élite legitimise or sanction the prevailing discourse (Turton 2000c).

### *First transition*

The first transition refers to that moment in historic time when the prevailing condition of *water scarcity* is encountered by a given social entity. This is usually accompanied by a major event such as a drought. It can also be the result of the convergence of events such as a period of rapid population growth and unchecked industrialisation that is punctuated

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by a major drought. The first transition can also be accompanied by increased levels of induced scarcity caused by the pollution of existing sources of water as the result of unchecked industrial or mining activities. The *Hobbesian form of hydrosocial contract* is often the result of this series of events.

### *Hobbesian form of hydrosocial contract*

The result of the interaction of hydropolitical dynamics during the *first transition* often gives rise to a bipolar configuration between government and the water-consuming public. This closely resembles the elements of Thomas Hobbes' (1651) philosophical writing.

### *Hydraulic mission*

The hydraulic mission is the overarching rationale that underpins the state's desire to establish conditions that are conducive to socio-economic and political stability. As such, it can be regarded as a form of ideology in the study of hydropolitics, infusing itself into the dominant or *sanctioned discourse*, serving to legitimise (and thereby sanction) this discourse.

### *Hydrosocial contract*

The hydrosocial contract is the unwritten contract that exists between the public and government (Turton & Ohlsson 1999). It comes into existence when individuals are no longer capable of mobilising sufficient water for their own personal survival, and acts as a mandate by which government ultimately takes on and executes this responsibility. This hydrosocial contract thus acts as the basis for institutional development, and also determines what the public deems to be fair and legitimate practice to which politicians react, such as the desire for ecological sustainability (Turton 2000c). There are two different permutations of the hydrosocial contract, known respectively as the *Hobbesian* and *Lockean form*.

### *Lockean form of hydrosocial contract*

The result of the interaction of hydropolitical dynamics during the *second transition* often results in a triangular configuration between government, the water-consuming public and special interest groups such as NGOs. This closely resembles the elements of John Locke's (1690) philosophical writing.

### *Resource capture*

Resource capture is a social effect of environmental scarcity where more powerful groups of people manage to monopolise access to a critical resource such as water (Homer-Dixon 1994b:11; Homer-Dixon & Percival 1996; Ohlsson 1998:4; Ohlsson 1999:38), thus leading to the ecological marginalisation of weaker groups of people. This becomes one of the driving forces in the hydropolitical arena, defining the actions of major roleplayers.

### *Second transition*

The second transition occurs when existing supply-side solutions fall short of water demand and a condition of *water deficit* prevails. At this time, the public start to regard future augmentation as being either too costly or environmentally unacceptable. This



transition is accompanied by factors such as the birth of a new form of social conscience, often in the form of environmentalism, and the growth of civil society that embraces this emerging conscience as its fundamental normative foundation. The *Lockean form of hydrosocial contract* is often the result of this series of events.

### *Sanctioned discourse*

The sanctioned discourse is the prevailing or dominant discourse that has been legitimised by the *discursive élite* within the water sector at any one moment in time. It represents what may be said, who may say it and how it may be interpreted, thereby leading to the creation of a dominant belief system or paradigm (Turton 2000c).

### *Water deficit*

Water deficit refers to the prevailing condition that exists when the use of freshwater within a given social entity exceeds the level of sustainable supply (Turton & Ohlsson 1999), and the ecological and financial costs of additional supply-side augmentation schemes become questioned by civil society. This usually coincides with the *second transition.*

### *Water scarcity*

Water scarcity is the condition that exists when the demographically induced demand for water exceeds the prevailing level of local supply (Turton & Ohlsson 1999), resulting in supply-side augmentation becoming necessary. This usually coincides with the *first transition*.

### *Water surplus*

Water surplus is the prevailing condition that exists when the locally available supply of freshwater exceeds the local demand for it.

## Development of a theoretical model

Due to the fact that the hydrosocial contract has a dynamic nature and will undergo a series of fundamental changes over time, it becomes instructive to dwell first on the development of a basic model. For the purpose of this argument, the assumption is made that, in a given geographic entity, at some past moment in time, there was an initial abundance of water. A good example to use is the region that was known as the *Witwatersrand* in South Africa. The reason for the selection of this geographic entity as a case study is fourfold:

- The name *Witwatersrand*, when directly translated, means 'ridge of white water'. This name was given to the area because it straddled a significant watershed in central South Africa, and was the origin of many springs and small streams. Early mining settlers gave this name to the area, because it described the cascading waters that fell over the escarpment shortly after emerging on the surface as a series of springs.
- The Witwatersrand is the place where gold was first discovered in South Africa. This led to the rapid growth of Johannesburg, along with a conurbation of smaller mining towns that sprawled out along the entire stretch of what later became known as the *Rand*, short for Witwatersrand. The rapid industrialisation and associated urbanisation placed enormous strain on water resources in a relatively short period of time.

- The Witwatersrand, which has subsequently become part of the province Gauteng ('place of gold'), is now the largest industrial and urban complex in the entire Southern African region. It can only survive due to massive water transfer schemes similar to those that maintain the city of Los Angeles. These schemes are extremely complex, a problem that is compounded by the fact that Gauteng is situated on a watershed at a high altitude (some 1 800 metres above sea level). This implies that all water, transferred there by these major schemes at great cost, simply flows away again.
- South Africa has undergone a major political transformation over the last century, with distinct periods where specific power configurations were in place. As a case study area, it provides a rich source of variables that can be analysed and interesting conceptual models can be constructed from these variables.

Having noted these points, the development of a basic model can be discussed. In the latter part of the 19th century, the Witwatersrand had a relative abundance of water. At the time, people were more intimately linked to their water supply. In most cases, water was available either from a shallow well or a nearby stream, and water quality was generally high. The subsequent discovery of gold in 1886 almost immediately triggered a massive influx of people. Most of them were driven by the desire to get rich quickly, and they had a fundamentally different set of values when compared with the original indigenous inhabitants. Whereas the original inhabitants tended to be farmers, living in a way more intimately linked with the environment, the newcomers tended to view the landscape as a source of potential mineral wealth. In 1887, the population of the area stood at around 10 000 people. Typhoid became a serious threat because no arrangements had been made for adequate sanitation. The small volume of water on which this unruly population relied for its survival, soon became polluted and unsuitable for human consumption (Bath 1999).

Two events of relevance to the development of a hydropolitical model occurred at this time. Firstly, mining started in earnest. This meant that the surface gold that had originally been exposed on the northern face of the watershed called the Witwatersrand, was rapidly depleted. The exposed ore-bearing seam was systematically followed underground and, in the process, mineshafts were sunk. These shafts encountered water, and dewatering became a major component of mining activities. One result of this was the rapid drop in the water table. Wells and boreholes dried up, as did the natural springs and fountains that had originally been the inspiration for the area's name. Secondly, mining attracted a large number of people, resulting in rapid urbanisation.

The net effect of these two variables was the fact that Johannesburg experienced an acute shortage of potable water between 1886 and 1903. This was a significant event because, at this point, the initial water abundance gave way to a prevailing condition of water scarcity. In terms of the hydrosocial contract, this was the 'first transition', a significant point for the purposes of developing a coherent model. The results of this transition to water scarcity were significant for four major reasons.

Individuals had lost the intimate contact that they previously had with the water resource. By 1895, all significant aquifers in the region were tapped. These were situated around Zuurbekom and the Klip River Valley, which were the main sources of supply until 1917 (Bath 1999). Whereas individuals would draw water in the past as needed from a local stream or well over which they had some form of direct control, the transition to water scarcity meant that this relationship between humans and water changed in a fundamental way.[1]



Because individuals were no longer able to fulfil their own water needs, they looked to government for the creation of a central authority with the sole task and responsibility of supplying clean water and sanitation services. In the case of the Witwatersrand, this gave rise to the establishment of the Rand Water Board (RWB) in 1903 (Bath 1999). The creation of this public utility came about after a severe drought, coupled with financial problems that plagued the fragmented operating companies, most of which were associated directly with a mine. These events saw the desire to find a more permanent solution to the water supply problems of the Witwatersrand (Bath 1999). This is significant as individuals now looked to the state to provide water, which thus became somebody else's business.[2]

Water became a commodity at this moment in time. This changed the perceptions of water held by people. Instead of being a vital source of life that was obtained from the local environment to which people were intimately linked, water now became a commodity that flowed from a tap and originating somewhere else, with its supply being someone else's business.

The state rose to the occasion with some relish and, as described by authors such as Reisner (1993) and Swyngedouw (1999), the 'hydraulic mission' of the state was born. This has been a very significant event in the development of the hydrosocial contract, and crucial to its understanding.

Thus, it can be maintained that the first transition from water abundance to a condition of water scarcity unleashes a number of critically important dynamics in a hydropolitical sense. The most notable of these is the formulation of the hydraulic mission of the state with its *raison d'être* the mobilisation of more water. Platt (1999) refers to this as the phase of 'heroic engineering'. Reisner (1993) refers to it as the era of performing 'hydraulic miracles', while Swyngedouw (1999) refers to the 'production of nature' or the creation of 'hybrids'. For the purposes of this chapter, it is called the 'supply-side phase'of water management that sees engineers become the dominant discursive élite with a clearly defined, sanctioned discourse that is centred on the basic paradigm of getting more water from increasingly distant sources to satisfy thirsty consumers. The work of these engineers becomes extremely important as, in essence, the foundation of stable long-term economic growth and prosperity (along with the associated social and political ramifications) rests on their shoulders.

Interesting things happen in a hydropolitical context during the supply-side phase of water management. Some seem to be universal as evidence of their existence can also be found elsewhere in the world.

The era of the engineer arrives with gusto. There is no end to their ingenuity. Starting off with simple dams, pipelines and water treatment plants, their skills develop in direct response to the levels of complexity encountered. There are two important aspects of this that are relevant to an understanding of the hydrosocial contract. Firstly, with their basic grounding in Newtonian physics, no problem is insoluble. Because all problems are presented in terms of a definite paradigm – how to get more water from increasingly distant sources – typically, no alternatives to this type of solution are considered. This gives rise to a strongly articulated sanctioned discourse that is reflected in the institutional

settings from which the engineers function. It also reveals itself in the language of the engineer where water conservation becomes the act of taking water from a river and supplying it to an arid or semi-arid area so that the 'desert may bloom'. They also refer to 'reclaiming'land where nature has allowed it to turn into a desert.[3] This hints at the second important aspect, the fact that the philosophical base of engineering is solidly cast on the desire to control nature. This is clearly evident in the philosophical writings of Francis Bacon (1620) and his student, René Descartes (1637).

The philosophical basis of modern science, particularly Newtonian physics, is to control nature rather than to understand it. Understanding nature is tolerated in so far as it enables man ultimately to gain control. This is evident in the work of Bacon (1620) who first described new methods of inquiry into the natural sciences. In this context, Bacon said that the 'noble discoveries' can be used that will come from the new method of inquiry to "renew and enlarge the power of the human race itself over the Universe" (Kitchen 1855:129). Bacon's thesis was supported by the subsequent work of Descartes (1637):

> "[I] saw that one may reach conclusions of great usefulness in life, an[d] discover a practical philosophy [the natural sciences] … which would show us the energy and action of fire, air, and stars, the heavens, and all other bodies in our environment and [we] could apply them … *and thus make ourselves masters an[d] owners of nature*" (Anscombe & Geach 1954:46; emphasis added).

The focus on the control of nature is still relevant today in the natural sciences and is particularly manifest in hydraulic engineering. An example can be found in the Royal Charter of the (UK) Institute of Civil Engineers (ICE), which aims at:

> "promoting the acquisition of that species of knowledge, which constitutes the profession of a Civil Engineer, being the art of directing the great sources of power in Nature for the use and convenience of Man" (Wright 2000).

This philosophical foundation affects the way people construct knowledge, which in turn impacts on the way they interpret information (Turton 1999f). This has urged social theorists like Giddens (1984:335) to conclude that there are social barriers to the reception of scientific ideas and provable truths. This strong philosophical basis underpins almost all supply-side management in the water sector.

Engineers can move water from anywhere to anywhere, provided that two necessary preconditions are met:[4]

- There must be enough money available to finance these increasingly complex projects.
- There must be sufficient energy available to move the water.

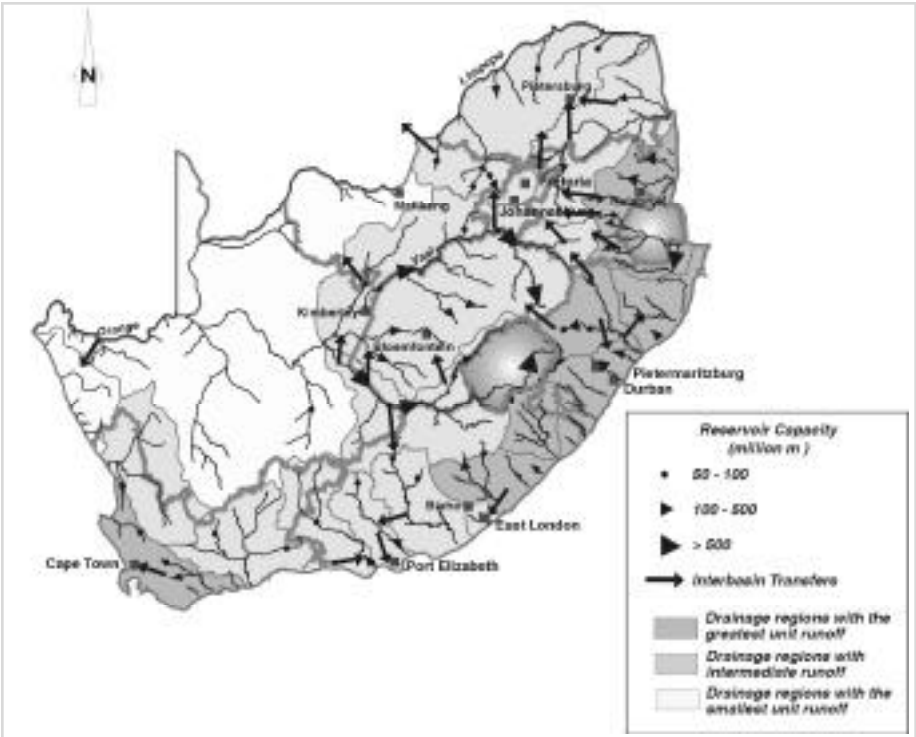
The problems of supply-side management, however, become increasingly complex. Water supply to the Witwatersrand grew by a steady 5% per annum for 80 years in order to keep pace with the growth of mining and industry in the area. To sustain this growth, RWB in conjunction with the Department of Water Affairs and Forestry (DWAF) extended its search for water sources over great distances (Bath 1999). As a consequence, some of these interbasin transfers (IBTs) are the largest in the world (Abrams 1996:2). In the case of the Witwatersrand, water is moved from a variety of sources into the Vaal Dam. Most of the augmentation comes in the form of IBTs where water from another river basin is harnessed and stored in a dam, then to be transferred through a watershed and discharged into an adjacent basin where it is allowed to flow according to gravity. A glance at figure



1 is most illuminating in this regard. This map shows the existence of major existing dams and IBTs in South Africa in the late 1990s (Basson et al 1997). In the case of the Vaal River system, the shortfall is augmented by the Tugela-Vaal, Buffalo-Vaal, Assegaai-Vaal and the Usuthu-Vaal transfer schemes (Basson et al 1997:49). What is missing from this map is the Lesotho Highlands Water Project (LHWP) as this was not completed at the time the map was drawn. What is today known as the Vaal River system consists of the above five IBTs augmenting supply to the Vaal, as well as the Vaal-Olifants and Vaal-Crocodile transfers, which are shown on the map. Should these schemes be insufficient for the needs of Gauteng, then three other alternatives are currently under consideration (Basson et al 1997:50). These are the Thukela Water Project; additional transfers from the Orange, either in the form of Phase 2 of the LHWP, or via a canal on South African soil;[5] and transfer of water from the Mzimvubu River via either the Thukela or Orange, to the Vaal. The elaborate nature of these schemes are illustrated in figure 5.

It is evident from these schemes that the problems of water supply to the Witwatersrand (Gauteng) are becoming increasingly complex and costly. Cost in this sense is used in terms

*Figure 1: Major dams and interbasin transfers in South Africa*




Source: Basson et al 1997:9. The Lesotho Highlands Water Project is not shown, as it was not yet operational when the map was drawn, although the Katse Dam is shown.

of both funding and environmental degradation. It is this increased cost that holds the key to understanding the next critical transition in the hydrosocial contract. This occurs when the condition of water scarcity gives way to a prevailing condition of water deficit. This so-called 'second transition'is important for a number of reasons.

The second transition coincides roughly with the birth of a new social consciousness. This is usually in the form of environmentalism, triggered by the increasing costs in ecological terms of the continued quest to mobilise more water. This certainly happened in the US where the Sierra Club became one of the early sources of anti-dam lobbying. This subsequently grew into a sophisticated set of NGOs such as the International Rivers Network (IRN). In the case of South Africa, a plethora of NGOs exist. Some of these derived from human rights activism during the anti-apartheid struggle, whereas others are more directly related to environmental issues.[6] Many of these NGOs have a strong international presence. These NGOs include, among others, the Environmental Justice Network Forum (EJNF), Earth Life Africa (ELA), Southern African Rivers Association (SARA), International Rivers Network (IRN), Group for Environmental Monitoring (GEM), MVULA Trust and the Environmental Monitoring Group (EMG).

This new social conscience is encapsulated in an emerging civil society that starts to act as a strong counterforce to government hegemony over the sanctioned discourse. In short, this civil society begins to challenge the prevailing sanctioned discourse, and starts to suggest that an alternative to supply must be considered. This can be considered to be the birth of the demand-side management phase of water management, which has as one of its components, the issue of equity.[7]

In the case of South Africa, the second transition coincided with a period of far-reaching political changes. Political conditions in South Africa, during the period before 1994, dictated that water management and supply had to be done in an inequitable fashion. Agriculture, for instance, received the bulk of the water supply, even in the Witwatersrand area, with farmers paying relatively little for the water abstracted from rivers and aquifers. Significantly, the commercial agricultural sector, consisting mainly of white Afrikaans-speaking farmers, was a significant constituency of the National Party (NP) government. At the same time, the bulk of South Africa's black population, especially those living in the rural areas, had limited and inadequate access to water resources. This changed dramatically after 1991, when a new political dispensation was negotiated at the Convention for a Democratic South Africa (CODESA), paving the way for the drafting of the new South African Constitution (Esman 1991:107). The change of government from a white minority controlled oligarchy to majority democratic rule was relatively peacefully transacted as a result of this negotiated transition. This political change transformed many aspects of life in South Africa, with municipal governance being no exception. The new Water Services Act (108/1997) placed the responsibility firmly on municipalities to provide water and sanitation services (Bath 1999) to all their citizens. Municipal boundaries were also redrawn to integrate the previously advantaged with the historically disadvantaged communities, some of which lived in close proximity to one another, but subject to different tax bases and municipal governance, and hence displaying major disparities in service delivery.

The policy basis and resultant functions of the DWAF prior to the second transition were focused jointly on water resource management and the aggressive development of water resources.[8] This included the management of larger catchments, the administration of



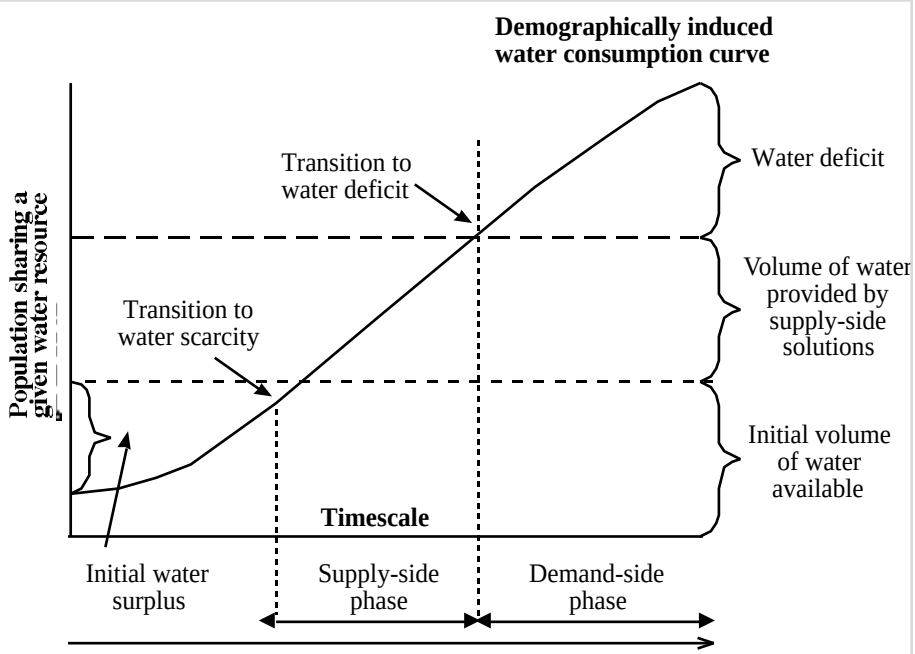
government water control areas, the supply of bulk untreated water to utilities such as RWB, water quality management and the administration of the Water Act (54/1956). Significantly, the DWAF did not regard itself as being responsible for ensuring that all citizens had a supply of water, and it had no political mandate for this responsibility. This is a manifestation of the institutionalisation of resource capture that had occurred throughout most of the 20$^{th}$ century. Furthermore, the country had been divided from the 1960s into nominally independent so-called 'homelands' or Bantustans as a consequence of the apartheid policies of the minority government, and the DWAF had no jurisdiction in these areas. The Bantustans were generally located in more arid and resource-poor portions of the country. Authors such as Homer-Dixon and Percival (1996) interpret this as a manifestation of the ecological marginalisation that was a consequence of the long-term and systematic resource capture strategies that the minority government had institutionalised during the apartheid era. By 1994, approximately 75% of the population lived on 13% of the land (Abrams 1996), mostly in the Bantustans, with far-reaching consequences. Not only are there an estimated 12 to 14 million people without any access to potable water, with a staggering 20 million lacking adequate sanitation services (Rowlston 2000), but there are also serious environmental effects as a result of poverty that impact on the water resource base of South Africa. These include deforestation, desiccation, widespread diffuse pollution, invasive species of exotic vegetation (Rowntree 1999; Van Wilgen et al 1999; Enright 1999) and other factors that together result in reduced aquifer recharge, increased siltation of impoundments and the increased risk of periodic flooding[9] (Abrams 1996). It was against this socio-economic setting that the second transition took place in South Africa.

These facts underlie the development of a basic model that shows the development of the water supply situation in an area such as the Witwatersrand. This is presented in figure 2 that depicts water consumption over time. Because water consumption is largely demographically induced, the curve is called the 'demographically induced water consumption curve' (DIWCC). This curve grows through three distinct trajectories. During the initial period of water abundance, the curve is relatively flat at first, but then starts to rise as the influx of people causes a rapid increase in water demand. The DIWCC then crosses the first transition from water abundance to water scarcity. In the Witwatersrand area, this occurred between 1886 and 1903. This phase sees a steady increase in demand as the population grows. In the Witwatersrand case, the population grew from approximately 10 000 in 1887, to around 10 million people to whom the RWB supplied water in 1999 (Bath 1999). The second transition to water deficit sees a change in trajectory again, with the early post-transition phase displaying a steep growth, followed by a gradual flattening of the curve as water demand management strategies start to impact on consumption patterns. This is not yet evident in the Witwatersrand case, so its existence remains purely hypothetical. This is the basic model from which the changing nature of the hydrosocial contract can be analysed in greater detail.

## Towards an enhanced understanding of the hydrosocial contract

Armed with the simplified model presented in figure 2, the hydrosocial contract can be analysed with particular emphasis on the way it changes over time. When first confronted with this model, two distinct phases of the hydrosocial contract seemed to be apparent.

*Figure 2: Simplified model of transition from supply-side phase to demand-side management phase in a political economy*




Source: Turton, 1999.

The 'first transition'seems to centre on five basic issues:

- At this time, individuals are no longer able to supply their own water needs, and thus look to the state.
- The state generally responds by creating a structure that could meet the needs of the people. In the case of the Witwatersrand, the state responded by creating a statutory body, the RWB, in 1903. This sees the birth of the hydraulic mission with the core aim of mobilising water and developing a reliable source of supply.
- Individuals are alienated from the source of supply, as the mobilisation, treatment, distribution and protection of water become somebody else's responsibility. The relationship between people and water undergoes a fundamental shift at this time.
- The commodification of water sees the emergence of a newly sanctioned discourse, dominated by engineers as the discursive élite, united by one overarching paradigm that is based on Newtonian physics and underpinned by Baconian and Descartean philosophy. This combination of reductionism with the desire to control nature becomes the norm.
- A process of the defeminisation of water resource management begins at this time.[10]

At the first transition, the supply of water is thus left in the hands of an exclusive group of individuals who are remarkably good at solving problems. This cadre of discursive élite



has many common features also found elsewhere in the world. For example, the birth of the American hydraulic mission as an official bureaucratic entity can be traced back to the Land Reclamation Act, which was signed by Roosevelt on 17 June 1902 (Reisner 1993:112). This hydraulic mission sought to have all of the water 'conserved'by damming and piping it in order to 'make the desert bloom'. Reisner (1993:114) notes that:

> "the engineers who staffed the Reclamation Service [at the time] tended to view themselves as a Godlike class performing hydraulic miracles for grateful simpletons who were content to sit in the desert and raise fruit."

The Spanish hydraulic mission consisted "mainly of 'restoring' the 'perturbed' equilibrium of the erratic hydrological cycles in Spain", with the Spanish Corps of Engineers being highly élitist, intellectualist, 'high cultured', male-dominated, socially homogenous and exclusive (Mateu Belles 1995, in Swyngedouw 1999a).

This implies that the hydrosocial contract is initially one in which unequal power relations exist. The socio-political setting in which the hydrosocial contract is born thus becomes important, because the power relations that are present within this broader setting are the primary determinants of the outcome of this hydrosocial contract. Two forms of power inequality can be isolated at the first transition, both of which are particularly relevant to the South African case study:

- The two parties to the hydrosocial contract – the individual and the state – are far from being equal in power and capability. This inequality becomes patently manifest in the functioning of the discursive élite and the emergence of the dominant sanctioned discourse that is focused on the continued augmentation of supply.
- Access to and control over water become key gatekeeping functions in society, because the first transition is about mobilising water under conditions of scarcity (Turton 2000b).

In South Africa, which had a political system at the time that was based on a rationale that can best be described as cultural Darwinism, a racially defined political élite gained hegemonic control over the balance of hydropolitical privilege in society. By this is meant that the allocation of water in society became a crucial element in determining the relative economic advantage enjoyed by individuals or social groups. It could be argued that water allocation was the result of existing financial and political inequality, but evidence shows that water misallocation was also the cause of continued and increasing inequality. When expressed in racial (and gender) terms, this meant that the white minority gained access to the key decision-making structures,[11] which meant that the balance of privilege in society started to manifest itself in the form of unequal access to clean water and sanitation services in hydropolitical terms. This is in keeping with the concept of resource capture, and is an excellent example of how resource capture and ecological marginalisation function in the water sector. From this it can be hypothesised that, under conditions of water scarcity, access to and control over these resources determine wealth and prosperity, and as such can be used as a powerful form of political control, as happened in South Africa under apartheid rule (Turton 2000b).

In terms of political science theory, the similarity is clear between the form of hydrosocial contract that occurred during this first transition and the social contract that was proposed by the classic contract theorist, Thomas Hobbes (1651). Hobbesian thinking was based on the assumption that the state of nature was brutish and anarchic, thus the

need was expressed to create an all-pervasive state through a social contract. This type of social contract would involve people transferring all their rights, except the right to life, to such a sovereign power (Frost 1991:249) or government. This 'super government'– the Leviathan – had absolute power. As Tuck (1990:106) notes, this sinister image symbolises a ruthless and all-powerful state. In substance, Hobbesian theory amounted to the identification of government with force, at least in the sense that force must always be present in the background whether it is applied or not. It is this aspect that promoted the isolation and definition of the *pouvoir* and *puissance* forms of power that exist in a hydropolitical sense (Turton 2000b), particularly in relation to the decision to build pipelines to alleviate water scarcity. As Hobbes (1651) noted in chapter 17 of *Leviathan*:

> "Covenants, without the sword, are but words, and of no strength to secure man at all. The bonds of words are too weak to bridle men's ambition, avarice, anger, and other passions, without the fear of some coercive power" (Sabine 1961:468).

To this end, Hobbes retained the ancient device of a contract, though he carefully excluded the implication of a contract binding on the ruler, describing it instead as "a covenant between individuals by which all resign self-help and subject themselves to a sovereign" (Sabine 1961:468). The essence of this was to presume the existence of two separate contracts: one by which the community itself was produced and that bound its members to one another, and one between the community thus formed, and its governing officials (Sabine 1961:431).

The fact that the Hobbesian contract "excluded the implication of a contract binding on the ruler" is of crucial importance in the water sector, as this hints at the non-existence of any form of alternative authority against which state-initiated actions can be checked or balanced. Because the first transition of the hydrosocial contract is the genesis of the hydraulic mission, the technocratic élite at the time do what they do increasingly well – mobilising water from ever-distant sources – but without taking the changing public opinion into consideration.[12] As the supply-side problems become more complex, and as the technocratic élite gain experience, they become increasingly important to the state. In effect, the state would cease to function and anarchy would prevail if the technocratic élite did not perform 'hydraulic miracles'. In effect, the stability of the state becomes a function of the ability of these engineers to solve problems continually. As such, two distinct changes occur among hydraulic engineers after the first transition. Firstly, they become increasingly protected by the state, and as such start to become instruments of the state by enacting political decisions, either wittingly or unwittingly. Secondly, they become increasingly élitist and distant from mainstream society, ultimately losing touch with changing groundswells of grassroots opinion.

These two factors are extremely important in terms of understanding the hydrosocial contract, because they contain the seeds of the eventual demise of hydraulic engineers as the sole discursive élite in society. In this regard, Gleick (1998:15) provides an interesting insight into what happened in the US:

> "The environmental movement in the United States was … *stimulated in the 1960s by the apparent unwillingness of the federal dam builders to recognize any environmental values of wild rivers* and their various proposals to build several particularly large and damaging reservoirs. In one of the most astounding proposals of all, the US government announced plans in the 1960s to build a series of massive dams in the Grand Canyon, one of the most important national symbols of America. These dams provoked such an enormous outcry of dismay from environmental groups – and then from the broad American public itself – that the plans were halted: the first time such a major project had been stopped. Many conservationists believe that the successful battle to stop dams, and the Grand Canyon dams in particular, led to the modern conservation movement in the United States" (Gleick 1998:15; emphasis added).



The quotation above hints at the existence of a technocratic élite, who had enjoyed such hegemonic control of the sanctioned discourse for a time, that they had finally lost touch with the normative basis of a changing society. In other words, the hydrosocial contract of the Hobbesian type, which seemed to exist in the US as well, was being challenged and the so-called 'second transition'had commenced. Significantly, the notion of wild and untamed rivers that have an intrinsic value when left unregulated, starts to enter the discourse at this time. This is contrary to the sanctioned discourse that is informed by the Baconian/Descartean philosophical principles of controlling nature. As such, the appearance of this component in the changing hydropolitical discourse provides a valuable indicator to the analyst.

The beginning of the demise of the supply-side phase in the US was heralded by the birth of the ecology movement in the 1960s. David Brower, the Executive Director of the Sierra Club, succeeded in denying funds to build the Echo Park Dam, even though the Club was forced to compromise at the time. In order to save Echo Park from inundation, the Sierra Club had to agree to leave the Glen Canyon Dam project unchallenged (Reisner 1993:284). This unleashed a powerful response as history has subsequently revealed. Brower, in his foreword to a book on the Sierra Club, entitled *The place no one knew*, wrote that:

> "Glen Canyon died in 1963, and I was partly responsible for its needless death. So were you. Neither you, nor I, nor anyone else, knew it well enough to insist that at all costs it should endure" (Reisner 1993:285).

This event mobilised considerable public support. The American social conscience was officially born and the hegemonic control over the sanctioned discourse by the engineering discursive élite was challenged for the first time (Turton 1999f). The notion of wild and untamed rivers as a central rallying point for public opinion is clearly evident in this case.

The above example suggests that the second transition needs some form of trigger event to set it in motion. In the case of South Africa, this trigger event took the form of the first democratic elections of 1994.[13] Prior to the elections, the state had total control over every facet of South African life. In the South African water sector, this meant that the balance of hydropolitical privilege became grossly skewed over time in favour of the white minority. In fact, at the time of the democratic transition, there were no less than 109 different water-related laws. Of these laws, at least 26 dealt directly with irrigation, with 25 of them promulgated between 1914 and 1965. Most irrigation projects were for the exclusive benefit of white, and in particular Afrikaner, commercial farmers. Only one act focusing purely on irrigation-related matters was passed after 1965, the Irrigation Districts Adjustment Amendment Act (34/1978). White hegemony had been firmly established by the mid-1960s and almost all of the irrigation land that could be appropriated had been appropriated by that

time. In short, resource capture, first of land and then of water, had been institutionalised by the mid-1960s, and all subsequent legislation was merely meant to tie up loose ends. This institutionalised resource capture became one of the cornerstones of apartheid strategy, but oddly enough is seldom written about by political scientists and analysts.

Central to the second transition of the hydrosocial contract in South Africa was the democratic transformation of the 1990s, with the Constitution (Act 108/1996) becoming the foundation of all future legislation. The Constitution includes a Bill of Rights that contains two paragraphs of importance to an understanding of the changing nature of the hydrosocial contract in South Africa. Paragraph 24 of chapter 2 states that everyone has the right to an environment that is not harmful to their health or well-being. Furthermore, everyone has the right to have the environment protected for the well-being of present and future generations through reasonable legislative measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development while promoting justifiable socio-economic development (Constitution 1996:11). Paragraph 27 of chapter 2 states clearly that everyone has the right to have access to sufficient food and water, with the state being given the legislative responsibility for achieving the progressive realisation of these rights (Constitution 1996:13).[14] This is relevant against the background that water is the highest priority of rural citizens, who constitute approximately half of the total population of South Africa (Abrams 1996). In fact, government can be sued for non-delivery in terms of the constitutional requirements noted above, which means that this issue is indeed being taken very seriously. The legacy of resource capture and its resultant ecological marginalisation thus impacts heavily on the water sector, leaving it a highly politicised environment.

The early development of the National Water Act (36/1998) was based on the White Paper on National Water Policy launched in April 1997. The white paper was the result of wide public participation that commenced a year or two previously.[15] In order to facilitate the public participation process, a discussion document entitled *Water law principles* was made available to the public and all interested roleplayers (DWAF 1996a). The document introduced a number of basic principles that subsequently became enshrined in the National Water Act (36/1998) in some form or other. This was a unique process for two fundamental reasons:

- The process was all-inclusive and deliberately sought to incorporate all South Africans in the act of drafting a law that would alter the balance of hydropolitical privilege in society forever, and in a peaceful way.
- These basic principles developed a conceptual framework that structured the public debate. These principles were far-reaching and were also designed to alter the balance of hydropolitical privilege in society in a fundamental and irreversible way.

Arguably the most important of these new principles are the following:

All water, irrespective of where it occurred in the hydrological cycle, is regarded as a common resource, of which the use should be subject to national control. This discarded the principle of riparian rights and the notion of ownership of water by virtue of existing land rights. In this regard, it must be remembered that, after years of apartheid rule, the white minority owned the majority of the land, and land ownership often included water rights. As such, water rights were divorced from land ownership rights for the first time in modern South African history, and the notion of water rights was abolished.



The only water that is protected by legally enforceable right is that which came to be known as the 'reserve'.[16] The reserve consists of two distinct sub-components. Firstly, the volume of water needed to maintain basic aquatic ecosystem functioning was referred to as the 'resource base'. This meant that for the first time in South African history, the aquatic ecosystem was legally entitled to the use of its own water, and this was protected by right. Secondly, it consists of the volume of water that fulfils 'basic human needs', which is calculated at 25 litres per person per day where no other forms of piped water are available.

After a lengthy public debate on the white paper, the National Water Act (36/1998) was signed into law, completely repealing 108 existing laws, and one partially. The partially repealed legislation was the Forest Act (122/1984) of which sections 7-9 were repealed. The National Water Act (36/1998) was based on the legal concept of *res publica* that was taken to embrace three key principles – equity of access, sustainability of use, and optimal utilisation. As such, the concept of *res publica* requires the state to discharge six key functions in the water sector with the view to promote sustainability and equity for the benefit of all:

- protecting the resource base from all forms of threat;
- ensuring the equitable use of the resource in an optimal way in keeping with the public good;
- ensuring that the resource is developed in an equitable and sustainable manner;
- ensuring that the resource is managed effectively and in a way that reduces conflict;
- ensuring that the resource is conserved wherever possible; and
- ensuring that the use of the resource is controlled.

With respect to allocation mechanisms, the National Water Act (36/1998) provides for three forms. *Schedule 1 authorisations*, using the *de minimus* principle, are allocated nationwide. *General authorisations* are also made on a nationwide basis, but in terms of geographic differentiation.[17] Significantly, this covers the use of borehole water, which is a major change when compared to the old pre-democratic legislation. In this regard, assuming that the infrastructure is installed and operated by the user, there will be no infrastructure charges (NWA s56(2)(b)), but there will be a water management charge (NWA s56(2)(a); Rowlston 2000). *Licenses* are issued based on individual application.[18] These are derived from deliberative criteria including social, equity and ecological issues, and are valid for a limited period only (40 years), but are subject to review every five years. All similar users will be treated the same. Furthermore, there is a distinction between two separate pieces of water-related legislation. The National Water Act (36/1998) provides for the full hydrological cycle, including first-tier tariff structures, whereas the Water Services Act (108/1997) governs the direct service delivery under water boards,[19] including the second and third-tier government tariff structures. The basic purpose of the Water Services Act (36/1998) is to set national standards and norms for water services and tariffs; to ensure that water services are properly planned; to clarify the institutional framework for water service provision; and to promote effective water resource management and conservation (DWAF 1997A:3).

Regarding the two pieces of post-apartheid water legislation in South Africa – the National Water Act (36/1998) and the Water Services Act (108/1997) – two issues are of great importance to an understanding of the second transition of the hydrosocial contract

that occurred in South Africa. The National Water Act (36/1998) is consensus-based, with the minister being legally unable to make unilateral decisions without involving all roleplayers. What power is placed in the hands of the minister and the department, is still subject to a counterbalance in the form of parliamentary review.[20] This is enshrined in chapter 11, sections 71 and 75 of the Water Services Act (DWAF 1997A:4).

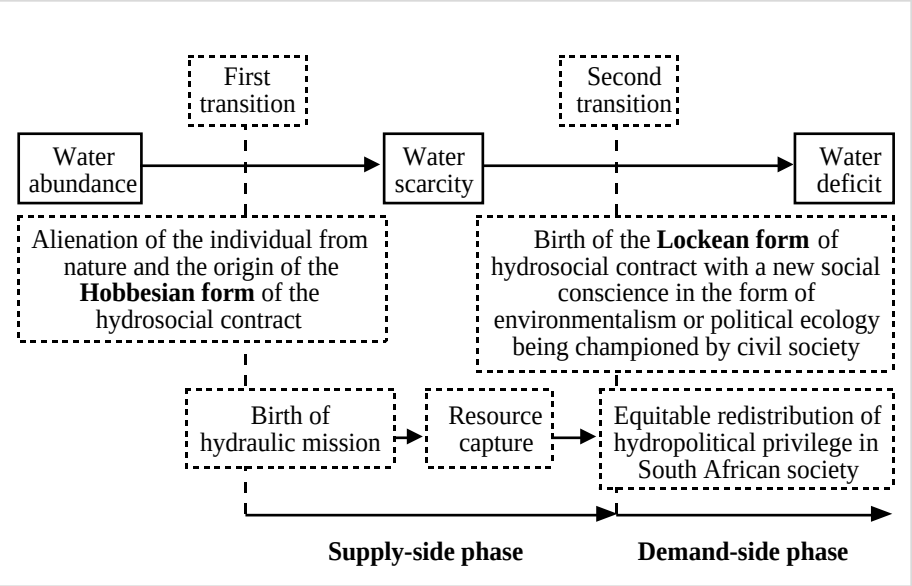
Significantly, there is substantial involvement by civil society in contemporary South Africa. One of the NGOs, Mvula Trust, has become a major vehicle of service delivery, particularly in rural and previously marginalised areas. Other NGOs are actively agitating for the implementation of water demand management (WDM) strategies as an alternative to continued augmentation of supply.[21] It is anticipated that the debate in this regard will centre on the impending decision either to proceed with Phase II of the LHWP, or alternatively to implement the Thukela Water Project (TWP). An analysis of these hydropolitical interactions will enable an understanding of the hydrosocial contract's further development. Furthermore, SARA, an NGO that is particularly active in the TWP case, is calling for the promulgation of a National Wild and Scenic Rivers Act in a bid to counter the uncontrolled expansion of large IBTs (Turton & Meissner 2000).

Having noted these fundamental changes in the way that hydropolitical privilege is determined in post-apartheid democratic South Africa, the similarities with the Lockean form of contract theory also become clear. John Locke paid much attention to the contract theory that was emerging at the time, and in particular provided a critique of the Hobbesian form of philosophy. In his work, *Two treatises of civil government* (1690), Locke articulated the idea that political power exists and is only exercised for the public good. The basis of government, according to him, is consent and the powers that are wielded by government officials are founded upon the nature of trust (Dunn 1990:115) between government and those being governed, therefore being liable to forfeiture if the conditions of this trust are not fulfilled (Carpenter 1970:v). As such, what Locke proposed was a government by consent, where the individual retained what was defined as 'natural rights'. Significantly, it is these natural rights that are retained by the individual[22] that form a balance against the so-called 'just power' of the government (Carpenter 1970:xiii). The rulers are therefore merely the trustees of the people who have delegated their individual powers to government.[23]

The notion that the inalienable rights of the individual form the basis of all rightful government is fundamental to Lockean thinking (Carpenter 1970:xiv). Thus, Locke conceives of democracy as a spirit rather than as a form of government, being compatible with a variety of institutions, so long as it is recognised that the rulers are merely the trustees of the people who have individually delegated their power to them. In essence, what the *Two treatises of civil government* attempts to do is to explain what government power is for, how far it may legitimately be extended, and who may do what to check if government arbitrarily chooses to extend this power further (Dunn 1990:113). This ultimately became the philosophical basis of all written democratic constitutions (Carpenter 1970:xv), including that of the US. Within the context of the hydrosocial contract, however, the most significant component of Lockean thinking is the notion of civil society as a fundamental component of the checks and balances needed to counter the absolutism, which resulted from the Hobbesian form of hydrosocial contract.



*Figure 3: Schematic representation of the two transition periods that are relevant to the development of the hydrosocial contract*




This helps to develop the notion of the hydrosocial contract a little further. Figure 3 shows a schematic rendition of the two transitions. Initial water abundance gives way to water scarcity as the result of some form of trigger event. In the case of South Africa, the trigger was the discovery of gold on the Witwatersrand. This meant that individuals looked to government to provide in their basic needs such as water supply and sanitation, and government responded accordingly.

This first transition, which in South Africa occurred between 1886 and 1903, saw the creation of a Hobbesian form of hydrosocial contract, where increased government involvement was seen to be better. Under such circumstances, the hydraulic mission was born. Central to this mission was getting more water, hence the historic origin of the supply-side phase of water management. Hydraulic engineers became the discursive élite and controlled the sanctioned discourse in a rather hegemonic way in keeping with the Hobbesian model. Superimposed onto this was the dominant political thinking of the time, which was based on some form of cultural Darwinism that introduced notions of superiority and inferiority into the hydropolitical equation. This split occurred along racial lines, with whites being given the overwhelming balance of hydropolitical privilege over time.[24] This saw the institutionalisation of resource capture that, in turn, became the genesis of social instability. Political activism resulted with a loose correlation between the degree of activism and the extent of resource capture. One element of this political activism was the birth of civil society, initially to champion the cause of the oppressed.

The second transition occurred when oligarchic rule gave way to democracy in 1994. With this historic event, the balance of hydropolitical privilege within South African

society was redistributed albeit through a negotiated instrument. Significantly, Locke (1690) stated that it is through an elected assembly that each new generation can alter the laws that it has inherited, thereby renewing public consent to the laws which it chooses to retain (Dunn 1990:115). The rejection of all the South African water laws of the past should be seen in this light. The Lockean form of hydrosocial contract arose, with the new water legislation reflecting fundamental characteristics of its philosophical rationale. The discursive élite changed with economists, environmentalists and social scientists all challenging the hegemonic status of engineers, thus leading to a new form of discourse and ending the purely supply-side phase of water resource management. Government shrank, and 'less'became better. In order to fill the vacuum left by shrinking government, a bifurcation occurred. On the one hand, civil society in the form of NGOs became a permanent part of the hydropolitical landscape, whereas the privatisation of water utilities, on the other hand, was considered as a viable option (but with consequences beyond the scope of this chapter).

## The impact of the second transition on South African water consumption

Figure 3 refers to the equitable redistribution of hydropolitical privilege in South African society as a form of counterbalance to the long-term effects of institutionalised resource capture. Equity is a contested issue, however, and it is no different in this case. Because it would have been too politically damaging to reduce water allocations to the historically advantaged South Africans, a tacit decision was made to extend the same level of privilege to historically disadvantaged communities. In other words, rather than to reduce the slice of the pie that the hydropolitically privileged would enjoy and give this away, the redistributive process seems to have been developed on a rationale akin to making the pie larger instead.[25] This means that the historically privileged will not have to face the consequences of reduced water availability, at least in the short-term. It is an erroneous assumption, of course, as water resources are unfortunately finite, and as the data set shows, rapidly approaching the point of full mobilisation. However, this is not unique to South Africa. In this regard, Allan (2000) notes:

> "Politicians faced with the challenge of reallocating limited water resources always construct the idea that there is more water than there actually is. This is because it is easier to get people to believe that there is more water than to get them to give up water. The case studies confirming this are numerous in the Middle East North Africa (MENA) region, and now it is manifest in South Africa too. It also has an international dimension when riparian countries are in contention. Although in the international case the upstream riparian may be tempted to conjure a lower volume for availability in that this means there will be a smaller share allocated downstream."

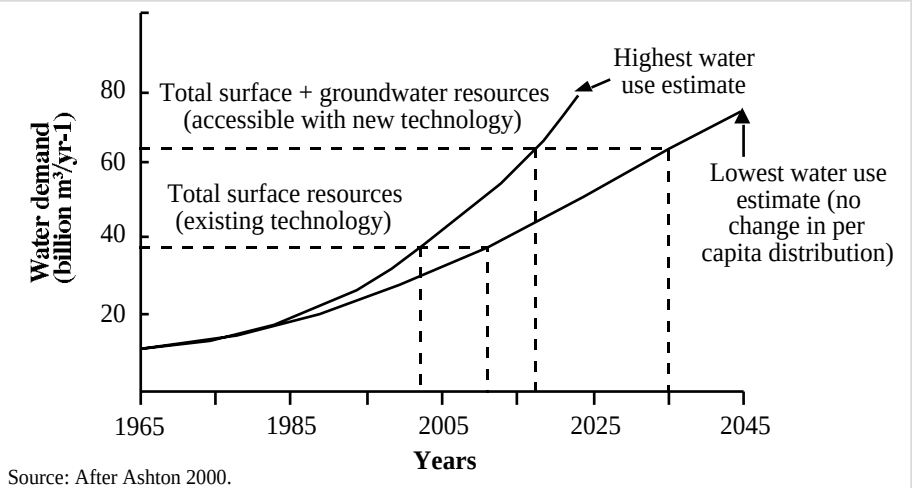
From this it can be deduced that an almost universal element of hydropolitics is the construction of knowledge, particularly regarding numbers or volumes, almost always leading to the fact that data becomes contested. It is therefore illuminating to see what impact this has had on water consumption patterns. Figure 4 shows the rather dramatic effects of this redistribution.

The highest water use estimate is the result of the reversal of apartheid-induced resource capture. By redistributing the balance of hydropolitical privilege in South African



society in a more equitable way, a dramatic increase in water demand is occurring. Should the high water use trajectory be maintained, then all surface water resources will be appropriated by around 2003, with the total known surface and groundwater resources being fully harnessed by around 2017.[26] The democratically elected government is thus sitting on the proverbial horns of a dilemma. If government meets public aspirations in the short term, the risk of environmental collapse is thus very real, despite the legal protection of aquatic ecosystems by means of the 'reserve'. This is relevant in light of the fact that the highest priority for almost all rural citizens, constituting half of the total population, is water supply and sanitation (Abrams 1996). If government chooses instead to avoid the consequences of environmental collapse, it runs the risk of alienating voter support in the medium term.

*Figure 4: The water supply dilemma in South Africa*



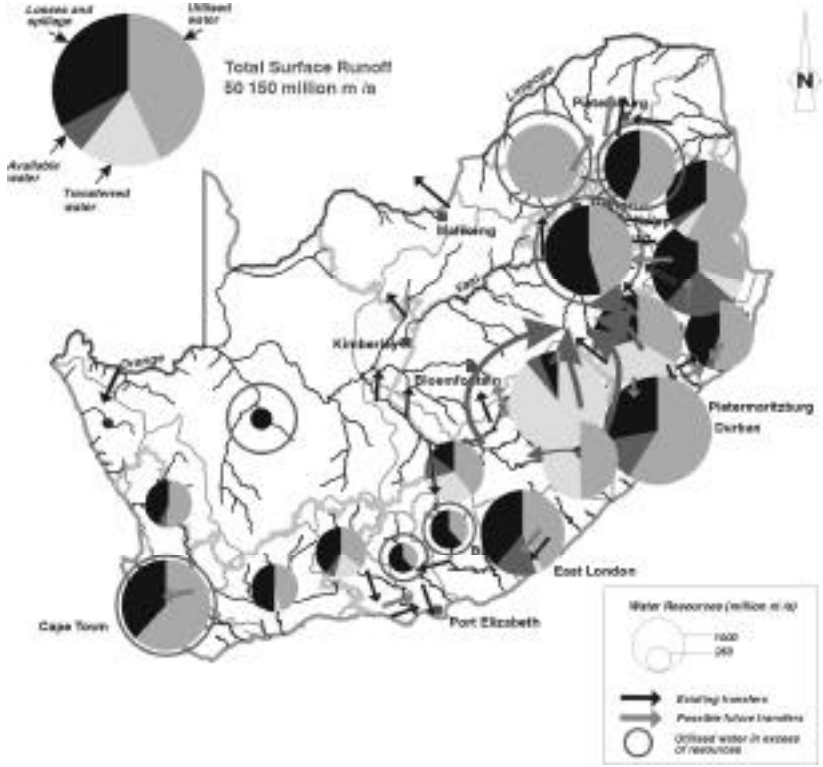

Source: After Ashton 2000.

Planning for the DWAF that was concluded in 1996/7 supports this rather alarming data set. Figure 5 is a reproduction of one of the possible DWAF scenarios for future South African surface water use in 2030. This planning is currently under consideration with the development of a new National Water Resource Strategy (NWRS) as required by the National Water Act (36/1998) (DWAF 2000). The official view may therefore change, but it certainly presents a picture worthy of concern.

Attention is drawn to the existence of major IBTs in this scenario, the vast majority of which focus on augmenting water supply to the Witwatersrand (Gauteng) area, and from there on to the drier northern reaches of South Africa. It should also be noted that seven of the important hubs, ranging from Cape Town in the south through to Gauteng and Pietersburg in the north, are designated as having water utilisation in future beyond locally available supply (refer to figure 1 for a comparison). This represents a classic example of water scarcity as defined at the beginning of this chapter. In fact, the overall situation at the national level is clearly one of water deficit, with sustainability being a key issue. The

figure representing the Lesotho Highlands and Thukela River Basin is particularly revealing in that virtually all of this water will be transferred outside of those basins. This can be regarded as being a classic case of resource capture. This implies that a real upper limit exists in those basins in terms of using their own water for future economic growth. The Inkomati and Maputo River systems are also characterised by significant transfers in this scenario, focusing attention on interstate relations between South Africa, Swaziland and Mozambique in future. This suggests the development of what has been defined as a 'hydropolitical security complex'[27] (Schulz 1995:97) in Southern Africa, as water allocation in these basins starts to reach its sustainable limit. The legal requirement under the National Water Act (36/1998), which prioritises water designated in terms of international agreements with riparian states above that of domestic consumption, will be severely tested under these conditions. Institutions and regimes will have to be robust in order to live up to these rigours.

*Figure 5: One scenario for the future utilisation of surface water resources in South Africa in 2030*




Source: Basson et al 1997:62.



The potential effects on the hydrosocial contract are not known. It can be speculated that the Hobbesian form could again come into effect, with its inherent resource capture rationale and repressive nature. One effect may well be the gradual discarding of the environmental 'reserve', which would also be a regressive step. This would be most unfortunate indeed. A viable solution seems to be the shift in policy away from national self-sufficiency in food towards food security, with reliance on the trade in 'virtual water' to balance out the national water budget. This is already recognised at DWAF level (Basson et al 1997:67) and is actively being promoted by some researchers (Turton, 2000b) and NGOs (Turton, Moodley, Goldblatt & Meissner 2000). The role of civil society in developing this discourse further will thus become increasingly important. The problem remains complex, however, deserving of ongoing research, preferably in a multidisciplinary manner.

## The hydrosocial contract in a global context

The South African transition did not take place in a vacuum. Significant changes occurred at the international level with milestone events such as the Dublin Conference (1992), which introduced the Dublin Principles, and the Rio Summit (1992), which introduced Agenda 21, albeit via a convoluted route. The First World Water Forum was also held in Marrakech (1997) where the quest for the so-called World Water Vision was launched that was ultimately presented at the Second World Water Forum in The Hague (2000). Interestingly, the Second World Water Forum had a special session on "The social charter for water" that was encapsulated in a book with a similar title (Académie de l'eau, 2000). The content of the book reveals that an evolution of the hydrosocial contract is taking place in many different parts of the world as well, suggesting that the Hobbesian/Lockean transition may in fact be more widespread than just in South Africa:

> "The Social Charter applies the same governing principles that were put forth at several conferences on water, especially those at Dublin, Marrakech and Paris. This demonstrates its agreement with several recent declarations focussing on water, such as the Earth Charter (Sweden), the Health Charter (England), the Declaration of Madeira by the OECD, the Report on Water Ethics by UNESCO or the World Water Contract by the Lisbon Group … The purpose of the Social Charter is to promote a new policy on water for the XXI century that is *designed by the policy-makers and their experts, in partnership with the citizens,*[28] that integrates their demands in the projects and takes into account local economic imperatives" (Académie de l'eau 2000:22; emphasis added).

This Social Charter, which has been launched at the international level, contains case studies and inputs from over 50 countries, having as a core theme the notion of a balance between government, water service providers and the public. It is thus a reflection of the Lockean form of hydrosocial contract, suggesting that such a concept may be more universal than originally evident from an analysis of the South African case alone.

The Social Charter is but a smaller component of the larger World Water Vision. This vision is built around certain key issues: limiting the expansion of irrigated agriculture; increasing the productivity of water; increasing storage; *reforming water resource management institutions*; increasing co-operation in international basins; valuing

ecosystem functions and supporting innovation (Cosgrove & Rijsberman 2000:xxi). To this end, it is illuminating to note:

> "People's initiative and capacity for self-reliance *need to be put at the centre of planning and action for water* supply and sanitation. Doing so can lead to systems that encourage genuine participation by empowering women and men, improving sustainable living conditions for all – particularly women and children"[29] (Cosgrove & Rijsberman 2000:xxiv; emphasis added).

This statement is clearly couched in the type of phraseology that has been used in this chapter. In short, the World Water Vision has as its very essence the desire to reformulate the relationship between people, water and water resource managers. As such, the vision is nothing more than the manifestation of the Lockean form of the hydrosocial contract.

## Conclusion

This chapter has sought to examine the concept of a 'hydrosocial contract'. It seems to exist in the South African case that has undergone two major phases of transition. The first transition saw the birth of a Hobbesian form of hydrosocial contract, with the emergence of a homogenous discursive élite who jealously guarded the dominant or sanctioned discourse that was strongly oriented towards the supply-side. When this was overlaid by the national political process, institutionalised resource capture was the inevitable result. A discernable second transition saw the emergence of a new form of hydrosocial contract, this time with a distinctly Lockean character. This saw the redistribution of the balance of hydropolitical privilege in South African society, the establishment of an active civil society and the move towards privatisation in the water sector. It is not known how sustainable this will be, however, as this move towards equity has altered the consumption trajectory significantly. The outcome of this trend is also not known, but it is speculated that civil society, in the form of NGOs, will increasingly place pressure on government to develop sustainable water resource policies. Two extreme cases can be envisaged. On the one hand, the gradual erosion of the Lockean form of hydrosocial contract can give rise to a distinctly Hobbesian form again, which would represent a step backwards and the entrenchment of the very driving forces of social instability that were evident under apartheid rule. On the other hand, a new relationship between government and civil society can map out a different path towards sustainability. In the event of the latter, a gradual erosion of state sovereignty can be anticipated, but this may be the price that needs to be paid in order to achieve social stability. The concept of the hydrosocial contract is thus offered in an attempt to contribute to the development of hydropolitical theory.

## Notes

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1 This has particular relevance to an understanding of water and gender. The reader is referred to Turton et al (2000b) for a deeper analysis of the so-called 'feminisation'of water as a component of the hydrosocial contract.
2 In the context of water and gender, this can be understood as being the start of the process of de-feminisation of water resource management (Turton et al 2000b).
3 This was particularly evident in American engineering circles during the 1950s. Because many engineers were sent from developing countries to be trained in the US, variations of this idea rapidly took root in other parts of the world as well.
4 There is a third precondition, but this is usually ignored by engineers during the infrastructural development phase of supply-side management. This third precondition is public support, but typically this is irrelevant during the Hobbesian form of hydrosocial contract.
5 This part of the Orange-Vaal transfer scheme would involve cascading a river backwards and thereby transferring water from the Orange River to the Vaal River sub-basin. This is a profound act of controlling nature in its own right.
6 Feminisation finds its way into the water management discourse via such special interest groups during the second transition to the Lockean form of hydrosocial contract. Refer to Turton et al (2000b) for more information.
7 Equity has many facets to it. Turton & Meissner (2000) have isolated at least five key equity-related issues. These are intergender equity; intersectoral equity; intergenerational equity (also known as sustainable development); institutional equity and international equity (between riparian states in a shared river basin). The interaction of various aspects of this discourse results in a key component of the Lockean form of hydrosocial contract.
8 This was manifest in an ambitious dam building programme (Rowlston 2000). Dr Thinus Basson (2000) refers to this as the infrastructural development phase of water resource management in South Africa.
9 The major floods of a one in 100-year magnitude that were experienced in large parts of Southern Africa during the first quarter of 2000 are an example of this.
10 There are two direct components of this early de-feminisation process (Turton et al 2000b). On one level, de-feminisation has negative connotations because it serves to marginalise women from water resource management and decision-making processes. On another level, however, it improves the quality of women's lives, as clean tap water becomes readily available, thereby relieving women of the arduous task of fetching water from relatively distant sources.
11 Water resource management became the almost exclusive domain of mostly Afrikaans-speaking, white, male engineers during the apartheid era. This started to change when Prof. Kader Asmal, in his capacity of Minister of Water Affairs and Forestry, appointed Ms Barbara Schreiner as a senior water resource manager within the DWAF, making her the first woman in the history of South Africa to occupy such a senior decision-making post.
12 Refer to note 4 above.
13 Unlike the US case, the trigger event for the second transition in South Africa was not related to environmental considerations in any way. Minister Kader Asmal's primary imperative in reviewing South African water law was to address the imbalances in water services provision – a social concern (Rowlston 2000). According to commentators who were involved in the process, it took some time before Prof. Asmal began to grasp the connection between water services provision and resource management, and a little longer to embrace the concept of sustainable utilisation, and ultimately the need for resource protection in order to achieve sustainability.
14 According to Mr Bill Rowlston (2000) of the DWAF, paragraph 27 was much more important in driving the water law review process than paragraph 24.
15 This is an interesting story in its own right, specifically within the context of the Lockean form of hydrosocial contract. Rowlston (2000) notes that if the Water Law Review Panel had had its majority way,

the 'reserve'would not have ultimately found its way into the National Water Act (36/1998). The fact that it finally prevailed in the national legislation was largely the result of Dr Carolyn (Tally) Palmer's tireless work. For her efforts, Dr Palmer won a gold medal, which was awarded to her in Swakopmund in 1999 by the Southern African Society of Aquatic Scientists (SASAQS). The National Water Act's (36/98) Resource Directed Measures involving the classification of rivers, the determination of the 'reserve' and the development of resource quality objectives, are largely founded on the inclusion of the 'reserve' in the legislation. The outcome of this is water legislation that is somewhat unique in a global context, and this in turn is the result of allowing special interest groups to become involved in the drafting of legislation. In short, this is an excellent example of the Lockean form of hydrosocial contract at work.

16 Refer to note 15 above for a history of how the 'reserve'came to be a legal concept.

17 The fact that water use authorisations can be used as source directed controls is based substantially on the fact that resource protection measures can be included as conditions in general authorisations and licenses (Rowlston 2000).

18 Technically, this is a moot point. While all licenses are applied for individually, for the most part these applications are likely to arise from invoking part 8 of chapter 4 of the National Water Act, which is a compulsory and geographically general application. This is important to note in the context of reducing overall water allocations at the national level. Compulsory license applications are specifically intended to effect reallocation in areas where demand exceeds sustainable levels of supply (Rowlston 2000).

19 This does not imply that water boards are the principal providers of water services under the Water Services Act. Local authorities are constitutionally the Water Services Authorities, and the Water Services Act makes it clear that water boards are but one Water Services Institution, with a specifically defined role of providing water services to other Water Services Institutions (WSAs29) (Rowlston 2000).

20 The parliamentary review process was introduced to preclude administrative law-making, which was perfectly possible under the older 1956 Water Act, where potentially powerful regulations were not subject to any substantial regular mandatory review process. According to Rowlston (2000), the legal requirement for public consultation is probably a more significant counterbalance to arbitrary DWAF actions, than the parliamentary review process. The National Water Act thus has two significant forms of counter-balance, making it a good example of the Lockean form of hydrosocial contract.

21 Basson (2000) notes that this may be an unrealistic aspiration. At best, according to Dr Basson, WDM measures may delay augmentation. Gilham & Haynes (2000) concur with this view.

22 The legal requirement that DWAF must be open to public consultations is an example of this.

23 In this regard, the National Water Act specifically states that the government is the trustee of the nation's water resources. It is interesting to note that NEMAhave also adopted this approach (Rowlston 2000).

24 While whites were in general privileged over their black counterparts, the water resource profession was skewed in favour of white, predominantly Afrikaans-speaking males over time. Refer to note 11 above.

25 The decision to allow existing lawful use to continue pro tem was a tacit acknowledgement that DWAF simply did not have the capacity to address all existing uses at once. In the longer term, there will be a need to reduce existing allocations, on a priority basis, under the loose banner of water stress. There are sufficient mechanisms in the National Water Act to do this. In the long term, the intention is to make the pie bigger by means of WDM, so these measures should be seen as being short-term strategies only (Rowlston 2000).

26 As with most hydropolitical issues, the data is contested. The heavy rains that fell over the entire Southern African region during the first quarter of 2000 have probably also served to stave off the inevitable for a bit longer, because they filled most large storage dams and recharged groundwater aquifers significantly. The dates should not be seen as absolutes, but can best be regarded as being one possible scenario.

27 A hydropolitical security complex is defined as including those states that are geographically part 'owners' and technically 'users'of shared rivers, and as a consequence, they all consider the rivers as a major national security issue (Schulz 1995:97). This happens under conditions of water deficit at the level of the international river basin. This condition of water deficit already exists in the Incomati, Limpopo and Maputo River Basins, and is rapidly approaching in the Orange River Basin.

28 This is a clear manifestation of the Lockean form of hydrosocial contract.

29 This is relevant to feminisation as a critical component of the changing hydrosocial contract (Turton et al 2000b).

# Chapter 4
# River basin management reconsidered

**Philippus Wester and Jeroen Warner**

## Introduction

Integrated river basin management and stakeholder participation are twin planks of a new consensus on how water should be managed. The assumptions on scale, boundaries, appropriate institutions and procedures underlying this new model are, however, not as self-evident as they seem. Rather, they are the outcome of socio-political *choices.* By presenting these choices as natural, the dominant water discourse works to depoliticise important issues of scale and voice. The apparent 'closure'in this debate is of concern, and an argument can be made for the rehabilitation of the political in water resource management – showing the realist side of the coin that, in the official literature, too easily plumps for its idealist face.

As water is essential to life and livelihood security and has multiple users and uses (use(r)s), its management readily gives rise to 'wicked' problems. Not all problems become politicised – many are handled in a routine, 'rational' fashion. Wicked problems are those that are not easily resolved through rational deliberation, as they involve alternative views based on competing perspectives and values, as well as large power disparities. They thus enter the realm of politics, understood here broadly as the process through which relations of power are constituted, negotiated, reproduced or otherwise shaped (see Mollinga 2001). Water is frequently a politically contested resource: a contest with unpredictable and unstable outcomes and diverging pathways to alternative futures (see Mehta 2000; Mollinga 2001; Mosse 1997). As a plethora of choice and controversy can be frustrating for decision makers, it is attractive for those in charge to present an outcome as unavoidable, that is, to posit a *point of no return.* This very powerful speech form could be called a 'move for closure' of the political issue. This chapter argues that such a process may be at work in river basin management, with many river basins not only heading towards closure from a water perspective, but also from a political perspective.

In the past ten years, a global water narrative has been constructed around water scarcity and an impending water crisis (most famously Gleick 1993c). This alarmist rhetoric was sanctioned at the Second World Water Forum held in The Hague in March 2000, where the growing global concern was highlighted about freshwater supplies and the complexity of the issues that must be faced for developing countries to meet future demands for water (Cosgrove & Rijsberman 2000). All around them, people are told, are the signs of a looming water crisis, consisting of droughts, waterlogging, salinisation, groundwater depletion and water pollution, threatening the world's capacity to feed itself, maintain human health and protect aquatic ecosystems.

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It has become conventional to cite water scarcity as the largest threat facing humanity in the 21st century, although there are also dissident voices suggesting it is not water scarcity *per se*, but rather the mismanagement of water that is the main problem. By creating a sense of urgency, the water scarcity discourse serves to justify a new series of water reforms and to galvanise support for these reforms. To make the transition to sustainable water management, the dominant water discourse emphasises three policy prescriptions:

- manage water on the basis of river basins;
- increase stakeholder participation in water management; and
- treat water as an economic good.

These prescriptions, lubricated with the promise of international funding, have led many countries to initiate significant water reforms, focused on national level policies, irrigation management transfer, the privatisation of domestic water supply and the creation of new institutions for managing river basins.

However, the water scarcity narrative is both flawed and dangerous, not least because it obscures issues concerning unequal access to and control over water (Mehta 2000). It is also necessary to question which institutional constellation produces the water scarcity discourse and whose interests it serves. While freshwater supplies are clearly limited, for most people water scarcity is caused by political, technological and economic barriers that limit their access to water and by competition between water use(r)s (Falkenmark & Lundqvist 1998). Water scarcity is not a naturally occurring phenomenon, but has been created through the development of water resources in the past, the selective entitlement of water rights and incidental and structural resource capture by the better off (see Homer-Dixon & Perceval 1996).

As a result of water over-exploitation, many river basins have become 'closed'and no longer have utilisable outflows as water depletion (the use of water that renders it unavailable for further use) equals or exceeds the level of annual renewable water (Keller et al 1996; Seckler 1996). It is undeniably true that the closure of river basins results in a complex interplay among declines in water quality, intersectoral water transfers, inequitable water allocation and reduced access to water, particularly affecting poor people. Especially the transfer of water from the agricultural to the urban and industrial sectors is a substantial threat to irrigation with grave implications for social equity and agricultural productivity. Paradoxically, while more water is withdrawn and consumed than ever before in closed river basins, the dominant water discourse would have it that water scarcity is the key problem. This scarcity paradox obscures the fact that the tremendous inequality in access to and control over water and the conflicts between the different use(r)s of water lie at the heart of the need for new approaches to water management (Mehta 2000).

Although it is widely argued that existing institutional arrangements for water management are inappropriate and a major constraint for achieving sustainable water management (Cosgrove & Rijsberman 2000; Gleick 2000; Merrey 1997; Vermillion & Merrey 1998), it is necessary to question whether the reforms currently in vogue will lead to significant improvements. Emerging research results suggest that irrigation management transfer, the creation of water markets and new forums for river basin management, as well as the privatisation of domestic water supply are strengthening



inequitable patterns of access to water and concentrating water rights in the hands of multinational corporations, private sector water companies, agribusiness enterprises and wealthy farmers (Barlow 1999; Bauer 1998; Ferrier 2001; ISDC/GCI 2001; Mollinga et al 2000). What is also striking is that hydraulic bureaucracies are proving to be very creative in maintaining their construction and command-and-control orientation under the guise of apparently drastic institutional reform processes (see Espeland 1998; McCool 1994; Rap et al forthcoming; Reisner 1993).

This chapter reconsiders one of the key water reforms propagated internationally: river basin management (also termed integrated catchment management or watershed management), based on a concern that the political dimension of river basin management has not received sufficient attention. The rationale for river basin management most frequently stressed in water policy circles is that nature prescribes, or even mandates river basins as the management units for water (see Newson 1997 for a summary of the literature), thus leaving no choice. The closure of river basins from a political perspective is an issue that warrants careful consideration. In raising this issue, it is clearly not the intention to question the sincerity of the many researchers, planners and policy makers working hard to make sustainable river basin management a reality. Rather, it is hoped that it will stimulate debate and critical reflection on the 'politics'of river basin management reforms and engender a shift in policy prescriptions from a technocratic 'should' to a democratic 'could'. To open the debate, the concept of 'river basin management' is first discussed – its provenance, rise and problems.

## The problem with ri ver basin management

Although it has long been argued that the effective management of surface and groundwater requires a basin perspective, the experience with river basin authorities as action agencies (in contrast to those designed primarily to carry out studies) suggests that they are difficult to sustain (Barrows 1998). Frequently, this is attributed to the fact that political and administrative jurisdictions usually do not correspond with basin boundaries, making accommodation between different states and government agencies difficult. In recent years, nonetheless, the proponents of river basin management appear to be gaining the upper hand over the pessimists who argue that river basin management will never work. Concomitantly, the question of which types of institutional arrangements are best suited for water management in a basin context has received increasing attention. Mostert et al (1999) identify three organisational models for river basin management: the hydrological, administrative and co-ordination model.

In the hydrological model, the organisational structure for river basin management is based on hydrological boundaries, and all water development and management decisions are typically concentrated in one single agency: the river basin authority. The most famous example of this model is the Tennessee Valley Authority (TVA). The opposite of the hydrological model is the administrative model, where water management is the responsibility of states, provinces, municipalities and other bodies not based on hydrological boundaries. This model applies in most countries in the world, where water is not managed along basin lines. In the co-ordination model, which falls between the previous two models, water management is typically co-ordinated by river basin councils or co-ordinating bodies. Pioneering countries in applying this approach are France and

England, which have had functioning co-ordinating bodies at the basin level for the past 30 years (Betlem 1999; Buller 1996). More recently, Australia has joined the select list of countries reputed to have 'successful'river basin management (Chenoweth 1999; Malano et al 1999; Pigram 2000).

A more sophisticated analysis of how increasing levels of water exploitation are related to institutional changes for water management is provided by Turton and Ohlsson (2000), who argue that an important distinction exists between a "first-order scarcity of natural resources" and a "second-order scarcity of social resources". They posit that water scarcity *per se* (first-order scarcity) is not the key issue, but rather the question whether a social entity has the ability or adaptive capacity (second-order scarcity) to cope with the challenges posed by increasing water scarcity.

Based on historical examples and conceptual work, Turton and Ohlsson (2000) conclude that two institutional transitions (need to) occur as water becomes more scarce: the first transition when water abundance turns to water shortage and the second transition when water shortage turns to water scarcity. The first transition occurs when the demographically induced demand overtakes the readily available supply of water, and triggers the construction of significant hydraulic infrastructure, usually by the government, to mobilise more water. Reisner (1993) terms this transition to water supply development the birth of the hydraulic mission, embodied in a central government agency consisting of hydraulic engineers. Whereas water was controlled locally before, its development and management becomes highly centralised after the first transition.

At a given point, the supply-oriented phase runs up against a barrier: when river basins close. This is when water demand continues to outstrip supply even though all available water sources have been developed or are prohibitively expensive to develop. This induces increased competition between water use(r)s, and water scarcity reaches such a level that the exploitation limits become evident and finding the best possible use of water becomes imperative. However, making the second water transition, from supply-oriented development to water demand management, requires substantial changes in institutional arrangements for water management. Under favourable socio-economic and political conditions, this transition can be made, resulting in a stabilisation of water demand and the birth of sustainable water management. However, these transitions are not automatic and whether and how well they occur are functions of the adaptive capacity of a society.

While Ohlsson and Turton seem to suggest that the second transition is actually holding sway over the water world, there is reason to be cautious. Certainly, the discourse of participation and integrated management is promising, but the situation on the ground often tells a different story. So far, environmental turnarounds and the design of participatory decision-making structures have taken on a top-down character. It may legitimately be questioned whether the onset of an *environmental consciousness* has fundamentally changed this technocratic outlook.

Combining the findings of Mostert et al (1999) and Barrows (1998) with that of Turton and Ohlsson (2000) suggests that co-ordinating bodies at the river basin level are necessary in the demand management phase. It is fair to say that this has become received wisdom, as evidenced by its endorsement in the World Water Vision process. Although the World Commission on Water for the 21st century emphasises that there is no 'silver bullet'to solve the water crisis, it is quite adamant that river basins should be managed holistically:



> "[G]overnments should set up management agencies at the basin and aquifer levels, and international funding agencies should be willing to support and help finance the setting up and strengthening of such agencies … There must also be clarification of the decisionmaking processes within the basin organization and accountability arrangements for those making decisions. The experience of water user parliaments needs to be generalized so that all stakeholders have a voice in the decisionmaking … It is equally imperative that decisionmaking be informed and scientifically and technically sound. Effective river basin management thus walks on two legs: parliaments, where users make policies and decide on the raising and spending of money, and excellent technical agencies, which provide the parliaments and users with the raw and processed information necessary for management" (World Commission on Water for the 21st Century 2000:27-29).

Together with Australia, England and France, several middle-income countries such as Brazil, Mexico and South Africa are at the forefront of applying variations of this approach to river basin management.

On the face of it, these policy prescriptions seem to make imminent sense as a pathway to sustainable water management and perhaps even substantial poverty reduction and ecosystem restoration. So why question the soundness of the policy prescription that water should be managed on the basis of river basins, and that governments should create councils or 'water parliaments' at the basin and aquifer levels, consisting of user and government representatives, which control the activities of its executive branch, the Water Agency? Answering this question is more difficult than it seems, and entails considering what is at stake in river basin management and studying why current water reforms continue to work to the detriment of poor people. As Barham argues so eloquently:

> "History teaches that gains in human freedom and democratic self-rule have never been given but have always been won, sometimes only after long and bitter struggle. Private interests may see in the transition to watershed thinking an opportunity to close some channels of true public debate and deliberation, thereby eliminating bothersome environmental 'constraints'. And politicians may see opportunities for new avenues to power, further removed from public accountability. It is the confluence of these two sets of interests that poses the danger of 'watershed rule'. We can only be sure of avoiding this outcome by taking the time to put democratic institutions and processes in place to match new ecosystem-based levels of authority. There are difficult questions of citizenship rights and responsibilities involved in building such new institutions, and they should be carefully studied rather than avoided or glossed over" (Barham 2001:190).

A major problem with river basin management is that its political dimension has been neglected, through the reification of 'natural'boundaries, the emphasis on 'neutral'planning and participation and the search for optimal management strategies ('win-win' solutions). From a political science perspective, it becomes apparent that, at heart, the delineation and maintenance of boundaries, the mobilisation of interests and stakeholder representation, and the creation of basin-level decision-making arrangements are quintessentially political processes that revolve around matters of choice. To grasp why these insights have not received more attention in river basin management, it is necessary to consider how the dominant water discourse exerts a strong depoliticising effect (see Ferguson 1994).

## River basin management as depoliticising discourse

To understand how river basin management could have taken off so successfully without much critical reflection, it is necessary to consider how hegemonic concepts are adopted. Sustainability, development, participation and integrated water management are all concepts that sound intuitively attractive and desirable – they sound like 'good things in themselves' as they connote desirable collective goals such as equity, voice, self-realisation and a healthy environment. However, they are also facile in that using such concepts papers over the inherent conflict that each of the concepts carries with it. Thus, 'stakeholder participation' sounds much more painless than 'managing conflict between disputing parties', which describes the same thing from the vantage point of negotiation literature (see Ramirez 2001, for example). The former starts from an imputed commonality of interest and desire to co-operate peacefully, while the latter starts from inherently contrasting interests and the difficulty of avoiding violent clashes that result from them. As people are both rational, self-regarding individualists and social beings with a sense of community, each approach represents one side of the coin. It is interesting to ponder why international aid institutions much prefer to emphasise the harmonious definition and ignore the discord. The concept of (de)politicisation seems to provide a major clue.

Politicisation of an issue questions the status quo, presents alternatives and involves conflict, often a drawn-out process. Politics is necessarily messy – it side-tracks, interferes and reopens debates long presumed closed, making business as usual problematic. As a plethora of choice and debate can be frustrating for decision makers, it is attractive for those in charge to present an outcome as unavoidable, that is, to posit a *point of no return*. Famously, Margaret Thatcher was fond of seeking to depoliticise an issue by claiming that "There Is No Alternative" (TINA). This very powerful speech form could be called a 'move for closure' of the political issue. If the issue is uncontroversial, it is not political; if there is nothing to choose from, and thus no degree of freedom, there is no politics. In this sense, language indeed "contributes to the domination of some people by others" (Fairclough 1989). Depoliticisation is therefore an attractive option to those who seek to neutralise opposition, opposition that might present persuasive alternatives to the preferred approach.

Ferguson (1994) highlights how development policy discourse constitutes Lesotho as a less developed country, badly in need of development, thus legitimising external development intervention. It reinforces the existing development trajectory as the 'norm', scripting aid institutions, notably the World Bank, as dispassionate, philanthropic institutions that know how to do development, and makes a different way of understanding society seem far-fetched (see also Crush 1995). How is the norm justified? This brings the argument to theories around legitimacy. As noted by Machiavelli (1958), a social order entails difference – everybody cannot be equal – but even a ruthless ruler needs to ensure that the ruled believe his rule is *justified*. Legitimacy justifies the authority of some over others, and hence power inequalities. Legitimising strategies seek support for a certain social arrangement that institutionalises these differences. These justifications are more persuasive if they invoke internal (custom, elders) or external (religion, science, natural law) allies. While the legitimacy of religion is on the wane in many societies, natural law and science remain powerful sources of legitimisation. It will be shown that the 'natural'scale of the river basin is a case in point.

Discourse is a powerful legitimising tool. While competing discourses may initially make themselves heard on the scene, a dominant discourse tends to emerge. It brings



'closure' to the ways society, its organisation and the way power is distributed are understood, thus excluding competing understandings. Scientific discourse has the particular characteristic of describing the world in an 'out-there' fashion as objective truths, without agency, subjectivity and uncertainty (Potter 1996). Thus, when the experts make a claim, it has much more authority than when other enunciators make a competing claim, unless the latter is successful in politicising such a claim. Thus, discourse helps to privilege and institutionalise expert knowledge, while overt (conditionality) or covert forms of indoctrination helps to diverge and divulge it (Bierschenk 1988).

## The 'naturalness' of ri ver basins

River basins have gained pre-eminence as the new territoriality for water management (Buller 1996) due to the confluence of three types of science, namely hydrology, geography and ecology. For hydrology, river basins are indeed the natural units for studying water flows on and in the earth. Geographers such as the Frenchman Philippe Buache (1700-1773) were the first to develop the concept of river basins as an ordering principle to study the lie of the land and have remained fascinated by them ever since (Melville 2000). The current concern for ecosystem management rests on the foundations of ecology, a science with a great interest in the delineation of natural systems. In practice, however, drawing the boundaries of ecosystems has proven difficult and, as a result, river basins and watersheds are being used more frequently as ecosystem boundary proxies (Barham 2001). Because river basins appear to be well-bounded and their boundaries are 'natural', it would seem that they are removed from the arbitrariness and mutability of boundaries drawn by humans (see Schlager & Blomquist 2000).

This seems to suggest the inevitability of the adoption of the so-called French model (Lorrain 1995). Indeed, the European Water Directive by and large adopts this model as does the World Commission on Water for the 21st century. But it is useful to keep in mind that river basin management in the US, generally seen as mature and 'successful', is characterised by river basin policy-making *without* a river basin policy maker (Schlager & Blomquist 2000; Svendsen 2000). Thus, the French model is not the only conceivable model. Once people become aware of the possibility of alternative modes of organising water resource management, it can be contemplated how and why one model is chosen over another, and whether such a model is necessarily ideal in all cases. It is thus necessary to bring politics back into river basin management, as explanations grounded in politics show that boundaries and institutional arrangements are not natural but matters of choice and contestation. In this context, it can be said that the politics of river basin management revolves around three fundamental questions:

- What is the appropriate scale for water management?
- Who decides on the appropriate scale and on the ensuing water management?
- How and in which forums are these decisions taken?

## Bringing politics back into ri ver basin management

### *Boundaries*

The policy prescription that river basins are natural units and thus the logical scale for organising water management is depoliticising in that it rules out debate by drawing

'nature' into the equation. Anyone wishing to dispute the boundaries of river basins has lost beforehand, as these boundaries are not a matter for political debate, but have been drawn by nature itself. On closer inspection, however, it turns out that it is not quite that easy to determine on the ground where nature has drawn the line. Mostert et al (1999) point out that river basins are open systems with sometimes ill-defined boundaries as rivers may have a shared delta, their boundaries often do not correspond with aquifer limits and in flatland and extremely dry areas are either vague or human-made. In addition, river basins interact with the atmosphere and their receiving waters, such as seas. Furthermore, the uses made of river basins often transcend river basin boundaries through interbasin water transfers (Mostert et al 1999). Griffen (1999:509) also highlights that nature does not always do such a good job at drawing the boundaries of river basins by stating that approximately one third of the landmass of the US (excluding Alaska and Hawaii) possesses physical characteristics that make river basin delineation problematic. He also points out that:

> "another problem with using a watershed as the appropriate spatial unit is that the use of watersheds erroneously assumes that all biotic and abiotic factors are similarly organized. Air, wildlife, and other natural resource issues are effectively transboundary and may not be well served by using watersheds as an organizing principle" (Griffen 1999: 509).

Newson (1997) makes similar points and emphasises the tremendous diversity in the size of river basins. Once these characteristics of river basins are taken into account, an obvious question becomes where the boundaries of river basins should be drawn and on which scale water management should be organised. As Schlager and Blomquist point out "the definition of a watershed and the selection of boundaries are matters of *choice*" (2000:14; emphasis in original) and "[d]rawing boundaries is the first step in determining who decides and how and with what effects. Different boundaries imply different decision makers and different effects" (2000:16). It is not suggested that water should not be managed on the basis of river basins, but rather that this choice is political and that river basins are thus as much political units as they are natural units.

## River basins as territories of governance

Reconceived as political units, river basins become territories of governance. Who will make decisions and how are the questions addressed that immediately arise? The need for stakeholder participation in river basin management is widely accepted, but including the poor and achieving substantive stakeholder representation has actually proven elusive in practice (Cleaver 1999). There is a danger that the participation discourse draws the attention away from the very real social and economic differences between people and the need for the redistribution of resources, entitlements and opportunities. This is typified by the frequent definition of stakeholders as water users only, thereby excluding those without water rights. As decision-making moves to the river basin level, serious thought needs to be given to how hard-won democratic rights in conventional social and political domains are assured in the river basin domain. As pointed out by Barham:

> "While watershed-level 'rules' may be desirable in terms of holistic environmental planning, the simple fact is that we do not have established social and political institutions in place that can assure that deliberations over these new rules will be broadly democratic. Without such institutions ... we may witness a gradual reassembling of authority on a watershed basis that leaves behind democratic access to information and the possibility of open public debate" (2001:189).

The nexus between integrated management and participation is not an obvious one. As Green and Warner (2000) point out, holistic management and participation pull in opposite directions. While the complexity of integrated management invites centralisation and technocracy, participation suggests subsidiarity and small-scale operations, engaging people to think creatively about issues intimately linked to their lives. Thus, in any basin of some size, river basin management would entail a layered system of participation, necessarily increasing the complexity of the arrangement.



## River basin organisations and stakeholder representation

On the face of it, participatory platforms or 'water parliaments' democratise water management by giving voice to a multiplicity of interested actors. But participation is not necessarily politics. It can institutionalise power differentials as the literate élite take on leadership roles (as chairpersons), and co-opt the weak, and may even prove empty shells when it has little mandate to change anything. Stakeholders may therefore find it more attractive to (threaten to) pull out of the process. Much depends therefore on the social/material practices from which stakeholder platforms for river basin management emerge – whether river basin councils, catchment management agencies, watershed councils, and the like. To understand this, the kind of institutions also need to be considered. They reduce the complexity of the real world by setting rules, assigning roles and allocating rights to the actors involved in them. Institutional change therefore changes (redistributes) all three of these. Rules and rights create boundaries (including that of the institution itself), ownership titles, permitted activities, and ingroups and outgroups, while roles structure the field. Institutions are *dynamic* – they are embedded in social/material practices where they are reproduced, transformed and subverted through interactions and negotiations between actors. As Cleaver suggests:

> "The institutions for the management of water ... are socially located and critically depend on the maintenance of a number of grey areas and ambiguity regarding rights of access, compliance and rules, [and] on a continuous process of negotiation between all users" (1999:602).

Such a notion of institutions opens avenues to analyse how power pervades institutional arrangements and gives rise to differentiated access to and control over water and more importantly, how to design processes to redress inequities.

Unfortunately, the situation before the creation of new institutions is often treated like a *tabula rasa*, while many roles (sanctioned or informal, established or highly flexible) and certainly the technologies for controlling water are in effect already in place. Barham points to the risk that river basin organisations may:

> "sap the effectiveness of existing democratic channels of communication in the interest of finding more efficient *technical* solutions to complex problems. Social organizations (boards, committees, etc.) created for watershed planning are imposed as it were *from the outside*, overlaying natural boundaries in a new way on top of existing social and political boundaries … To use a water metaphor, authority, funding, research, and new scientific approaches can all be poured from existing

social and political 'containers' into the watershed boundary. But we can't be certain that processes of democratic deliberation that were associated with the older containers will be poured along with the rest or separated out and cast aside unless we give this careful and constant attention" (2001:190; emphasis in original).

If done unreflectively, new institutions can institutionalise inequality. In river basins, it is the norm that water management stakeholders have different levels and kinds of education, speak different languages, differ in access to politics, and hold different beliefs about how nature and society function (see Edmunds & Wollenberg 2001). If this is not taken into account when creating rules, roles and rights, the institutional outcome can easily privilege those who are literate and have access to the legal system. A preliminary path to understanding why this should be so lies in a limited understanding of the definition of 'resources'. It suggests that, once social energies are released, reformist tendencies will evolve painlessly. Indeed, many social energies remain untapped. Turton and Ohlsson are saluted for pointing out that a more extensive definition of 'resource' is needed. In addition to natural resources, actors and societies have material and other resources (energies and capacities) available that can help (or hurt) adaptation to first-order scarcity. Indeed, freeing up second-order resources requires a more sophisticated social arrangement for decision-making to widen rather than narrow down the range of alternatives (White 1974) to a supposed 'natural'approach (or 'one best way'). The work of Kooiman (1993) suggests that governing complexity requires a wider range of actors whose self-organising energies, knowledge and capacities can enable (or disable) sensible (water) management. While these insights may help in understanding why countries with similar endowments can have widely diverging degrees of success in switching to demand management, it focuses on the idealist side of the coin – it does not really clarify structural iniquities that impede change and promote conflict. Second-order resources, like first-order resources, can be captured by powerful interests, which have the means at their disposal to alter the playing field to their advantage. When pressing for institutional reforms, there is a clear danger of institutionalising the very rigidities that obstruct structural reforms at the level of first-order resource management.

Moreover, it is of little use to establish new institutions for water management without realising that they are embedded in an institutional ecology, a meta-institution with its own rules, roles and rights. The new institution will need to carve out its niche, demarcate its boundary, defend its mandate and acquire a resource base, which will inevitably create some conflict with those interested in the *ancien regime*. Resources may be material or intangible – power, knowledge, occupation of strategic pressure points in decision-making (Warner & Turton 2001). This process is deeply politico-strategic, a fact that is easily obscured by depoliticising discourse – in this case, on scale, boundaries, participation and procedure.

It is clear that the size of the population in most river basins is such that it precludes the direct participation of all stakeholders in basin-level decision-making. The question then is who represent groups of stakeholders in river basin management, once again a political choice. The issue of inequality and difference in stakeholder representation has already been pointed out. In addition, the relationship of the people participating in any multistakeholder process to their constituents is also problematic, especially when third parties are involved. It is a nostrum of development work that third-party facilitators



(researchers, NGOs, extension workers) are needed to help to identify, mobilise, organise and inform stakeholder groups. However, as pointed out by Edmunds and Wollenberg:

"the relationship of a representative to his/her constituency is perhaps most politically charged when representatives of a group are designated by outsiders or are accountable to them, as is often the case in multistakeholder negotiations. From the start, outside convenors and facilitators influence representation by the selection of stakeholder groups, the people to represent each group and how the expression of interests is facilitated in the meeting" (Edmunds & Wollenberg 2001:240).

Even when agreement is reached on stakeholder selection and the concerns mentioned above are taken into account, the question remains to which extent the representative body actually has a mandate. Empirical research is needed to assess emerging forums for river basin management and their democratic content. This entails studying the boundaries of consent, that is, where the line is drawn between weak forms of stakeholder participation (communicative governance, surveys, public enquiries) and strong ones (actual control over water management agenda-setting and decision-making by water users and citizens). It also entails questioning whether emphasis is placed on protecting proven productive capacity and assuming that growth will lead to redistribution, or whether meaningful attempts are made to redistribute productive resources. Where the boundaries of consent for river basin management are drawn is a political choice, and should be treated as such in current water reforms.

## Conclusion

Drawing from the insights of political science, it becomes apparent that the closure of the discourse on river basin management is a quintessentially political process that revolves around matters of choice and legitimacy. By showing how there is nothing 'logical', 'natural' or 'unavoidable' about taking river basins as the units for water management, an attempt was made to reopen the closed concept of river basin management and to engage critically with the way such concepts are selected and promoted. Interdisciplinary research focusing on the relationship between the over-exploitation of water, the production of dominant water discourses, processes of institutional change concerning river basin management and changing patterns of access to water, is needed to bring a greater understanding of such processes (see Bolding et al 2000). Such research should be conceptually grounded on the notion that water is a politically contested resource and that water management institutions and policies are effects of political practices. It would contribute to the construction of a counterdiscourse that describes instead of prescribes, that focuses on processes and outcomes instead of forms and functions, and that is informed by real world struggles instead of deformed by donor agendas and élite interests. This will lead to a better understanding of water management practices and processes of institutional change in the water sector and yield new insights into outcomes in terms of economic and environmental sustainability and social equity in the face of increased competition over water.

# Chapter 5
# Contributions of regime theory in understanding interstate water co-operation: Lessons learned in the Jordan Ri ver basin

**Anders Jägerskog**

## Introduction

The purpose of this chapter is to analyse whether and how regime theory can assist in better understanding interstate water co-operation. In particular, specific emphasis is placed on the role of water experts in the promotion of co-operation. While the case study deals with the Jordan River basin, it is believed that the lessons learned in the Middle East are also helpful in the case of Southern Africa. Acknowledging the fact that any analysis needs to be situated in its specific political, historical and cultural circumstances, it is argued that the general insights about the creation and role of water regimes is applicable in any case of transboundary water course analysis.

A wide range of International Relations scholars showed by the mid-1970s that the international system is increasingly characterised by interdependence. As interdependence affects politics and the behaviour of states, new forms of rules, procedures and institutions for various activities have been created in order to manage and control transnational relations. These co-operative arrangements are usually referred to as international regimes (Keohane & Nye 1989).

The hydrological interdependence, or the transnational nature of international river basins (Elhance 1999) provides a rationale for co-operation. Indeed, an awareness of the positive prospects of basin-wide co-operation through the development of a water regime might spur an increased hydrosolidarity. Or, as Kader Asmal, a South African politician formerly responsible for the country's water affairs, put it, "water may be a catalyst for peace" (Asmal 2000). Water experts are an integral part of the establishments of co-operative water regimes as they tend to favour basin-wide co-operation. They are referred to by political leaders who, under conditions of uncertainty, consult scientific experts to assist them in identifying their own interests and policies (Haas 1994).

## Why study water regimes?

Many International Relations scholars have devoted significant attention in trying to understand why international co-operation occurs in spite of the presumed anarchic international system. Some try to explain the co-operation through regime theory. The most commonly used definition of an international regime is that of Krasner:

> "implicit principles, norms, rules, and decision-making procedures around which actors'expectations converge in a given area of international relations. Principles are beliefs of fact, causation, and rectitude. Norms are standards of behaviour defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice" (Krasner 1983:1).

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The particular object that regime analysis is concerned with is the normative institution, dealing with a specified issue, which states create and subscribe to voluntarily as a means of self-regulation in the international arena (Mayer et al 1993). Keohane holds that:

> "international regimes are useful to governments. Far from being threats to governments (in which case it would be hard to understand why they exist at all), they permit governments to attain objectives that would otherwise be unattainable. They do so in part by facilitating intergovernmental agreements. Regimes facilitate agreements by raising the anticipated costs of violating others' property rights, by altering transaction costs through the clustering of issues, and by providing reliable information to members. Regimes are relatively efficient institutions, compared with the alternative of having a myriad of unrelated agreements, since their principles, rules, and institutions create linkages among issues that give actors incentives to reach mutually beneficial agreements. They thrive in situations where states have common as well as conflicting interests" (Keohane 1984:97)

These regimes are considered to exist in areas such as international trade, monetary policies, security and arms control, and the use of natural resources. The regimes might be seen as an intermediating factor between the power structures of the international system and the political bargaining that takes place within it. In fact, regimes can become embedded in a sort of normative framework for action and thereby increase the political salience of certain issues (Keohane 1993; Keohane & Nye 1989). Furthermore, they may also function as a vehicle for international learning and the converging of policies of states (Haas 1994). This is iterated by Mayer et al (1993) who hold that the social interaction that takes place in a regime fosters a convergence in value orientation and thereby create incentives for a further institutionalisation of co-operation. Wendt (1994:87) has usefully clarified the institutionalisation of co-operation in the international arena. He argues that:

> "the process by which egoists learn to co-operate is at the same time a process of reconstructing their interests in terms of shared commitments to social norms. Over time, this will tend to transform a positive interdependence of outcomes into a positive interdependence of utilities or collective interest organized around the norm in question" (Wendt 1994:87).

Wendt argues that this constructivist approach to the institutionalisation of co-operation focuses on how the expectations that are produced by behaviour affect interests and identities. This process of institutionalisation is one in which actors internalise new understandings of self and other and, furthermore, move towards increasingly shared commitments to the norms of the regime. Thus, there is a strong behavioural component in the international regime theory. Whereas an international treaty is a legal document stipulating rights and obligations, a regime is a social institution in which the behaviour of its actors constitute the regime (List & Rittberger 1992). Thus, a regime is often based on an informal understanding and does not have to be in the form of a written document.

Applied to the water relations in the international system, regime theory therefore appears to be a relevant tool in the analysis of how compromising solutions may be found, built on an acknowledgement of hydrological interdependence, through co-operation (Du Plessis 2000).

Water regimes has been identified by Haftendorn as:



> "when the affected states to a conflict observe a set of rules designed to reduce conflict caused by use, pollution or division of a water resource or the reduction of the standing costs and the observance over time of these rules" (Haftendorn 2000:65).

Haftendorn, however, distinguishes between general water regimes and those intended for a particular conflict. An example of a general regime is the 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses. Its aim is to establish general principles for the use of transboundary water resources. An example of a regime dealing with a specific watercourse is the Rhine regime, which stemmed from an agreement on chemicals and chlorine. The regime has been beneficial in that it has managed to bring problematic issues to the fore and thereby facilitated the settlement of disputes (Haftendorn 2000). Another example of a general water regime is the SADC Protocol on Shared Watercourse Systems (SADC 1995). In the Southern African region, there are also examples of more specific regimes. The Orange/Senqu River Basin Commission (ORACOM) is a regime that is fairly well established and functioning despite border tensions between the two riparian countries, South Africa and Namibia.

## How does a water regime come into existence?

There are a variety of explanations for the development of regimes. Realists tend to focus on the interests of hegemonic states. In their view, regimes are created by the powerful hegemons because they serve their interests. Consequently, when the power of a hegemon declines, the regime also weakens. Neo-liberals, on the contrary, focus on the *demand* for regimes. They view norms not only as a reflection of sheer power, but also as something likely to be demanded regardless of the existence of a hegemon as norms will enable states to estimate more accurately the costs and benefits of action. When the regime is in place, a state is able to interpret and value the actions of self and other and determine if it is in line with agreed upon principles (Mansfield 1994). The regime might also help states to co-ordinate their behaviour so that they can collectively avoid suboptimal outcomes (Hasenclever, Mayer & Rittberger 1997).

Another explanation is the view that a crisis or shock might precipitate the formation of a regime (Young 1994). This understanding has close connections to Hajer's (1996) *emblematic events*, which he sees as being necessary in order to raise the awareness of environmental degradation and vulnerability. Yet another explanation to the formation of regimes is the one offered by Haas (1994) and Adler and Haas (1992). They focus not so much on interests and dramatic events, but argue that a regime can stem from communities of shared knowledge. Experts in a specific issue-area are termed *epistemic communities*. The emphasis is on how these experts play an important role in the articulation of complex problems, such as water management issues or pollution control.

The epistemic communities approach is the one that will be elaborated as it emphasises the role of groups of experts or so-called 'expert communities' in the formation of policy innovation and the institutional processes leading up to the formation of a regime. Haas (1994) holds that "regimes may be transformative, leading to the empowerment of new groups of actors who can change state interests and practices." Members of an epistemic community might also have a decisive influence on the construction of policy in an area and, since the communities' nature is international, it might also lead to a general convergence of policies internationally.

The more general water conventions, which aim to establish general principles for the use of transboundary water resources, have seen a high degree of involvement from the water expert community. Although the principles of these conventions are of a more general nature, they may serve as a baseline for interstate water relations. In fact, the general international principles have led to the formation of more regional water regimes. This has been brought about when riparians have mutually embodied norms, rules and principles and have thereby incorporated a higher degree of co-operation among themselves (Haftendorn 2000).

## What are water regimes good for? A case-study of the Jordan River Basin water relations

Water relations in the Jordan River basin have often been used as an example to show that water might indeed lead to conflict and even war (Bulloch & Darwish 1993; Starr 1991). However, Allan (1999; 2001), Wolf and Hamner (2000) and Isaac (1995) have shown the weakness of this reasoning. In particular, Allan (1999) emphasised the ameliorating factor of 'virtual water', the water used in water-intensive food production that are 'imported'into the region. Furthermore, authors focusing on the potential for war have tended to neglect the fact that a kind of water regime has been in place regulating the relations between Israel and Jordan since the early 1950s. Although Israel and Jordan have been in a *de jure* state of war, they have had low-key co-operation on shared water resources under US auspices. This regime has provided a means to build trust among the states and has facilitated the development of more friendly relations. Furthermore, the Johnston plan for the management of the Jordan River basin, which was prepared by a US team of experts, can be seen as a water regime despite the fact that it was not recognised by the states involved (Wolf 1993). It may be argued that the water agreement between Israel and Jordan, part of the Peace Agreement signed in 1994, has enhanced and formalised regime co-operation between the two states. The treaty stipulates the rights and obligations of the two parties, however, while the regime predominantly concerns the actual behaviour of the parties. Keohane (1984) holds that international regimes should be distinguished from specific interstate agreements and argues that a major function of regimes is to facilitate the making of agreements. Young (1989) does not agree, and argues that, if this view of regime analysis was adhered to, it would merely resemble an analysis of explicit bargaining. He argues that both normative frameworks that are not formalised in agreements, as well as formal agreements, constitute regimes. In line with the argument of Young, the water relations between Israel and Jordan are viewed as a water regime, even though a formal agreement is in place.

How can the quality of the water regime, presumed to exist between Israel and Jordan, be assessed? Regime theory offers some tools. Hasenclever et al (1997) maintain that the *effectiveness*, *robustness* and *resilience* of regimes should be analysed. The effectiveness of a regime depends on whether its members abide by its norms and rules, while robustness refers to the 'staying power' of a regime in the face of exogenous challenges. Its resilience refers to the ability of the regime to adapt itself to changing circumstances.

It seems as though the regime between Israel and Jordan has been somewhat limited in its effectiveness as conflicts (not about water) between the two countries have forced them to break the rules of the regime at times. Having said this, it is apparent in the agreement of 1994 that many of the principles existing on the international level, such as the provision not to cause 'significant harm', have been incorporated in the regime. Furthermore, a joint institution (the Joint Water Committee) has been established in order to implement and monitor the principles agreed upon. It is positive to see that the emphasis has been put on co-operation around maintaining the common resource. As water experts have been an integrated part of the negotiations leading to the formulation of these principles, it may be argued, along the lines of Haas and others, that scientific consensus has clearly made its mark on the regime.



If the robustness and resilience of the regime are considered, it is arguably a rather strong regime. The last time it was severely challenged was during the drought of 1998-2000, which resulted in disagreement over allocation during periods of drought. This was partly due to the fact that no provisions were made for droughts in the agreement of 1994. The conflict was solved, however, and it seems that the norms, rules and principles that existed in the water regime contributed to this end.

It is also interesting to examine water relations between Israel and Palestine. Although still awaiting a final peace agreement between Israel and the Palestine Authority, an interim agreement is in place of which water forms an integral part. As in the Israeli-Jordanian case, a Joint Water Committee also exists. Even in the midst of the latest tensions arising from the al-Quds intifada that started in the autumn of 2000, the work of the committee continues. A joint statement from the Israeli and the Palestinian heads of the committee (31 January 2001) reaffirmed their commitment, despite exogenous challenges, to continue their co-operation. This was significant and seems to confirm the functionalist regime analysis.

A further aspect that has to be acknowledged is the asymmetrical power relations between Israel and Jordan. Keohane and Nye (1989) argue that an asymmetrical interdependence can be a source of power in itself to control resources or affect outcomes. Less dependent actors can have political or economic resources at their disposal, and changes in the regime or relationship may therefore prove less costly. While Israel has an economy that is diversified and strong, and is also the upstream riparian, Jordan is neither economically strong nor is it in a favourable negotiating position in terms of control over water (Allan 2000). Hence, changes in the relationship may prove more costly to Jordan than to Israel.

## Analytical limitations

While regime theory contributes to the understanding of how water co-operation may come about, it has its limitations like any other theory. The thinking of Asmal (2000) and others is functionalist as it holds that co-operation over water could precede co-operation in other more contentious areas. The argument in this chapter also tends to lean in this direction. However, an obvious objection to functionalist regime theory is that it is somewhat blind to the fact that, for the states involved, water may be subordinated to much more important areas of dispute (Allan 2000). The hierarchy of issues is important to understand. A realist objection to the focus on water experts would be that it is the interests of the powerful that make regimes come about. Hence, the co-operation between Jordan and Israel would rather be a result of US interests than anything else.

Considering the focus on experts and epistemic communities, it is debatable whether experts exert such vast influence as the theory claims. Furthermore, in a world where

policy makers increasingly tend to consult scientific expertise, there is also a growing scepticism about their expertise, especially since complex issues are often characterised by both social and scientific controversy (Corell 1999). While these and other objections to the analysis appear to be valid, it could still be argued that the formation of co-operative water regimes, through the epistemic communities approach, is illuminative about the way co-operation is achieved.

A further limitation of the involvement of experts in policy-making is the connection between science and politics. While there may be scientific agreement on an issue or a way to handle a problem, solutions may not be politically feasible. As Allan (1999) pointed out, the logical way to achieve strategic water security would be to secure supplies of 'virtual water'. However, the virtual water solution may not be acceptable to the governments in the region if it is not part of the 'sanctioned discourse'on water. This term refers to a normative paradigm within which certain hypotheses might be raised while others cannot. Hence, some strategies that would be logical are not on the agenda as they are politically stressful.

It is also argued that water is seen as a human right by many. The fact that people and governments involved in a water conflict tend to view water as an absolute necessity of life means that there is a general reluctance to use water as a weapon. Thus, the view that water is a human right is a reason why governments do not withhold water from an enemy (Soffer 2001). However, others argue that there is strong historical evidence of water being used as a weapon of or target in periods of conflict and war (Turton 2000d). Thus, the explanatory power of the concept of 'water as a human right' as a reason for interstate water co-operation is weak.

## Conclusions

International water regimes might be seen as a mitigating factor in conflict, since they promote basin-wide interstate co-operation and thereby increase water security. An analysis of co-operation around water in the Jordan River basin through the prism of regime theory is helpful in explaining why co-operation has occurred in spite of the strong political conflict. When a convergence of values occurs within a regime and co-operation is institutionalised, it is conceivably more difficult to reverse or end such co-operation. This is relevant to Southern Africa where there is an apparent desire for states to co-operate with regard to international river basins in the context of the SADC Protocol on Shared Watercourse Systems.

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# PART III: LEGAL DIMENSIONS

# Chapter 6
# Development of international water law and the UN Watercourse Convention

**Gabriel E Eckstein**

## Introduction

The Convention on the Law of the Non-Navigational Uses of International Watercourses was adopted by the United Nations General Assembly on 21 May 1997 (UN 1997a). It was drafted to articulate and codify the prevailing state practice and *opinio juris* – an action taken out of a sense of legal rather than moral obligation – in the area of international water law. It was designed to serve as a framework for more specific bilateral and regional agreements relating to the use, management and preservation of transboundary water resources. It was also designed to help prevent and resolve conflicts over international water resources, and to promote sustainable development and the protection of global water supplies.

The Convention was adopted by a vote of 103 for and three against, with 27 abstentions and 33 members absent (UN 1997b; see figure 1 for a more complete breakdown of the vote). Although the actual number of votes against the Convention was small, the numbers belie a voting pattern that manifests the complexity of the subject matter, as well as the fragility of the coalition favouring the Convention. Many upper riparian states, for example, voted against passage of the Convention or abstained from the vote, while lower riparian states typically supported its adoption. Many states that abstained or voted against the text contended that the document was not ready for a vote, and noted the lack of consensus on several key provisions, including those governing dispute settlement. Others, both upper and lower riparian states, argued that there was a lack of balance in the Convention's provisions between the rights and obligations of upstream and downstream riparian states (UN 1997b). By 20 May 2000, the end of the signature period, only eight countries had ratified and another ten had signed the document[1] (see figure 2). Clearly, the debate surrounding the UN Convention is a function of the competing interests of states and is political in nature. Especially telling is the fact that it took more than 25 years of continuous work, 13 reports and five special rapporteurs to finalise the text.

This chapter examines the evolution of the UN Convention and analyses the vote on the text of the document in the UN General Assembly. It begins with a brief review of the development of international water law leading up to the creation of the Convention, and follows with an analysis of the diverging interests that, nevertheless, resulted in the adoption of the Convention. Finally, an assessment is presented of the voting and ratification patterns of the Convention, as well as a review of the document's present status.

## Background to the UN Watercourse Convention

Modern international water law is the result of an evolutionary process in legal doctrine related to the agricultural and navigational uses of transboundary freshwater

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resources.[2] Early civilisations, which settled along many of the world's major river basins such as the Nile, Tigris and Euphrates, Indus, Amazon and Mississippi, used the waters for irrigation and flood control, as well as for travel and transportation (Wouters 1997). Over the course of time, many of these communities developed complex rules for the navigation, allocation and use of water. With the growth of travel and commerce, however, navigational rules became pre-eminent over non-navigational uses (see Teclaff 1985).

Prior to the industrial revolution, legal doctrine emphasised that continued transboundary water flow should be ensured and harm to neighbouring states prevented, particularly as water flow related to navigation (Teclaff 1967). Both common law and civil law jurisdictions, for example, observed the doctrine of *sic utere tuo ut alienam non laedas* (use your property in such a manner that it does not injure another). This principle, now considered a part of customary international law, obliges states not to use, or allow the use of their territory in a way that would harm the territory or rights of neighbouring states (Lien 1998; Moermond & Shirley 1987; Caponera 1954). With the advent of industrialisation, however, increased demands on water resources propelled non-navigational water uses to the forefront and engendered innovation in the law as it applied to personal and sporting use, industrial and agricultural purposes, and the conservation, sound allocation and management of limited resources (Lien 1998).

In the early years of industrial development, international water law was manifest primarily in the form of bilateral treaties (Lien 1998). Typically, bordering countries would enter into agreements for the sharing of a river or lake in the context of defining political borders, flood management, reallocating waters for growing populations, diverting river flow for agriculture, and developing new industries (for example, see UN 1963a; 1963b; 1963c). The development of the law, however, also resulted from various international and federal cases concerning these same issues, including, for example, jurisdiction over the River Oder (PCIJ 1929); the development of the River Meuse (Anon 1937); the utilisation of the waters of Lake Lanoux (Anon 1957); as well as the flow and diversion of international rivers (Anon 1927).

Over the years, however, the large variety of issues and cases resulted in considerable incongruity among the laws of transboundary waters, especially where legal principles were devised or interpreted to fit specific interests. Accordingly, a variety of often irreconcilable legal bases emerged as the means for allocating and sharing transboundary water resources. These bases can be divided into five categories:

- absolute territorial sovereignty (Eckstein 1995:67, 73; Lipper 1967:22);[3]
- absolute territorial integrity (Eckstein 1995:74);[4]
- *sic utere tuo ut alienam non laedas*;
- limited (or restricted) territorial sovereignty (Lien 1998:292);[5] and
- community of interests theory (Eckstein 1998:80-81).[6]

In an effort to bring uniformity to international water law, the International Law Association (ILA) developed the Helsinki Rules in 1966 (International Law Association 1966:484). Drafted as a comprehensive code for the use of transboundary drainage basins, the rules included provisions on both the navigational and non-navigational uses of transboundary waters. The Helsinki Rules, however, have become best known for their non-navigational guidelines and are often regarded as the predecessor to the UN Convention. Most notable of its provisions are articles IV and V, which set forth the well-known doctrine of *equitable and reasonable apportionment*, and some of the geographic, hydrological, climatic, historical, social, economic and technical elements assessed when effecting this apportionment. The Helsinki Rules complemented this principle with additional articles providing that no category of use enjoyed any inherent preference over another (article VI), that no state may reserve future uses for itself (article VII), and that existing activities may be presumed equitable and reasonable unless established otherwise (article VII). The Helsinki Rules were later supplemented by the ILA with subsequent resolutions, including the Montreal Rules on Pollution (ILA 1983:13) and the Seoul Complementary Rules (also known as the Seoul Rules on International Groundwaters) (ILA 1987:232). Over the years, these principles have become accepted as bases for negotiations among riparian states over shared waters, and have played an important role in the development and codification of international water law.



Nevertheless, despite their soundness, the Helsinki Rules and their supplementary declarations have received little recognition as official codifications of international water law. While the *raison d'être* of the ILA is the interpretation and codification of international law, the organisation operates as a private NGO and therefore enjoys no official status in the development of international law. Accordingly, the work of the ILA has always been regarded merely as aspirational in nature and not as hard and fast rules for state conduct.

Due to this lack of definitiveness, as well as a result of growing tensions in various water-poor regions, the General Assembly of the United Nations commissioned the International Law Commission (ILC) in 1970 to draft a set of articles to govern the non-navigational uses of transboundary waters (UN 1970). Tasked with the interpretation of international law "with a view to its progressive development and codification" (UN 1970) and operating under the aegis of the UN, the work of the ILC is highly respected as a definitive elucidation of international law. Following lengthy discussions, the ILC completed Draft Articles in 1991, and submitted the text to UN member states for comment (see McCaffrey 1991:703).

## The text of the UN Convention

That the Draft Articles took nearly 25 years to prepare is just one indication of the complexity of the issues, and of the importance that states attributed to the subject matter. In October 1996, and again in March/April 1997, the Sixth Committee of the UN General Assembly convened as a Working Group of the Whole to debate the draft text with a view to produce a framework convention. These meetings were quite contentious, raising issues of rights and responsibility and of the scope and applicability of the Convention. The central and recurring issues in the debate included:

- the framework nature of the Convention;
- the implication of the Convention for existing and future treaties; and
- the relationship between the substantive rules of no appreciable harm (article 5) and of equitable and reasonable use (article 7) (Wouters 1997).

The UN Convention is intended to be a framework agreement, flexible and open to a degree of interpretation, designed to accommodate the development of more specific bilateral and multilateral agreements related to the use, management, and preservation of transboundary water resources. Hence, the parties express in the Preamble:

> "the conviction that a framework convention will ensure the utilization, development, conservation, management and protection of international watercourses and the promotion of the optimal and sustainable utilization thereof for present and future generations" (UN 1997a; 1997b).

Notably, the Preamble also explains that the Convention takes "into account the problems affecting many international watercourses resulting from, among other things, increasing demands and pollution." It further acknowledges the "special needs of developing countries" and "the principles and recommendations ... in the Rio Declaration and Agenda 21" (UN 1997a).

Despite this aspirational language that explains the need for a framework convention, concern was voiced by some states that the aim of the Convention had deviated from being a framework agreement. Countries like China, India and Turkey asserted that the structure of the Convention had surpassed its original intent, pointing, in part, to the compulsory provisions regarding the settlement of disputes. India, for example, which abstained from the vote, asserted that "[a]ny procedure for peaceful settlement of disputes should leave the procedure to the parties" (UN 1997b). Likewise, Israel, which also abstained, stated that:

> "As a matter of principle, States must settle their disputes peacefully. However, the means of settling a dispute must be left to their agreement. Parties to a dispute must be allowed to choose the mechanism which was most appropriate to their specific needs" (UN 1997b).

The relationship between the UN Convention and existing and future treaties governing specific watercourses is discussed in articles 3 and 4 of the text. Generally, the Convention does not affect existing agreements, although it encourages parties to such agreements to consider harmonising the agreements with the basic principles of the Convention. Moreover, under article 3, the Convention calls on states to apply the Convention's principles in bilateral and regional agreements, but also to adjust those principles to the particular characteristics and uses of the watercourse that is the subject of the treaty.

The basic contradiction between the need to 'harmonise' existing treaties with the Convention's principles, and the need in future agreements to 'adjust'the same principles to particular watercourse characteristics was not lost on UN members. Responding to these provisions, India remarked that "Article 3 had not adequately reflected a State's autonomy to conclude agreements without being fettered by the Convention" (UN 1997b). Ethiopia, which abstained from the vote, argued that adjusting the principles in future agreements "could undermine the Convention. Specific watercourse arrangements should be adjusted to the Convention, not the other way around" (UN 1997b). While Israel also abstained, it concluded that the Convention did not affect existing agreements: "States had full freedom in negotiating and entering into new agreements, providing those agreements did not adversely affect other States" (UN 1997b).

Undoubtedly, one of the most contentious issues before the Sixth Committee and the UN General Assembly concerned the scope and relationship of the substantive principles contained in articles 5, 6 and 7. A sizeable number of states, including many who voted in favour of the text, objected that, in these articles, the Convention failed to establish a balance between the rights and obligations of upper and lower riparian states.



Article 5 provides that states "shall in their respective territories utilize an international watercourse in an equitable and reasonable manner." Article 6 provides a non-comprehensive list of factors, relevant to the assessment of water use, which watercourse states must consider when assessing what uses meet the criteria of equitable and reasonable utilisation. Like article V of the Helsinki Rules, these include, among others, geographic, hydrological, climatic, historical, social, economic and technical elements, as well as existing and possible uses, costs and the availability of alternatives. Article 7 provides that watercourse states "shall … take all appropriate measures to prevent the causing of significant harm to other watercourse States."

Traditionally, upstream riparian states tended to advocate the doctrine of absolute territorial sovereignty over resources located within their jurisdiction, while lower riparian states favoured the principles of prior appropriation[7] (or vested rights) and absolute territorial integrity. In contrast, both the equitable and reasonable use and no substantial harm rules require states to consider the interests of other riparian states and incorporate them into their water resource development plans. Following significant debate in the meetings of the Sixth Committee, the text was revised and the principle of equitable and reasonable use was endorsed, including over the principle of no appreciable harm, as the fundamental basis of international water law (ICJ 1998:162; Stec & Eckstein 1997:41).[8] Article 7 of the Convention now provides that:

> "Where significant harm nevertheless is caused to another watercourse State, the States whose use causes such harm shall … take all appropriate measures, *having due regard for the provisions of articles 5 and 6* … to eliminate or mitigate such harm" (UN 1997a; emphasis added).

While this shift suggests increased support for reconciling the various interests of watercourse states in the development of their transboundary waters (Wouters 1997), it overshadows a continued determination by the opposition to prevent the inclusion of more definite obligations in the Convention.

In comments on the text of the Convention, China, Rwanda and Turkey, among others, criticised the Convention for failing to contain language referring to states' sovereignty over watercourses located within their territory. Tanzania stated that "the delicate balance" between articles 5, 6 and 7 "had been undone by the introduction, in … article 5, of reference to a demand to take into account the interests of the watercourse States concerned." Tanzania was concerned that the reference expanded the scope of the Convention beyond its intended purpose, "thus introducing an element of uncertainty" and improperly allowing "some States' actions [to] remain subject to the consent of others" (UN 1997b). In contrast, Israel "supported the compromise reached on Articles 5, 6 and 7," although it believed that "[n]either principle should be subservient to the other. The balance between them should be based on the specific case" (UN 1997b).

## Review of the vote on the UN Convention

The UN Convention on the Law of the Non-Navigational Uses of International Watercourses was adopted on 21 May 1997. As noted above, the vote on the Convention text was not so clear-cut as to allow for any specific assumption about the strength of the coalition favouring the text or the Convention's enforceability. In fact, a review of the vote and comments made at the time suggest that many states had and still have strong

misgivings about several of the provisions of the Convention. Moreover, the fact that, to date, only 12 states of the 35 needed for the Convention to enter into force have ratified the document is construed by some not only as waning support, but also that the Convention may not actually have codified the current status of international water law (see Schwaback 1998:258).

Voting results showed that 103 countries voted in favour of the text of the Convention, three against, and 27 states abstained. Another 33 member states were absent from the vote. The count, however, might have been 106 in favour with 26 abstentions. Belgium, which was recorded as abstaining, and Fiji and Nigeria, which were recorded as absent, subsequently announced that they had intended to vote in favour of the UN Convention (UN 1997a). Figure 1 provides a detailed breakdown of the recorded vote in the UN General Assembly.

The three states which voted against the Convention were Burundi, China and Turkey. All three are primarily upper riparian states, two of which – China and Turkey – are engaged in controversial hydro projects. China has been the subject of significant criticism for its Three Gorges Dam project (see Shapiro 1997:148-152), while Turkey has been criticised by its downstream neighbours for its work on the South-Eastern Anatolia Project (also known as GAP), including the Ataturk Dam (see Shaplan 1997; Dellapenna 1996:229-235). Moreover, all three states are significant players in a number of the world's major drainage basins: China controls the headwater of the Mekong River, Turkey supplies the bulk of the water for the Tigris, Euphrates and Araks Rivers, and Burundi is a significant contributor to the Nile and Zaïre Rivers (Anon 1997b). These negative votes suggest the determination of these states to rely on the power of diplomacy rather than on international law for the resolution of current and future disputes.

Of the 166 states recorded in the chronicles of the Convention as voting, abstaining, or absent, 57 do not share freshwater resources with other states. These include 35 island-nations and 22 states that can be categorised as non-riparian, or otherwise without any notable upper or lower riparian geographies (non-riparian states). Given that these states have little or no significant national stake in transboundary waters, their vote can be presumed more of an intellectual or ideological exercise than a matter of personal state interests.[9]

Of the 35 island-states, 23 participated in the vote on the Convention. The vast majority of these – 22 island-states – voted in favour. Cuba was the sole island-nation abstaining. Another 12 island-states were absent from the vote. Of the 22 non-riparian states, all voted in favour of the Convention except Andorra, Monaco and Panama, which abstained. Thus, 41 island and non-riparian states voted for the Convention out of a possible 57 states.

Subtracting the 41 island and non-riparian states which voted for the Convention from the total of 103 results in 62 states which presumably voted favourably because of particular national interests. Of these, a distinct majority, or 53 states, can be categorised as primarily or entirely lower riparian states (24), or countries with both significant lower and upper riparian geographies (29).[10]

Hence, lower riparian states and states with both significant lower and upper riparian interests tended to favour the text. Coupled with the fact that the three votes against the Convention and ten of the 27 abstentions were by states with primarily upper riparian



geographies, the vote may bear out the charge made by several states that the text disfavoured upper riparian states and placed greater burdens on them in the context of future development.

Among the 35 high-income nations participating in the vote, 28 voted in favour of the text, six abstained, and one was absent. Of the 131 low, lower-middle and upper-middle states (in prior years, known as developing nations), 75 voted in favour of the text, three voted against, 21 abstained, and 32 were absent. Among the eight high-income island-nations, all except the Bahamas (which was absent) voted in favour of the Convention text. Of the 25 low, lower-middle and upper-middle income island-nations, 14 voted in favour of the text, one abstained, and ten were absent from the vote.

In the context of a watercourse-by-watercourse review, lack of consistency among riparian states appeared to be the norm. With the possible exceptions of rivers in North America, Southern Africa and a few other regions, the vote by most riparian states of major watercourses was divided. In some cases, countries failed to participate in the vote at all, thus leaving the status of the Convention unclear as it might apply to a specific watercourse:

- *Tigris and Euphrates Rivers*: While Syria and Iran backed the Convention, Turkey voted against the text (upstream of both Syria and Iran). Iraq was not recorded as participating in the vote.
- *Nile River*: In a watercourse that traverses the Middle East and North Africa and the sub-Saharan Africa geographic regions, only Kenya and the Sudan voted in favour of the Convention. Seven other riparian states abstained, while Burundi opposed the text outright.
- *Niger and Volta Rivers*: Three states voted in favour, two abstained, and three were absent, including Niger and Nigeria. Chad and the Central African Republic did not participate in the vote.
- *Limpopo River*: Three of the four riparian states – Botswana, Mozambique and South Africa – voted for the text, while the fourth, Zimbabwe, was absent from the vote.
- *Orange River*: All four riparian states – Botswana, Lesotho, Namibia and South Africa – voted for the Convention.
- *Zambezi River*: Angola, Botswana, Malawi, Mozambique and Zambia backed the Convention, while Tanzania abstained, and Zimbabwe was absent.
- *Indus, Ganges, Brahmaputra and Mahakali Rivers*: Nepal and Bangladesh voted in favour of the text, while Pakistan and India both abstained. Bhutan was absent from the vote.
- *Mekong River*: Cambodia, Laos, Thailand and Vietnam voted in favour of the text, while China submitted one of only three votes against the Convention. Myanmar was absent from the vote.
- *Syr Darya, Amu Darya and Aral Sea*: Kazakstan voted for the Convention and Uzbekistan abstained, while Afghanistan, Tajikistan and Turkmenistan were formal absentees. Kyrgyzstan was not recorded as participating.
- *Danube River*: Of ten riparian states, seven voted in favour of the text. Bulgaria abstained, while Yugoslavia (Serbia-Montenegro) and Moldova did not participate in the vote.
- *Rhine River*: While France abstained, and Switzerland is not a member of the UN, the remaining six riparian states voted in favour of the Convention text.

- *Colorado River and Rio Grande*: Both Mexico and the US voted in favour of the Convention.
- *Columbia River*: Both Canada and the US voted in favour of the Convention.
- *Amazon River*: Brazil, Guyana, Suriname and Venezuela backed the Convention, while Bolivia, Peru, Colombia and Ecuador abstained.
- *La Plata and Paraguay Rivers*: Brazil and Uruguay supported the Convention while Argentina, Bolivia and Paraguay abstained.

Overall, a number of conclusions can be drawn from the voting patterns. Generally, lower riparian states and countries with both lower and upper riparian geographies tended to favour the Convention. High-income countries like those of North America and Europe, regardless of their upper or lower riparian geographies, also favoured adoption of the text. Likewise, arid states, especially those in the Middle East, generally backed the Convention. Finally, a large majority of island-nations and non-riparian states also supported the Convention. States that disfavoured the Convention included primarily upper riparian states with low, lower-middle and upper-middle income levels (those historically labelled as developing countries).

## The fate of the UN Convention

While the text of the Convention was adopted by a wide margin, the vote conceals the complexity of the subject matter and the intricacies of the state interests at stake. With the exception of most of the island-nations and those with no riparian interests, the votes were clearly factors of diverse economic, geographic and other national interests. As a result, the current status and future of the UN Convention may be somewhat unclear. Most concerning is that riparian states of many of the world's major watercourses, especially those that are the subject of disputes, did not vote consistently in favour of the Convention. Moreover, it is unclear whether enough states in such sensitive watercourses will ratify the agreement.

In fact, five years after its adoption in the UN General Assembly, the Convention is far from entering into force. Article 36(1) of the Convention provides that it shall enter into force upon submission of the 35th instrument of ratification, acceptance, approval or accession with the UN Secretary-General. By April 2002, only 12 states had ratified the Convention: Finland, Hungary, Jordan, Lebanon, Norway, South Africa, Sweden and Syria.[11] Another ten states had signed the document, but not yet ratified it: Côte d'Ivoire, Germany, Luxembourg, Namibia, the Netherlands, Paraguay, Portugal, Tunisia, Venezuela and Yemen (see figure 2).

Nevertheless, the vote on the UN Convention also suggests that the text has value as the product of a democratic process and may yet serve as a standard for state practice. Irrespective of the politics and national interests involved, passage of the Convention shows that there is broad agreement in the international community on, at least, the basic principles that govern transboundary water resources. The Convention was negotiated publicly and in the context of an international forum. Moreover, it was adopted by a weighty majority of UN members.

Even if the Convention never enters into force, it carries significant weight and will have influence in the development of other water resource agreements, as well as the resolution of controversies (see McCaffrey 2000:70). For example, prior to its adoption by the UN General Assembly, the ILC's Draft Articles had already significantly influenced the drafting of other international agreements, including the UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UN 1992), the SADC Protocol on Shared Watercourse Systems (SADC 1995), the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin (ILM 1995), and the 1991 Protocol on Common Water Resources concluded between Argentina and Chile (Anon 1997a). This trend has continued even after the Convention's adoption as evident in the 1999 Draft Protocol to the 1992 UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UN 1999).



Of particular significance, the Convention was recently referred to by the International Court of Justice (ICJ) in the Gabcíkovo-Nagymaros case with the Court also affirming the centrality of the principle of equitable and reasonable utilisation (see ICJ 1998).

In addition, the passage of the Convention strongly suggests that certain principles contained in the text have reached the status of accepted norms of international law regarding the non-navigational uses of international watercourses. Among others, these include the principles of equitable and reasonable use and of no significant harm. Both of these doctrines have substantial independent support in state practice and judicial decisions, as demonstrated by the ILC and the Sixth Committee of the UN in their extensive deliberations (see McCaffrey 2000:71; UN 1992; ILA 1996; Anon 1984; ICJ 1949: PCIJ 1927). Moreover, there is substantial evidence that the principle of prior notification of planned measures has also entered the realm of customary international law (see McCaffrey 2000:70; Barberis 1991:179; UN 1997a).

Ultimately, as noted by Ambassador Tello of Mexico, the Convention "undoubtedly marks an important step in the progressive development and codification of international law" (UN 1997c). This process of legal evolution, however, is a dynamic process that often requires years to develop. Therefore, the Convention's impact and effectiveness are not necessarily dependent upon its ratification. Rather, they are more subject to the degree to which states embrace the principles contained in the text over time. It will also depend on the ability and desire of states to use the Convention's guiding principles as a framework for more specific bilateral and regional agreements. In the words of Franklin D Roosevelt, "There are many ways of going forward, but only one way of standing still."

## Notes

1 When a state signs an international treaty, such as the UN Convention, it does not necessarily bind such a state to the terms of the treaty. This merely obliges the state not to act in a manner that would defeat the object and purpose of agreement. A treaty becomes binding on a state only after the state has followed its own domestic procedure for approving and implementing an international agreement.

2 International water law focuses solely on freshwater law and does not apply to coastal, ocean or seawaters.

3 The principle of absolute territorial sovereignty posits that states have the right to unrestrained use of resources within their territories. The principle is also known as the Harmon Doctrine, after US Attorney-General Judson Harmon, who declared in 1895 that, in the absence of established law to the contrary, states are free to exploit resources within their jurisdiction without regard to the extraterritorial effects of such action.

4 In direct contrast to absolute territorial sovereignty, absolute territorial integrity provides that lower riparian states have the right to the continuous or natural flow of a river.

5 Akin to the principle of sic utere tuo ut alienum non laedas, this doctrine holds that a state may use the waters flowing through its territory only to the extent that this does not interfere with the reasonable utilisation of downstream states.

6 The theory of community of interests advances the goal of optimal use and development of a transboundary water resource. It seeks to achieve economic efficiency and the greatest beneficial use possible, though often at the cost of equitable distribution and benefit among the states sharing the resource.

7 The principle of prior appropriation posits that current uses of water have precedence over future or planned uses.

8 This articulation is in line with the recent decision of the International Court of Justice (ICJ) in the Gabcíkovo-Nagymaros case between Hungary and Slovakia. The ICJ confirmed the centrality of the principle when it emphasised the importance of operating the project involved in the case "in an equitable and reasonable manner."

9 It is conceivable that their actions might also be motivated by political relations with states that do have transboundary water interests or concerns. However, such in-depth analysis is beyond the scope of this chapter.

10 States with both lower and upper riparian interests are categorised together with those that are predominantly lower riparian states, since the vote suggests that their interests correspond more closely with those of lower rather than of upper riparian states. Of the 43 states with both lower and upper riparian interests, 29 favoured the Convention, seven abstained, and seven were absent. Of the upper riparian states, three voted against the Convention, seven voted in favour, 10 abstained, and 8 did not participate in the vote.

11 Lebanon and Sweden officially acceded to the Convention without having signed it.



*Figure 1: Detailed breakdown of the recorded vote on the UN Watercourse Convention in the General Assembly*

| Country | Vote | Upper or Lower Riparian | Economic Level Income* | Geographic Region* |
|---|---|---|---|---|
| China | Against | Mostly Upper | Lower-Middle | East Asia & Pacific Islands |
| Turkey | Against | Mostly Upper | Lower-Middle | Eastern Europe & Central Asia |
| Burundi | Against | Upper | Low | Sub-Saharan Africa |
| | | | | |
| Albania | For | Mostly Lower | Lower-Middle | Eastern Europe & Central Asia |
| Algeria | For | Neither | Lower-Middle | Middle East & North Africa |
| Angola | For | Upper & Lower | Low | Sub-Saharan Africa |
| Antigua & Barbuda | For | Island Nation | Upper-Middle | Latin America & Caribbean |
| Armenia | For | Upper & Lower | Low | Eastern Europe & Central Asia |
| Australia | For | Island Nation | High | East Asia & Pacific Islands |
| Austria | For | Mostly Upper | High | Western Europe |
| Bahrain | For | Island Nation | Upper-Middle | Middle East & North Africa |
| Bangladesh | For | Mostly Lower | Low | South Asia |
| Belarus | For | Upper & Lower | Lower-Middle | Eastern Europe & Central Asia |
| Botswana | For | Mostly Lower | Lower-Middle | Sub-Saharan Africa |
| Brazil | For | Mostly Lower | Upper-Middle | Latin America & Caribbean |
| Brunei Darussalam | For | Neither | High | East Asia & Pacific Islands |
| Burkina Faso | For | Mostly Upper | Low | Sub-Saharan Africa |
| Cambodia | For | Upper & Lower | Low | East Asia & Pacific Islands |
| Cameroon | For | Upper & Lower | Low | Sub-Saharan Africa |
| Canada | For | Upper & Lower | High | North America |
| Chile | For | Mostly Lower | Upper-Middle | Latin America & Caribbean |
| Costa Rica | For | Neither | Lower-Middle | Latin America & Caribbean |
| Côte d'Ivoire | For | Mostly Lower | Low | Sub-Saharan Africa |
| Croatia | For | Upper & Lower | Upper-Middle | Eastern Europe & Central Asia |
| Cyprus | For | Island Nation | High | Eastern Europe & Central Asia |
| Czech Rep | For | Upper & Lower | Upper-Middle | Eastern Europe & Central Asia |
| Denmark | For | Neither | High | Western Europe |
| Djibouti | For | Neither | Lower-Middle | Middle East & North Africa |
| Estonia | For | Upper & Lower | Upper-Middle | Eastern Europe & Central Asia |
| Finland | For | Neither | High | Western Europe |
| Gabon | For | Mostly Lower | Upper-Middle | Sub-Saharan Africa |
| Georgia | For | Mostly Upper | Low | Eastern Europe & Central Asia |
| Germany | For | Upper & Lower | High | Western Europe |

| Country | Vote | Upper or Lower Riparian | Economic Level Income* | Geographic Region* |
|---|---|---|---|---|
| Greece | For | Upper & Lower | High | Western Europe |
| Guyana | For | Upper & Lower | Lower-Middle | Latin America & Caribbean |
| Haiti | For | Island Nation | Low | Latin America & Caribbean |
| Honduras | For | Mostly Lower | Lower-Middle | Latin America & Caribbean |
| Hungary | For | Upper & Lower | Upper-Middle | Latin America & Caribbean |
| Iceland | For | Island Nation | High | Western Europe |
| Indonesia | For | Island Nation | Low | East Asia & Pacific Islands |
| Iran | For | Neither | Lower-Middle | Middle East & North Africa |
| Ireland | For | Island Nation | High | Western Europe |
| Italy | For | Neither | High | Western Europe |
| Jamaica | For | Island Nation | Lower-Middle | Latin America & Caribbean |
| Japan | For | Island Nation | High | East Asia & Pacific Islands |
| Jordan | For | Lower | Lower-Middle | Middle East & North Africa |
| Kazakhstan | For | Upper & Lower | Lower-Middle | Eastern Europe & Central Asia |
| Kenya | For | Upper & Lower | Low | Sub-Saharan Africa |
| Kuwait | For | Neither | High | Middle East & North Africa |
| Laos | For | Mostly Lower | Low | East Asia & Pacific Islands |
| Latvia | For | Mostly Lower | Lower-Middle | Eastern Europe & Central Asia |
| Lesotho | For | Mostly Upper | Low | Sub-Saharan Africa |
| Liberia | For | Mostly Lower | Low | Sub-Saharan Africa |
| Libya | For | Neither | Upper-Middle | Middle East & North Africa |
| Liechtenstein | For | Neither | High | Western Europe |
| Lithuania | For | Mostly Lower | Lower-Middle | Eastern Europe & Central Asia |
| Luxembourg | For | Upper & Lower | High | Western Europe |
| Madagascar | For | Island Nation | Low | Sub-Saharan Africa |
| Malawi | For | Mostly Upper | Low | Sub-Saharan Africa |
| Malaysia | For | Neither | Lower-Middle | East Asia & Pacific Islands |
| Maldives | For | Island Nation | Lower-Middle | South Asia |
| Malta | For | Island Nation | Upper-Middle | Middle East & North Africa |
| Marshall Is | For | Island Nation | Low | East Asia & Pacific Islands |
| Mauritius | For | Island Nation | Upper-Middle | Sub-Saharan Africa |
| Mexico | For | Upper & Lower | Upper-Middle | Latin America & Caribbean |
| Micronesia | For | Island Nation | Lower-Middle | East Asia & Pacific Islands |
| Morocco | For | Neither | Lower-Middle | Middle East & North Africa |
| Mozambique | For | Mostly Lower | Low | Sub-Saharan Africa |



| Country | Vote | Upper or Lower Riparian | Economic Level Income* | Geographic Region* |
|---|---|---|---|---|
| Namibia | For | Upper & Lower | Lower-Middle | Sub-Saharan Africa |
| Nepal | For | Mostly Upper | Low | South Asia |
| Netherlands | For | Mostly Lower | High | Western Europe |
| New Zealand | For | Island Nation | High | East Asia & Pacific Islands |
| Norway | For | Upper & Lower | High | Western Europe |
| Oman | For | Neither | Upper-Middle | Middle East & North Africa |
| Papua New Guinea | For | Island Nation | Lower-Middle | East Asia & Pacific Islands |
| Philippines | For | Island Nation | Lower-Middle | East Asia & Pacific Islands |
| Poland | For | Mostly Lower | Upper-Middle | Eastern Europe & Central Asia |
| Portugal | For | Mostly Lower | High | Western Europe |
| Qatar | For | Neither | High | Middle East & North Africa |
| South Korea | For | Mostly Lower | Upper-Middle | East Asia & Pacific Islands |
| Romania | For | Upper & Lower | Lower-Middle | Eastern Europe & Central Asia |
| Russian Fed | For | Upper & Lower | Lower-Middle | Eastern Europe & Central Asia |
| Samoa | For | Island Nation | Lower-Middle | East Asia & Pacific Islands |
| San Marino | For | Neither | High | Western Europe |
| Saudi Arabia | For | Neither | Upper-Middle | Middle East & North Africa |
| Sierra Leone | For | Mostly Lower | Low | Sub-Saharan Africa |
| Singapore | For | Neither | High | East Asia & Pacific Islands |
| Slovak Rep | For | Upper & Lower | Upper-Middle | Eastern Europe & Central Asia |
| Slovenia | For | Upper & Lower | High | Eastern Europe & Central Asia |
| South Africa | For | Mostly Upper | Upper-Middle | Sub-Saharan Africa |
| Sudan | For | Mostly Upper | Low | Middle East & North Africa |
| Suriname | For | Mostly Lower | Lower-Middle | Latin America & Caribbean |
| Sweden | For | Upper & Lower | High | Western Europe |
| Syria | For | Upper & Lower | Lower-Middle | Middle East & North Africa |
| Thailand | For | Mostly Lower | Lower-Middle | East Asia & Pacific Islands |
| Trinidad & Tobago | For | Island Nation | Upper-Middle | Latin America & Caribbean |
| Tunisia | For | Mostly Lower | Lower-Middle | Middle East & North Africa |
| Ukraine | For | Upper & Lower | Low | Eastern Europe & Central Asia |
| UAE | For | Neither | High | Middle East & North Africa |
| UK | For | Island Nation | High | Western Europe |
| United States | For | Upper & Lower | High | North America |
| Uruguay | For | Mostly Lower | Upper-Middle | Latin America & Caribbean |

| Country | Vote | Upper or Lower Riparian | Economic Level Income* | Geographic Region* |
|---|---|---|---|---|
| Venezuela | For | Upper & Lower | Upper-Middle | Latin America & Caribbean |
| Viet Nam | For | Mostly Lower | Low | East Asia & Pacific Islands |
| Yemen | For | Neither | Low | Middle East & North Africa |
| Zambia | For | Upper & Lower | Low | Sub-Saharan Africa |
| Andorra | Abstain | Neither | High | Western Europe |
| Argentina | Abstain | Upper & Lower | Upper-Middle | Latin America & Caribbean |
| Azerbaijan | Abstain | Mostly Lower | Low | Eastern Europe & Central Asia |
| Belgium | Abstain | Upper & Lower | High | Western Europe |
| Bolivia | Abstain | Mostly Upper | Lower-Middle | Latin America & Caribbean |
| Bulgaria | Abstain | Mostly Lower | Lower-Middle | Eastern Europe & Central Asia |
| Colombia | Abstain | Upper | Lower-Middle | Latin America & Caribbean |
| Cuba | Abstain | Island Nation | Lower-Middle | Latin America & Caribbean |
| Ecuador | Abstain | Mostly Upper | Lower-Middle | Latin America & Caribbean |
| Egypt | Abstain | Lower | Lower-Middle | Middle East & North Africa |
| Ethiopia | Abstain | Mostly Upper | Low | Sub-Saharan Africa |
| France | Abstain | Upper & Lower | High | Western Europe |
| Ghana | Abstain | Lower | Low | Sub-Saharan Africa |
| Guatemala | Abstain | Mostly Upper | Lower-Middle | Latin America & Caribbean |
| India | Abstain | Upper & Lower | Low | South Asia |
| Israel | Abstain | Mostly Lower | High | Middle East & North Africa |
| Mali | Abstain | Upper & Lower | Low | Sub-Saharan Africa |
| Monaco | Abstain | Neither | High | Western Europe |
| Mongolia | Abstain | Upper | Low | East Asia & Pacific Islands |
| Pakistan | Abstain | Mostly Lower | Low | South Asia |
| Panama | Abstain | Neither | Upper-Middle | Latin America & Caribbean |
| Paraguay | Abstain | Upper & Lower | Lower-Middle | Latin America & Caribbean |
| Peru | Abstain | Upper & Lower | Lower-Middle | Latin America & Caribbean |
| Rwanda | Abstain | Upper | Low | Sub-Saharan Africa |
| Spain | Abstain | Upper | High | Western Europe |
| Tanzania | Abstain | Upper | Low | Sub-Saharan Africa |
| Uzbekistan | Abstain | Mostly Upper | Low | Eastern Europe & Central Asia |
| Afghanistan | Absent | Mostly Upper | Low | South Asia |
| Bahamas | Absent | Island Nation | High | Latin America & Caribbean |
| Barbados | Absent | Island Nation | Upper-Middle | Latin America & Caribbean |
| Belize | Absent | Mostly Lower | Lower-Middle | Latin America & Caribbean |
| Benin | Absent | Upper & Lower | Low | Sub-Saharan Africa |
| Bhutan | Absent | Mostly Upper | Low | South Asia |
| Cape Verde | Absent | Island Nation | Lower-Middle | Sub-Saharan Africa |
| Comoros | Absent | Island Nation | Low | Sub-Saharan Africa |
| North Korea | Absent | Upper & Lower | Low | East Asia & Pacific Islands |
| Dominican Rep | Absent | Island Nation | Lower-Middle | Latin America & Caribbean |
| El Salvador | Absent | Mostly Lower | Lower-Middle | Latin America & Caribbean |
| Eritrea | Absent | Mostly Lower | Low | Sub-Saharan Africa |
| Fiji | Absent | Island Nation | Lower-Middle | East Asia & Pacific Islands |
| Guinea | Absent | Mostly Upper | Low | Sub-Saharan Africa |
| Lebanon | Absent | Upper | Upper-Middle | Middle East & North Africa |
| Mauritania | Absent | Lower | Low | Sub-Saharan Africa |
| Myanmar | Absent | Mostly Lower | Low | East Asia & Pacific Islands |
| Niger | Absent | Upper & Lower | Low | Sub-Saharan Africa |
| Nigeria | Absent | Mostly Lower | Low | Sub-Saharan Africa |
| Palau | Absent | Island Nation | Upper-Middle | East Asia & Pacific Islands |
| Saint Kitts & Nevis | Absent | Island Nation | Upper-Middle | Latin America & Caribbean |
| Saint Lucia | Absent | Island Nation | Upper-Middle | Latin America & Caribbean |
| St. Vincent & The Grenadine | Absent | Island Nation | Upper-Middle | Latin America & Caribbean |
| Senegal | Absent | Upper & Lower | Low | Sub-Saharan Africa |
| Solomon Is | Absent | Island Nation | Low | East Asia & Pacific Islands |
| Sri Lanka | Absent | Island Nation | Lower-Middle | South Asia |
| Swaziland | Absent | Mostly Upper | Upper-Middle | Sub-Saharan Africa |
| Tajikistan | Absent | Mostly Upper | Low | Eastern Europe & Central Asia |
| Macedonia | Absent | Mostly Upper | Lower-Middle | Eastern Europe & Central Asia |
| Turkmenistan | Absent | Upper & Lower | Low | Eastern Europe & Central Asia |
| Uganda | Absent | Mostly Upper | Low | Sub-Saharan Africa |
| Zaire (DRC) | Absent | Upper & Lower | Low | Sub-Saharan Africa |
| Zimbabwe | Absent | Upper & Lower | Low | Sub-Saharan Africa |

* Note: Economic income level and geographic region categories, except the Western Europe geographic region category, are based on classifications established by the World Bank. The Western Europe geographic region category was created by this author.

*Figure 2: Status of the UN Watercourse Convention, 1 August 2002*

| Party | Signature | Ratification | Acceptance | Accession | Approval |
|---|---|---|---|---|---|
| Côte d'Ivoire | 25 Sep 1998 | | | | |
| Finland | 31 Oct 1997 | | 23 Jan 1998 | | |
| Germany | 13 Aug 1998 | | | | |
| Hungary | 20 Jul 1999 | | | | 26 Jan 2000 |
| Iraq | | | | 9 July 2001 | |
| Jordan | 17 Apr 1998 | 22 Jun 1999 | | | |
| Lebanon | | | | 25 May 1999 | |
| Luxembourg | 14 Oct 1997 | | | | |
| Namibia | 19 May 2000 | 29 Aug 2001 | | | |
| Netherlands | 9 Mar 2000 | | 9 Jan 2001 | | |
| Norway | 30 Sep 1998 | 30 Sep 1998 | | | |
| Paraguay | 25 Aug 1998 | | | | |
| Portugal | 11 Nov 1997 | | | | |
| Qatar | | | | 9 Feb 2002 | |
| South Africa | 13 Aug 1997 | 26 Oct 1998 | | | |
| Sweden | | | | 15 Jun 2000 | |
| Syrian Arab Republic | 11 Aug 1997 | 2 Apr 1998 | | | |
| Tunisia | 19 May 2000 | | | | |
| Venezuela | 22 Sep 1997 | | | | |
| Yemen | 17 May 2000 | | | | |

Note: Article 36(1) of the UN Watercourse Convention provides that "The present Convention shall enter into force on the ninetieth day following the date of deposit of the thirty-fifth instrument of ratification, acceptance, approval or accession with the Secretary-General of the United Nations."

The Convention was open for signature from 21 May 1997 until 21 May 2000. States, however, may continue to ratify, accept, approve or accede to the Convention indefinitely.

# Chapter 7
# From Harmon to Helsinki: The evolution of key principles in international water la w

**Sackey Akweenda**

## Introduction

The Harmon Doctrine developed out of a dispute between Mexico and the United States that arose in 1894 and 1895. Mexico protested against the diversion of the Rio Grande in the US to the detriment of existing Mexican users. Mexico contended that:

> "the principles of international law would form a sufficient basis for the rights of the Mexican inhabitants of the bank of the Rio Grande. Their claim to the use of the water of that river is incontestable, being prior to that of the inhabitants of Colorado by hundreds of years, and, according to the principles of civil law, a prior claim takes precedence in case of dispute" (Griffin 1895:50).

The US Secretary of State requested Attorney-General Harmon to prepare an opinion on the Mexican contentions. Harmon declared in 1895 that, since the US had sovereignty over the Rio Grade in its territory, international law imposes no obligation upon the US to share the water with Mexico, or to pay damages for injury in Mexico caused by diversion in the US. Significantly, the US government did not comply with the opinion given by Harmon. Instead of implementing the opinion, Mexico and the US jointly established a boundary commission to investigate and report on the Rio Grande dispute. On 25 November 1896, the commission issued a report stating that the only feasible way to regulate the use of the water in order to secure the legal and equitable rights of each state was to build a dam at El Paso. The commission further reported that Mexico had been wrongly deprived of its equitable rights for many years. It recommended that the dispute should be settled by a treaty that divided the use of water equally. Mexico waived all claims for past damages. The treaty was accordingly concluded on 21 May 1906.

The opinion given by Harmon is commonly referred to as the Harmon Doctrine. This is certainly an old opinion on territorial sovereignty. By way of summary, it provides that a state may do as it pleases with the water in its territory without any legal responsibility for the injury it may inflict on states sharing such a basin. This approach has long been obsolete and has been replaced by the principle of equitable utilisation. According to modern international law, a riparian state must refrain from altering, diverting or stopping the flow of a river traversing its territory to the detriment of co-basin states, or from using water in such a manner that it either prevents a co-basin state from enjoying the use of the river in its territory, or causing it any damage or danger (Oppenheim 1955:474-476)

The issue of state sovereignty is clearly implied in these principles. An attempt to define sovereignty was made by Judge Max Huber, the sole arbiter in a case known as Island of Palmas (1928). In this case, the Netherlands and the US agreed to submit to the Permanent Court of Arbitration a dispute concerning sovereignty over the Island of

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Palmas or Miangas lying between the Philippine Islands, then under US control, and the Netherlands East Indies as they were known at the time. Judge Huber stated:

> "Sovereignty in the relations between States signifies independence. Independence in regard to a portion of the globe in the right to exercise therein, to the exclusion of any other State the functions of a State … Territorial sovereignty belongs always to one, or in exceptional circumstances to several States, to the exclusion of all others."

The term sovereignty appears in some conventions, notably the Convention on International Civil Aviation (the Chicago Convention) of 1944. Article 1 of the convention, entitled 'sovereignty', provides that "contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory." This is a restatement of the principle of international law. Brownlie rightly states that the term sovereignty is normally used to describe the legal competence of states in general. This includes legislative, judicial and administrative competence over national territory (Brownlie 1999:29). Sovereignty may also refer to the power to acquire title to the territory and the rights accruing from the exercise of the power (Brownlie 1999:301).

## Contributions to international water la w

International organisations, both governmental and non-governmental, made valuable contributions to the codification and progressive development of international water law. This chapter explores some contributions by intergovernmental organisations, and international and national NGOs in an attempt to develop key principles in international water law. The measures adopted by intergovernmental organisations include:

- Montevideo Convention on the Rights and Duties of States of 24 December 1933 adopted by the 7th International Conference of American States (League of Nations);
- propositions adopted by the Asian-African Legal Consultative Committee in 1973; and
- Draft Principles of Conduct released on 7 February 1978 in Nairobi by the Inter-Governmental Group of Experts on Natural Resources Shared by More than One State.

Fifteen Latin American states and the US are parties to the Montevideo Convention. The convention provides that parties should settle water disputes through "diplomatic channels", "conciliation" or "any other procedure contained in any of the multilateral conventions in effect in America" (articles 9 &10). The rules on international drainage basins adopted by the Asian-African Legal Consultative Committee are set out in Proposition X:

> "A state which proposes a change of the prevailing existing uses of the waters of an international drainage basin that might seriously affect utilization of the waters by any other co-basin state, must first consult with the other interested co-basin states. In case agreement is not reached through such consultation, the states concerned should seek the advice of the technical expert or commission. If this does not lead to agreement, resort should be had to the other peaceful methods provided for in Article 33 of the United Nations Charter and, to international arbitration and adjudication" (see Asian-African Legal Consultative Committee 1973:91-107).

Contributions by international NGOs include:

- resolutions of the Institute of International Law;
- resolutions of the Inter-American Bar Association; and
- rules adopted by the International Law Association (ILA) at the Helsinki conference in 1966 regarding the use of international rivers; the New York conference in 1972 dealing with flood control; and the Madrid conference in 1976 on the administration of international water resources.



The Institute of International Law was founded in 1873. Its aim is to contribute to the development of international law, among others, by "endeavouring to state the general principles of the science" (Scott 1916:xx). As early as the session held in Paris in 1878, members of the Institute expressed concern over the necessity to place the navigation of the Congo River under international supervision. The Institute subsequently adopted a resolution on the Congo River at its session held in Munich on 7 September 1883 (Scott 1916:63). On 9 September 1887, in Heidelberg, the Institute adopted a resolution on the navigation of rivers (Scott 1916:78). In 1910, at its session held in Paris, the Institute decided to study the formulation of "the rules of international law relating to international river[s] from [the] point of view of the utilization of their energy." It adopted a resolution on the subject on 20 April 1911 in Madrid (Scott 1916:168). However, the Institute decided later to study the issue again. Consequently, at its session held in Granada in 1956, the Institute established a new commission, which prepared a draft resolution that was presented at the session held in Neuchatel in September 1959 (see ILA 1972:43-96; 1976:239). At its session held in Salzburg from 4 to 13 September 1961, the Institute considered the final report of the commission accompanied by a further draft of the resolution. On 11 September, it adopted the resolution on the utilisation on non-maritime international waters (except for navigation). The preamble of the resolution states that the economic importance of the use of waters is transformed by modern technology. The application of modern technology to the waters of a hydrographic basin that includes the territories of several states clearly affects all states in general. The preamble further states that "the maximum utilization of available natural resources is a matter of common interest", and that "the obligation not to cause unlawful harm to others is one of the basic general principles governing neighbourly relations." The resolution subsequently included nine articles or 'recommendations'.

*Article 1.* The present rules and recommendations are applicable to the utilization of waters which form part of a watercourse or hydrographic basin which extends over the territory of two or more States.
*Article 2.* Every State has the right to utilize waters which traverse or border its territory, subject to the limits imposed by international law and, in particular, those resulting from the provisions which follow. This right is limited by the right of utilization of other states interested in the same watercourse or hydrographic basin.
*Article 3.* If the States are in disagreement over the scope of their rights of utilization, settlement will take place on the basis of equity, taking particular account of their respective needs, as well as of other pertinent circumstances.
*Article 4.* No State can undertake works or utilizations of the waters of a watercourse or hydrographic basin which seriously affect the possibility of utilization of the same waters by other States except on condition of assuring them the enjoyment of the advantages to which they are entitled under Article 3, as well as adequate compensation for any loss or damage.

*Article 5.* Works of utilizations referred to in the preceding Article may not be undertaken except after previous notice to interested States.
*Article 6.* In case objection is made, the States will enter into negotiations with a view to reaching an agreement within a reasonable time. For this purpose, it is desirable that the States in disagreement should have recourse to technical experts and, should occasion arise, to commissions and appropriate agencies in order to arrive at solutions assuring the greatest advantage to all concerned.
*Article 7.* During the negotiations, every State must, in conformity with the principle of good faith, refrain from undertaking the works or utilizations which are the object of the dispute or from taking any other measures which might aggravate the dispute or render agreement more difficult.
*Article 8.* If the interested States fail to reach agreement within a reasonable time, it is recommended that they submit to judicial settlement or arbitration the question whether the project is contrary to the above rules. If the State objecting to the works or utilizations projected refuses to submit to judicial settlement or arbitration, the other State is free, subject to its responsibility, to go ahead while remaining bound by its obligations arising from the provisions of Articles 2 to 4.
*Article 9.* It is recommended that States interested in particular hydrographic basins investigate the desirability of creating common organs for establishing plans of utilization designed to facilitate their economic development as well as to prevent and settle dispute which might arise.

Clearly, the resolution does not support the Harmon Doctrine. The Institute referred to the nine articles as 'rules' or 'recommendations'. These rules or recommendations contributed significantly to the development of international water law.

Other international NGOs that have been involved in water law are the World Power Conference and the International Commission on Irrigation and Drainage.

With regard to national NGOs, a significant contribution was made by the American Bar Association. The resolution adopted by the council of the Section of International and Comparative Law at a meeting held in Chicago on 22 February 1959 provides as follows:

> "Resolved, that the Council, considering the report of the Committee on Uses of International Inland Waters, approves, in conformity with its support of the rule of law, the principle that the United States or any state thereof should not unilaterally divert any boundary inland waters, or international rivers without consulting with and obtaining the agreement of any interested foreign state or seeking a solution in accordance with the principles and procedures set out in the Charter of the United Nations and the procedures envisaged in Article 33 thereof or other treaty provision"(American Bar Association 1960:128).

The Austrian Society for Water Economy, another national NGO, also made a study of the subject under discussion in 1955.

## Helsinki Rules on the Uses of International Ri vers

In 1954, the ILA established a committee to consider the uses of international rivers. The aim of the committee was to clarify and restate existing international law as it applies



to the rights of states to utilise the waters of an international drainage basin. With Eagleton as chairperson, the committee presented its first report at a conference held in Dubrovnik in 1956. At its 52nd conference held in Helsinki in 1966, the ILA approved the articles prepared by the committee, and resolved that they should be known as the *Helsinki Rules on the Uses of International Rivers*.

### *Scope*

The Helsinki Rules consist of 37 articles and one annex with five articles, dealing with:

- the general scope of the Rules;
- equitable utilisation of an international drainage basin;
- pollution;
- navigation;
- timber-floating; and
- the procedure for the prevention and settlement of disputes.

The annex contains the Model Rules for the Constitution of the Conciliation Commission for the Settlement of Disputes in the implementation of article XXXIII. The scope of the rules is defined by article I, which provides that they "are applicable to the use of waters of an international drainage basin except as may be provided otherwise by convention, agreement or binding custom among the basin States." An 'international drainage basin'is described as:

> "a geographical area extending over two or more States determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus" (ILA 1966:article II).

The ILA stressed that a drainage basin is an "indivisible hydrologic unit." According to the above definition, an international drainage basin is the entire area known as the 'watershed' that contributes water, both surface and underground, to the principal river, stream, lake or other common terminus. With regard to underground waters, the ILA conceded that, due to certain geographic features, such water may occasionally flow in a direction or have an outlet different from that of the surface waters of the same area. Furthermore, in rare instances, underground waters appear to form indistinct underground fields without ascertainable limits. For these reasons, the ILA maintained that underground waters constituting a part of the drainage basin, as described in article II, are those that contribute to its principal river, stream, lake or other common terminus. The ILA further commented that a state, although not a riparian to the principal stream of the basin, may nevertheless supply a substantial quantity of water to the basin. Thus, such a state is in a position to interfere with the supply of water through action that involves the water flowing within its own territory. The ILA therefore concluded that, in order to accommodate potential or existing conflicts in instances of the multi-use development of a common resource for the benefit of each state where a portion of the system lies in its territory, the drainage approach has become a necessity.

### *Basin state*

The Helsinki Rules define a basin state as "a State the territory of which includes a portion of an international drainage basin" (ILA 1966:article III). This definition is

intended to include all states that contribute waters to the international drainage basin, regardless whether or not they are considered to be 'riparian'(ILA 1966:486). According to customary international law, states that are territorially concerned with an international drainage basin are referred to as 'riparian', 'co-riparian', or 'upper riparian'. The ILA maintained that these terms are based upon the view that the territory of the state so described touches a river flowing on the surface of the drainage basin. However, recognition of the fact that underground waters may flow from a state into the territory of other states in an international drainage basin without reaching the surface in its own territory, where they contribute substantially to the surface flow, demonstrates that these terms are inadequate to describe all states included in the international drainage basin.

## *Equitable utilisation of water*

According to article IV of the Helsinki Rules, "each State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin." This principle recognised that each basin state has rights equal in kind and correlative with those of each co-basin state. Equal and correlative rights do not mean that each state will receive an identical share of water, as this will depend on those factors listed in article V of the Helsinki Rules. The ILA noted that, to be worthy of protection, the use of water must be "beneficial", or "economically or socially valuable."

The nature and extent of a 'reasonable and equitable share'are to be determined by all relevant factors in each particular case. The relevant factors to be considered are listed in article V(2) of the Helsinki Rules, and include:

- the geography of the basin, including the extent of the drainage area in the territory of each basin state in particular;
- the hydrology of the basin, including the contribution of water by each basin state in particular;
- the climate affecting the basin;
- the past utilisation of the water of the basin, as well as current utilisation in particular;
- the economic and social needs of each basin state;
- the population that depends on the water of the basin in each basin state;
- the comparative costs of alternative means of satisfying the economic and social needs of each basin state;
- the availability of other resources;
- the avoidance of unnecessary waste in the utilisation of the water of the basin; and
- the practicality of compensation to one or more of the co-basin states as a means to adjust conflicts among users, and the degree to which the needs of a basin state may be satisfied without causing substantial injury to a co-basin state.

The list above is not exhaustive, since each case must be examined according to its own merits. The weighing of these factors may result in one co-basin state receiving the right to use water in quantitatively greater volumes than its neighbours. The notion of equitable sharing provides the maximum benefit from the use of the water to each state, while ensuring the minimum detriment to each state.

It is worth commenting on preferential and future uses at this juncture. Article VI of the Helsinki Rules provides that "a use or category of uses is not entitled to any inherent



preference over any other use or category of uses." This means that a drainage basin must be examined on an individual basis to determine which uses are the most important in such a basin, or in a portion of the basin where appropriate. With regard to future use, article VII of the Helsinki Rules provides that "a basin State may not be denied the present reasonable use of the waters of an international drainage basin to reserve for a co-basin State a future use of such waters." The ILA noted that the reservation of water for future utilisation can only be accomplished to a meaningful degree of certainty if there are detailed plans available for future use. Thus, article VII is intended to ensure that no current user's needs will go unsatisfied if the water has been reserved for uncertain future use by another co-basin state. When a state is ready to use the water or to increase existing use, the entire issue of the equitable utilisation of the water will be reviewed (ILA 1966:493). In reviewing equitable utilisation, consideration must be given to the rules stipulated in article VIII. In this context, the rules provide that an existing reasonable use may continue operating unless the factors justifying its continuance are outweighed by other factors, which lead to the conclusion that it should be modified or terminated to accommodate a competing incompatible use. Furthermore, a use that is operational is deemed to have been an existing use from the time of the initiation of construction directly related to the use or, where such construction is not required, the undertaking of comparable acts of actual implementation. Such a use continues to be an existing use until such a time as it is discontinued with the intention to be abandoned. A use will not be deemed an existing use, however, if it is incompatible with an already existing reasonable use at the time of becoming operational.

The principle of a reasonable and equitable share rejected the claim to unlimited sovereignty exemplified by the Harmon Doctrine. The ILArightly stated that the Harmon Doctrine never had a large following among states and was rejected by virtually all states that had the occasion to reject it.

## *Legal significance of the Helsinki Rules*

The International Law Association, or the Association for the Reform and Codification of the Law of Nations as it was originally known, was founded in Brussels at a conference held on 10, 11 and 13 October 1873. The main objectives of the association, as its original name indicates, are the reform and codification of international law. The ILA can be seen as a collection of highly qualified publicists for the different nations represented among its ranks. The ILA's Helsinki Rules undoubtedly contributed to the development of international water law. Some of the Helsinki Rules are merely declarations of the principles of international law. The doctrine of 'reasonable and equitable share', for instance, might have become a principle of international law by virtue of state practise before the rules were approved in 1966. The ILA, for example, cited the dispute between Bolivia and Chile over the Lauca River, where Chile, the upper riparian, did not utilise the Harmon Doctrine to justify its conduct, but instead recognised that Bolivia had certain rights in the water. The association also referred to the dispute between Israel and certain Arab states where both sides adhered to the position that each is entitled to a share of the relevant basin waters. Starke noted that the Helsinki Rules "broke new ground in certain respects" and could well "serve as a basic draft for a proposed general convention" (1984:188).

## Principles of modern international la w

In international law, a state is not allowed to alter the natural conditions of its own territory to the disadvantage of the natural conditions of a neighbouring state. The flow of international rivers clearly does not fall within the exclusive sovereignty of one state. As Eagleton, the president of the American branch of the ILAat the time, pointed out:

> "while each State has sovereign control within its own boundaries, in so far as international rivers are concerned, a State may not exercise that control without taking into account the effect upon other riparian States" (Eagleton 1955:1018).

Bourne also clearly pointed out that "there is ample authority for the proposition that a State can utilize the waters in its territory if its doing so will cause no injury to co-riparians" (Bourne 1965:189; see also Akweenda 1997:63; Bourne 1969:62; Manner 1987:53; Bos 1973:131; Bains 1960-61:39; Griffin 1957:36; Griffin 1959:59; Bacon 1929:158; Smith 1930:195; Hyde 1910:145). States have thus concluded agreements that contain specific provisions on their rights and obligations.

Reference may be made at this juncture to some provisions of the United Nations Convention on the Non-Navigational Use of International Watercourses adopted by the UN General Assembly and opened to signature on 21 May 1997. In the preamble, parties to the convention expressed "the conviction that a framework convention will ensure the utilization, development, conservation, management and protection of international watercourses and the promotion of the optimal and sustainable utilization thereof for present and future generations." The preamble also affirms "the importance of international cooperation and good-neighbourliness in this field." Significantly, the parties recorded in the preamble that they are:

> "mindful of the valuable contribution of international organizations, both governmental and non-governmental, to the codification and progressive development of international law in this field."

The rights and obligations of watercourse states arising from agreements that are in force for such states on the date on which they become parties to this Convention are protected (article 1). However, states may consider harmonising such agreements with the basic principles of the Convention (article 2). Watercourse states may enter into applicable watercourse agreement and adjust the provisions of the Convention to suit the characteristics and uses of the whole or a part of a particular international watercourse (article 3). Such an agreement shall define the waters to which it applies. It may be entered into with respect to an entire international watercourse, any part of a watercourse, or a particular project, programme or use, except in so far as the agreement adversely affects to a significant extent the use by one or more other watercourse states (article 4). Significantly, the Convention contains principles on equitable and reasonable utilisation and the relevant factors in this regard (article 5).

# Chapter 8
# The SADC Protocol on Shared Watercourses: History and current status

**Phera Ramoeli**

## Introduction

Water is Southern Africa's single most shared resource. It occurs with varying abundance or scarcity at different times of the year and in different parts of the region. The Southern African Development Community (SADC), a regional grouping of 14 sovereign member states, comprises Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. SADC brings its member states together with one common goal of regional integration on the basis of balance, equity and mutual benefit for all the peoples of the region. SADC was formally established through the signing of the SADC Treaty on 27 August 1992 in Windhoek, Namibia. The SADC Treaty is the central document that outlines the vision, overall objectives and institutional framework of the Community. Article 22(1) of the Treaty provides for member states to conclude a series of protocols that elaborate the objectives, scope and institutional mechanisms for co-operation and integration in the region. These protocols are to be developed, negotiated and agreed upon with the focus on various areas of co-operation as identified in article 21(3) of the SADC Treaty. These protocols, after negotiation by member states and approval and signature by the Summit, become integral parts of the Treaty.

The following paragraphs highlight some of the historical background to the co-operation on water issues in SADC through a regional framework protocol. The chapter also highlights some of the challenges facing the region in terms of water resources management and development, including the process of protocol implementation.

## Historical background of the SADC Protocol on Shared Watercourses, 1995

SADC gradually developed from a co-ordination conference founded in 1980, to a development community in 1992, with an increased number of members. The importance of water in regional co-operation and integration was soon demonstrated by the formulation of the SADC Protocol on Shared Watercourse Systems that was signed in 1995, and finally by the establishment of the dedicated Water Sector as an area of co-operation in August 1996.

The SADC Protocol on Shared Watercourse Systems was the first sectoral protocol to be developed by the Community. Its history goes back to 1993 when SADC was implementing one of its basin-wide programmes, the Zambezi River Basin System Action Plan (ZACPLAN). This was initially implemented as one of the ZACPLAN projects (ZACPRO 2), which aimed to establish a basin-wide legal and institutional framework to facilitate the environmentally sound management of the Zambezi River basin. In the process of

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negotiating the agreement for the establishment of the Zambezi River Basin Commission (ZAMCOM) by the riparian states of the basin, SADC felt that, instead of developing a single legal instrument for river basin management, it should rather first develop a region-wide legal framework on which all river basin instruments should be based. As a result of this decision, a process of negotiation was initiated by member states in 1993 to formulate the Protocol on Shared Watercourse Systems. The Protocol was subsequently adopted and signed by 10 SADC member states: Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe, in 1995 in Johannesburg, South Africa. Mauritius signed the Protocol when it became a member of SADC in 1996.

## The process of amending the Protocol

Some member states had certain reservations about the contents of the Protocol even at the time of signature. The Summit approved that their concerns should be addressed through a process of consultation and negotiation, which started with these member states submitting their areas of concern and/or reservation. The process took the form of making recommendations for amendments to the Protocol with the first round of negotiations starting in April 1997 at a workshop in Swaziland. It culminated in a series of proposed amendments in 1999 after three more negotiation forums were held. The complete process was consultative in nature, both at regional and national level, and was further enhanced and supported by national 'water week workshops' in which the Protocol and its implications for implementation were the main subjects of discussion. These workshops assisted member states in clearly understanding the provisions and contents of the Protocol, as well as the implications for member states in ensuring its smooth implementation.

The Protocol amendment process was further influenced by developments in international water law, particularly the adoption by the United Nations of the Convention on the Law of the Non-Navigational Uses of International Watercourses (the UN Watercourse Convention), in April 1997. The SADC Water Sector Co-ordinating Unit commissioned a study, which considered both the Protocol and the UN Watercourse Convention, aiming to identify possible areas of conflict and disharmony with a view of aligning the Protocol to the Convention. A discussion paper was produced and circulated among member states, which used it to guide their national consultations on the Protocol. The results of this process are evident in the provisions of the Revised Protocol, especially with regard to environmental protection, planned measures, and compensation for harm caused.

The SADC Revised Protocol on Shared Watercourses was adopted by a SADC Summit of Heads of State and Government at an ordinary summit meeting in Windhoek, Namibia, in August 2000. It has since been opened for signature and subsequent ratification by member states. It has been signed by all SADC member states and, by June 2001, had been ratified by three states, with others at different stages of the ratification process. The original Protocol, which entered into force in September 1998, will remain in force in all states parties until 12 months after the Revised Protocol has come into force, after which time it will be repealed by the Revised Protocol.

## Some salient features of the original SADC Protocol (1995)

The SADC Protocol on Shared Watercourse Systems was the first sectoral protocol to be developed and adopted by SADC after the SADC Treaty of 1992. It was greatly



influenced by different international water law instruments such as the Helsinki Rules, the Dublin Principles and Agenda 21. It recognises international consensus on a number of concepts and principles related to water resources development and management in an environmentally sound manner. The following paragraphs will compare the current Protocol and the Revised Protocol to demonstrate the implications of developments in international water law for the SADC region.

The SADC Protocol of 1995 covers all uses of water including agricultural, domestic, industrial and navigational. It follows principles laid out in international rules and conventions and is premised on the effort to maintain a balance between development needs in the national interest of member states, the needs for conservation, as well as the needs for sustainable development. It aims to achieve and maintain close co-operation between member states. It also sets out the rights and obligations of member states with regard to shared watercourse systems in the region. The Revised Protocol of 2000, on the other hand, has added the environment as a legitimate user of water resources and has hence included a new definition for 'environmental use'. It further emphasises downstream and upstream rights, roles and responsibilities, especially in emergency situations, which have also been defined as a new concept.

The first part of the Protocol is devoted to the definition of terms and concepts. It sets out a framework for interpreting the various terms and concepts that are used in the body of the Protocol to avoid the possibility of any misinterpretation of these terms as they are used in the Protocol. About 14 concepts and terms are defined in article 1. These cover areas of use, and physical and management aspects of water resources. They form an important part of the Protocol, especially in relation to its implementation and the settlement of disputes. This section was the subject of long and serious discussions and negotiations during the development of the Protocol and during the amendment process. The concepts and terms capture the spirit of the Protocol, as well as that of the SADC Treaty. The other sections, as briefly discussed below, cover the main provisions of the Protocol.

## General principles

### *Respect for the sovereignty of member states in the utilisation of shared watercourses*

This principle recognises the right of member states to develop the resources of shared watercourses within their territory (sovereignty). The principle stipulates, without necessarily being restrictive, the uses to which these shared watercourses may be put. These include agricultural, domestic, industrial and navigational uses. This differs from the UN Watercourse Convention as it includes navigational uses. Other uses have been introduced in the amendment process, such as the concept of 'environmental use' to enhance the practicality of this principle, especially with regard to its implementation.

### *Application of rules of general or customary international law, community of interest and equitable utilisation*

States parties to the Protocol undertake to apply existing rules of customary international law in their respective water laws, as well as to respect the community of

interest in the equitable utilisation of shared watercourses. This is an important recognition of the responsibility of member states towards equitable utilisation of shared watercourses. The Revised Protocol has also incorporated this principle to promote the concept of sharing the benefits.

### *Maintaining a proper balance between development and environmental protection and conservation*

This principle recognises the importance for member states to develop their water resources in order to improve the lives of their citizens, on the one hand, while protecting the environment that yields this resource, on the other. Member states undertake to apply the principle of sustainable development.

### *Co-operation in joint projects and studies*

This principle supports the overall objective of SADC to foster co-operation among member states in different areas of economic development. This is an important measure to prevent potential conflicts that may arise as a result of the uncoordinated development of shared watercourse systems and competing demands.

### *Information and data-sharing*

This principle is closely related to the one above and aims to level the playing field and to create an enabling environment for negotiations around the equitable utilisation of shared watercourses. The development of the SADC Hydrological Cycle Observing Systems (SADC-HYCOS) will go far in trying to address this issue. Information-sharing is central to the co-operation and economic integration envisaged in the SADC Treaty.

### *Equitable and reasonable utilisation of shared watercourse systems*

Member states undertake to use the resources of shared watercourses in an equitable and reasonable manner. This principle is in line with the principles of international water law such as the Helsinki Rules and the UN Watercourse Convention. Several aspects must be taken into consideration in order to achieve equity and reasonable sharing. These include the natural physical characteristics of the watercourse, social and economic needs, as well as potential impacts and effects of the intended use on the watercourse. The principle also promotes the development of guidelines and agreed standards of use. Some of the projects in the SADC Water Sector portfolio – for example, the development of common groundwater minimum standards – already address the development of common minimum standards and guidelines as envisaged in the Protocol.

### *Use of discharge and abstraction permits or licences*

This principle confers some responsibility on member states to regulate the use of shared watercourses in order to ensure that adequate protection is given to the resource. This is already practiced in most member states, although the level of enforcement differs from one state to the next. The principle supports the 'polluter pays' attitude that is currently fast gaining ground in the global water sector. Monitoring for compliance and enforcement at national level is very important in this regard, if it has to have any significant impact at regional level.



### *Obligation to notify about emergency situations, protection against pollution and the use of installations for peaceful purposes*

States parties to the Protocol have the responsibility to notify potentially affected watercourse states about an emergency that originates in their territories and to take the necessary measures to ameliorate the impact of such an emergency situation. This principle have been further elaborated and strengthened in the Revised Protocol.

### *Institutional framework*

The Protocol also proposes an institutional framework necessary for the effective implementation of its different provisions. The Protocol proposed the following institutions:

- a monitoring unit as part of the Co-ordination Unit (in the absence of a distinct and dedicated Water Sector, this unit was meant to be situated in the SADC Environment and Land Management Sector (SADC-ELMS));
- river basin commissions between basin states and in respect of each drainage basin (eg the Zambezi River Basin Commission (ZAMCOM)); and
- river basin authorities or boards for each drainage basin.

The framework was subsequently changed when integration in SADC progressed to the extent that the dedicated Water Sector was established. Its institutions will assume some, or all of the responsibility for implementation. This has been adequately captured in the Revised Protocol.

The Protocol further elaborates objectives and specific functions for proposed river basin management institutions. The objectives cover the monitoring of policy development, the promotion of equitable utilisation, as well as the formulation of strategies and the monitoring of the implementation of joint development plans for shared watercourse systems. This is the functional part of the Protocol, and is most important in addressing the implementation of the Protocol both at national and regional levels.

The Protocol also provides for a mechanism and framework to settle disputes if and when they occur. It follows the spirit of the SADC Treaty in its focus on amicable settlement, failing which arbitration can be pursued. Disputes that cannot be settled amicably will be referred to the SADC Tribunal for adjudication under article 16(1) of the SADC Treaty. The SADC Council can also be requested to render an advisory opinion in accordance with article 16(4) of the Treaty. In the case of disputes referred to the Tribunal, the Tribunal shall render a final and binding opinion.

## The Revised Protocol on Shared Watercourses (2000)

It has already been pointed out that the original Protocol was revised as a result of a number of developments within and outside SADC. The Revised Protocol was adopted by SADC in August 2000. It addressed a number of issues, including the following:

- definition of terms and concepts (notably the concepts watercourse and basin);
- alignment with the UN Convention on the Law of the Non-Navigational Uses of Shared Watercourses;
- provision for environmental protection; and
- a clarification of the role of river basin institutions and their relationship to SADC structures.

- The process was driven by some critical issues and factors, including the following:
- Water shortages and abundance that sometimes afflicted the region in the past are likely to increase in future (the region is generally arid, and is afflicted by extremes of drought and floods, its water is unevenly distributed, and inequalities exist in access to clean water).
- The threat remains of pollution of shared watercourses and its subsequent impact on the utility of the resource (poor sanitation facilities, unchecked industrial and agricultural activities).
- There is a need for a regional regulatory framework, which articulates SADC peculiarities, and which is sufficiently informed by current international thinking on water resources management and development.

The Revised Protocol includes clearly defined objectives that have taken due cognisance of the provisions of the SADC Treaty, notably to:

- promote and facilitate the establishment of shared watercourse agreements and institutions for the management of shared watercourses;
- advance the sustainable, equitable and reasonable utilisation of shared watercourses;
- promote co-ordinated and integrated environmentally sound development and management of shared watercourses;
- promote the harmonisation and monitoring of legislation and policies for planning, development, conservation, the protection of shared watercourses and the allocation of their resources; and
- promote research and technology development, information exchange, capacity-building and the application of appropriate technologies in shared watercourses.

The Revised Protocol has further enhanced the guiding principles that are contained in the original Protocol:

- equitable and reasonable utilisation;
- no harm to other watercourse states;
- environmental protection of the watercourse;
- where harm is nevertheless caused, the duty to eliminate or mitigate and, where appropriate, to discuss compensation;
- no discrimination on the basis of nationality in recognising the rights to claims for harm caused; and
- exchange of available hydrological, hydrogeological, water quality and meteorological information on shared watercourses.

These principles have further been elaborated to provide a comprehensive framework for the execution of planned measures, environmental protection plans, the notification of emergency situations and co-operation in mitigating and eliminating harmful effects. The elaborated sections above constitute the special provisions of the Protocol.

## Conclusion

The SADC Protocol on Shared Watercourse Systems currently contains the general thrust of the intentions of signatories to co-operate in the realm of shared watercourses. The Revised Protocol – essentially an enhanced version of the original protocol – is in the process of ratification by member states and will enter into force after attaining the requisite two-thirds ratification by member states.



The challenge remains for the full implementation of the provisions of the Protocol, which will require a number of activities to be carried out by states parties to the Protocol. Some effort has already been made in implementing the Protocol through the elaboration of a project specifically focused on the challenges in implementing the Protocol. The main objectives of the project are to fulfil the remaining prerequisites and to lay down sound foundations that would enhance the implementation of the Protocol through:

- developing legal and institutional frameworks for the establishment and functioning of river basin organisations;
- developing multilevel alternative dispute resolution mechanisms and forums for inclusion in a common bench for shared natural resources under the SADC Tribunal;
- harmonising national legislation with the Protocol and other international water law.

Once this is achieved, it will create a conducive environment in Southern Africa to share water, the most common but also scarce resource in the region. Together with other initiatives contained in the SADC Water Sector Regional Strategic Action Plan, this will be vital for the smooth implementation of the Revised Protocol.

# Chapter 9
# Water sector reforms in Southern Africa: Some case studies

**Robyn Stein**

"When I was a child, it was hard to get water. We walked for long distances to find water. We fetched water from a water hole. We had to wake up early in the morning to make sure that we were at least first or second at the water hole, otherwise the water hole would be empty. If we were too late and the water hole was already empty, we used to cook and drink run-off rainwater from the roof, although it was rusted. We used to catch run-off rainwater from the roof in buckets and drums. If the water hole and the buckets and drums were empty, we had to walk for even a longer distance to get water from another river and we had to ask permission from those people. We used to wash in the Moses river. It was a dangerous river especially for the boys who loved swimming. We used to get very itchy from the river and it caused bilharzia" (*Water and when I was little*, Esther Ntombi Kaba – translated from Zulu, 2001).

## Introduction

Southern Africa's hydrology is characterised by an uneven distribution of water resources. Persistent flood and drought cycles exacerbate the political, social and economic challenges that water poses to each of the region's nation-states. The distribution of Southern Africa's water to its cumulative population is even more unequal when measured in terms of class, race and gender (Bond & Stein 1999:324).

Access to clean water and adequate sanitation is at the core of human health and well-being. These are basic human needs, if not rights.

Notwithstanding the process to entrench the commodification of water, as initiated by the Washington Consensus and intensified by the World Bank in its water sector activities in developing countries, the debate surrounding the recognition of water as a basic human right has not been resolved. The development imperatives of international conferences and conventions, particularly during the 1970s, had the potential to offer clear direction on the characterisation of water as a basic human right. For example, the 1977 United Nations conference at Mar Del Plata resolved that "[a]ll people have the right to access to drinking water in quantity and quality equal to their basic needs." Thereafter, the productionist logic of globalisation in the 1980s and 1990s contributed to the dilution of this crisp definition. Reference to the right to water as a basic human need was substituted with indirect references, for example, the right to "freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being" (Stockholm Declaration 1972); the right of women "to enjoy adequate living conditions particularly in relation to sanitation and water supply" (Convention on the Elimination of All Forms of Discrimination Against Women 1979) and the right to "a healthy and productive life in harmony with nature" (Rio Declaration 1992). In the 1990s,

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commodification arguments obtained a place in international declarations, for example, "water must be valued as an economic good and managed as a resource to meet basic human rights" (Dublin Statement 1992).

However, denied of these rights, human beings cannot survive, let alone hope for a future when they will enjoy the benefits of productive participation in their country's economy. Southern African states continue to face colonialism's legacy of water inequity. A rights-based discourse explains the need for the law's intervention in managing and distributing nature's most precious resource.

In Southern Africa, legislative reform in the water sector has gained increasing momentum over the past decade. Many years after independence and democracy, many of the region's states still experience colonialism's water legacy – much of which was legislated by the colonial regimes and left intact in inherited statute books.

This chapter examines water sector reform in three Southern African states – South Africa, Namibia and Zambia. Each country has its own unique set of geohydrological conditions. In each independent democracy examined, a similar set of principles underpins the reform of water law. In understanding these principles and their translation into domestic legislation, a useful insight is gained into the region's contribution to the debate on the real relationship between access to water resources (and their life sustaining fluids) and basic human rights.

The process of water law reform is at a different stage of development in each country. At the time of writing, Namibia was deliberating and consulting on draft legislation (Draft Water Resources Management Bill 28 February 2001). In South Africa (National Water Act, 36 of 1998, as amended; Water Services Act, 108 of 1997) and Zambia (Water Act, chapter 312, Laws of Zambia 1970, as amended), post-democracy water legislation is already being implemented.

## Overview of basic guiding principles

The enactment of water legislation generally has a dual purpose. It is designed to support integrated water resource management and to facilitate the implementation of water supply and sanitation strategies (DFID 1999). While a comprehensive water statute may comfortably accommodate both objectives, Zambia and South Africa have opted to create separate statutes for integrated water resource management and water supply and sanitation services. Namibia, in contrast, attends to water supply and sanitation as a chapter of its proposed omnibus legislation on water.

Growing attention to water law reform in the last century created the impetus for a number of international and regional initiatives that provided forums for debate and deliberation on comparative legislative experiences. Over time, what emerged from these discussions (which were mainly lead by the northern hemisphere) was a collection of general guiding principles for water law reform. These guiding principles were recommended as 'best practice'in any water law reform programme. The Dublin Statement (ICWE 1992), for example, advocated four principles to be applied to water resources:

- Water must be managed in an holistic way, taking interactions among users and environmental impacts into account.
- Water must be valued as an economic good and managed as a resource necessary to meet basic human rights.



- Institutional arrangements must be reformed so that stakeholders are fully involved in all aspects of policy formulation and implementation. This means that management must be devolved to the lowest appropriate level, with enhanced roles for NGOs, community groups, and the private sector.
- Women must play a central part in the provision, management and safeguarding of water (FAO 1995c).

Despite contradictions – for example, that water should be treated simultaneously as an economic good and a basic human right – additional factors considered to be critical in the planning, management, development, distribution and control of water resources have been identified, including:

- equity
- efficiency
- sustainability
- public health
- environmental impact
- fiscal impact
- political and public acceptability
- sustainability
- administrative feasibility (FAO 1995c).

Some of the principles and factors noted above are clearly identifiable in the particular water laws of each of the three countries used as case studies. The countries enjoy their own independent constitutional dispensation and jurisprudential basis. In an effort to examine the extent to which each country's reformed water legislation addresses the right to water for productive and consumptive use, the principles of equity, sustainability and efficiency are used as focus. These principles are not proffered as a 'litmus test' for each country's particular performance on the rights-and-resource front. They are used as nothing more than they were ever intended to be – useful points of guidance and departure.

## Equitable access

Colonialism's dire contribution to water law in Southern Africa was the entrenchment of an inefficient system of inequitable access to water for domestic consumption and productive use. Access to and distribution of water rights were determined on the basis of structural and systematic race and class discrimination, as the distribution of water rights in the region's colonies was inextricably linked to access to land. The colonial experiences of Zambia, Namibia and South Africa are all characterised by oppressive programmes of land dispossession. In the case of both South Africa and Namibia, this continued with oppressive determination during the apartheid years. In South Africa, for example, the programme gained momentum at the turn of the last century when legislation was introduced to prevent 85% of South Africans from acquiring, holding or disposing of immovable property (see Native Land Act, 27 of 1913).

In order to redress the results of this dispossession, two particular legislative mechanisms have been embraced. The first comprises a return to "the commons" (Ward 1997:chapters 1 & 2). What is established in this instance through statutory intervention is the fundamental principle that the country's water is common to all its people, cannot

be privately owned and is held in public trust by the state. Another variety of this mechanism affords some degree of private right of use, with the state retaining "a supervening right of use and enjoyment superior to that of individuals" (Burchi 1991:90). Both the first and second mechanisms are supported by an administrative licensing system. Under such a system, the state regulates abstraction of a specified volume of water, often for a specific purpose, from a particular source in the public and environmental interest (FAO 1995c). The licensing mechanism applies in South Africa and Zambia. It is contemplated as a mode of regulation in Namibia. In all three countries, the domestic use of water is (in the case of Namibia, will be) exempted from licence requirements. Domestic use in South Africa includes the use of water for small-scale irrigation and the watering of animals for non-commercial purposes. In all three countries, designated water suppliers (whether operating in the public or private sector) are regulated by the relevant national water legislation.

In South Africa, the National Water Act constitutes a radical transformation of water resource management. It affects a legislated shift from a private rights system of water allocation to a public rights system. It ensures that water is treated in an integrated fashion and, wherever it occurs in the water cycle, is a resource "common to all" (DWAF 1996b). In contrast, apartheid's Water Act (54 of 1956) made a distinction between 'public water' and 'private water' (see section 1). Private water was defined as "all water, which rises or falls naturally on any land or naturally drains or is lead onto one or more pieces of land which are the subject of separate original grants, but is not capable of common use for irrigation purposes." Public water was defined as "any water flowing or found in or derived from the bed of a public stream, whether visible or not" (Water Act, 54 of 1956:section 1). Each category was governed by a specific set of rules, which disregarded the unified nature of the hydrological cycle (Gildenhuys 1998:1). These distinctions are abolished in the National Water Act. Instead, all water use is treated uniformly in the National Water Act, which contains a comprehensive definition of the term 'water use'. The National Water Act, unlike the 1956 Act, does not prioritise the use of water for irrigation above all other water uses. The Act does not limit water use to abstraction but also regulates an unlimited array of activities in relation to water use such as the storing (or impoundment) of water, and the alteration of the bed, banks, course or characteristics of a watercourse (National Water Act 1998:section 21).

The South African doctrine of public trust, as legislated in the National Water Act, constitutes a revival of certain Roman, Roman-Dutch and indigenous and customary law principles which were lost as a result of statutory intervention by the apartheid regime. "The principle of the public trust is an internationally accepted concept" (DWAF 1997b:14), which was further developed during the course of the water law reform process, culminating in its establishment in the reformed water legislation. The objective of the South African public trust doctrine is two-fold:

> "As custodian of the nation's water resources, the National Government shall ensure that the development, apportionment, management and use of those resources is carried out using the criteria of public interest, sustainability, equity and efficiency of use in a manner which reflects its public trust obligations and the value of water to society while ensuring that basic domestic needs, the requirements of the environment and international obligations are met" (DWAF 1996b:4).



Hence, the public trust doctrine, as encapsulated in the National Water Act, serves the primary purpose of addressing the "responsibilities of national government in managing and protecting water resources" (DWAF 1997b:14). Government is ultimately responsible to ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons and in accordance with its constitutional mandate. Executive responsibility is delegated to the minister of Water Affairs and Forestry who must ensure that water is allocated equitably and used beneficially in the public interest, while promoting environmental values. In order to guide the implementation of measures designed to fulfil the public trust function, a national water resource strategy must be established, which provides the framework for the protection, use, development, conservation, management and control of water in the country as a whole (National Water Act 1998:section 6).

South Africa's Constitution (Act 108 of 1996:section 27) guarantees the right of every person to have access to sufficient water and obliges the state to take "reasonable legislative and other measures, within its available resources, to achieve the progressive realisation" of this right. Furthermore, the Constitution enshrines the right to an environment that is not harmful to human health and well-being (Act 108 of 1998:section 24). In accordance with this constitutional imperative, the National Water Act gives effect to the water access rights enshrined in the Water Services Act by providing for a national water reserve, which supersedes existing riparian rights to water. This reserve is meant to fulfil the essential needs of individuals served by the water resource in question and includes drinking water for food preparation and personal hygiene.

In Zambia, ownership of water is vested in the country's president. Any use or diversion of water is only permitted if it takes place in compliance with the provisions of the Water Act of 1970 (section 5). In contrast with the South African position of treating water as a resource common to all, Zambia chose to vest the ownership of water in the state. Furthermore, the Zambian Water Act provides for a category of "private water" owned by a landowner (see section 2). Private water is defined as:

- "the water in a swamp, the boundaries of which are wholly within the boundaries of the land owned by a landowner and which do not cross or abut against the boundaries of the said land and to or from which no stream extending beyond the boundaries of the land flows either continuously or intermittently"; or
- "the water in a spring which is situated wholly within the boundaries of the land and which does not naturally discharge water into a water course beyond the boundaries of the aforesaid land or abutting on its boundaries"; or
- "the water brought to the surface of the land by artificial means"; or
- "flood waters which are impounded on the land by artificial means and would otherwise have run to waste" (Water Act of 1970:section 2).

Democratisation and relatively successful land reform programmes, particularly in the interests of sustaining small-scale agricultural development, appear to have formed the basis for the decision to retain private use rights in Zambia.

The Zambian Water Act provides for and regulates various types of water rights for the use of public water for primary, secondary and tertiary use (Water Act of 1970:sections 8-13) and for mining, railway or urban (sections 15-22) purposes. In addition, the Water Act provides for special rights (section 11) to use public water. Special rights enjoy protection

against any interference, diminution or encroachment by water rights subsequently granted (section 13).

The Zambian National Water Policy states that the government has invested in the provision of safe and accessible drinking water in order to enhance the lives of people. It recognises that adequate clean water supply and sanitation are absolute necessities for human life and well-being. The policy records that only one-third of the rural population has access to safe drinking water (Water Policy for Zambia 1994:19). It also provides for a minimum level of service to persons who are unable to afford the full cost (Water Policy for Zambia 1994:25). The measures to achieve the goals set out in the policy document include the integration of community education, motivation, health and hygiene, and water awareness programmes in the development, operation and maintenance of rural water supply and sanitation programmes (Water Policy for Zambia 1994:19).

The Namibian Constitution vests the ownership of all natural resources in the state (Constitution of the Republic of Namibia 1990:article 100). This provision provides the government with the power to control and manage water resources in the country. The government has a corresponding duty to ensure that all national water laws are observed. It is empowered to enact laws that are in line with the efficient, equitable and sustainable management of all water resources within the country.

The preamble of the sixth draft of the Namibian Water Resources Management Bill (2001) acknowledges that "while water is a natural resource that belongs to all people, discriminatory laws and practices of the past have prevented equal access to water, and use of water resources." It recognises "the Government's overall responsibility for and authority over the nation's water resources and their use, including the equitable allocation of water to ensure the right of all citizens to sufficient safe water for a healthy and productive life and the redistribution of water." Particular reference is also made to the role and participation of women in water resource planning and management.

The Draft Namibian Bill provides that the Act must be applied in a manner consistent with the following basic principles:

- equitable access to water resources for every citizen, in support of a healthy and productive life;
- access by every citizen, within a reasonable distance from their place of abode, to a quantity of water sufficient to maintain life, health and productive activity;
- water is essential for life and safe drinking water is a basic human right;
- harmonisation of human needs with environmental ecosystems and the species that depend on them, while recognising that these ecosystems must be protected to the maximum feasible extent;
- integrated planning and management of surface and underground water resources, in ways that incorporate economic, environmental and social dimensions in the planning process;
- openness and transparency, by making available water resources information accessible to the public;
- management of water resources in a manner that would promote sustainable development;
- recognition of the economic value of water resources and the need for their cost-effective development;



- promotion of a process of human resource development, including competence in water resource decision-making;
- facilitation and encouragement of awareness and participation by stakeholders in decision-making;
- consistent water resource decisions based on firm and specific mandates of the government, separating policy-making from operational and regulatory roles;
- fulfilment of Namibia's international obligations to neighbouring states and promotion of respect for Namibia's rights with regard to shared water resources and, in particular, to the abstraction of water for beneficial use and the discharge of polluting effluents; and
- regional diversity, as well as decentralisation to the lowest possible level of government, consistent with the available capacity at such a level (Draft Water Resources Management Bill 2001:section 3).

The Draft Namibian Bill imposes a duty on the minister to ensure that Namibians have a water supply that is safe, dependable, affordable, reliable and adequate for basic human needs (Draft Water Resources Management Bill 2001:sections 39 & 40).

The Bill also provides for the issuing of licences in respect of water use other than that used for domestic purposes and rainwater collected on private property. The minister is required to determine the outcome of applications for licences. The criteria that must be taken into account include "the conformity of the proposed use with the need to redress the effects of past and racial gender discrimination" and "the need to ensure the efficient and beneficial use of water resources" (Draft Water Resources Management Bill 2001:section 49).

The Draft Bill further stipulates that the minister has the power to grant financial assistance to users of water with respect to applicable charges. Before giving any financial assistance, the minister must take into account all relevant factors, including the need for equity, transparency, redressing the results of past racial and gender discrimination, as well as the financial position of the applicant (Draft Water Resources Management Bill 2001:section 104). This principle ensures an equitable distribution of water resources especially among people who do not have the financial means to pay for the water they require.

## Efficiency

The need for efficiency primarily requires the evaluation of the social and economic benefits and costs of competing water uses. For example, in the course of allocating water under a licensing system, the interests of all water users (including the environment) of the particular resource should be taken into account. In order to give effect to the concept of efficiency, two particular legal instruments are often incorporated in water statutes. The first is the inclusion of particular processes and procedures for decision-making in keeping with the precepts of administrative justice. For example, these would define factors to be taken into account in decision-making, the right to be afforded an opportunity to be heard, the obligation to provide reasons for a licensing decision and the right of appeal. The second entails the use of economic instruments such as pricing mechanisms and financial assistance, or subsidisation programmes.

The execution of the concept of efficiency is facilitated in South Africa through the incorporation of administrative justice principles in its National Water Act. All decisions

by a government or public body are subject to review. Those affected by decisions taken by the government and its organs are entitled to reasons for these decisions. Public consultation provisions are found throughout the National Water Act. For example, in establishing the national water resource strategy (National Water Act 1998:section 5) and the water pricing strategy (section 56.7), the minister must call for comments from the public. The minister is obliged, in accordance with the principles of natural and administrative justice, to take these comments into account in the process of decision-making. Access to information is guaranteed in the National Water Act through the establishment of national monitoring networks and national information systems on water resources (sections 139-142). Information must be made available to the public in respect of, among others, flood and drought warnings, any risks imposed by the quality of water to life, health or property, and any other matter that may be necessary to achieve the goals of the National Water Act (section 142).

The fiscal impact of water policies is a further important criterion, both for general macro-economic management and for the proper funding of water provision (FAO 1995c:19). The South African National Water Act makes provision for the imposition of water use charges (1998:section 58). The funds obtained will be applied to support the implementation of policies, water resource protection and conservation measures. Chapter 5 of the National Water Act provides for the establishment of a national pricing strategy for water use charges. The pricing strategy may differentiate between different water users on the basis of the extent of their water use, the quantity of water returned by them to source, or their economic circumstances (National Water Act 1998:section 56). Water use charges may be waived on an equitable basis in respect of specific users for a specified period of time.

The Preamble to the Namibian Draft Water Resources Management Bill (2001) recognises "the economic value of water and that its abstraction, use and management be efficient, cost-effective and promote equitable and sustainable socio-economic development." The Draft Bill obliges the relevant minister to prescribe "efficient water management practices in respect of each region" (section 89). Efficient water management practices are defined as "the water abstraction, water use and agricultural irrigation methods developed in accordance with the provision of Chapter 11 of the Bill" (section 1). The Bill further acknowledges the need to ensure the efficient and beneficial use of water resources (section 49). In developing efficient water management practices, the minister has the discretion to utilise any of the following measures:

- economic instruments, including pricing structures;
- water metering;
- standard setting;
- public education;
- improved water efficient technology, particularly improvements in irrigation technology; and
- such other measures as the minister deems to be appropriate to consider or utilise (section 90).

The minister also has a duty to undertake periodic reviews of water users throughout Namibia in order to determine their compliance with efficient water management practices (section 91.1).



The Draft Namibian Bill contemplates a pricing structure for water use. It provides that licence terms and conditions may stipulate water use charges (section 57).

In Zambia, the Water Board is given the power to revoke, vary or amend any registered right to public water (Water Act of 1970:section 27.d). The Water Board may award compensation to affected registered owners of water rights, or to rural councils in respect of any "African areas", defined in the Act as any area declared through legislation as "a reserve, trust or any area set aside for the exclusive use of Africans" (section 2).

The Zambian Water Act provides for the appointment of a water officer to serve as a technical advisor to the Water Board, as well as a water registrar who is responsible for the registration of all water rights acquired prior to the commencement of the Act and those acquired in terms of the Act. Both the water officer and the registrar are subject to the control and direction of the minister.

Subordinate law-making is relied on in the Zambian Water Act in order to achieve objectives related to efficiency considerations (1970:section 46). The minister is empowered to make regulations for the effective administration of the Act and may also make regulations to carry out all or any of the following:

- establishing and maintaining hydrographic stations on any private land and erecting gauging weirs, gauging poles or any other devices for the measurement of water; obtaining and recording observations made at such hydrographic stations, with the understanding that the owner of the land on which such a station is established shall not be entitled to any payment or compensation, if any existing works for the beneficial use of water of which the right has been registered or authorised under this Act, are not adversely affected;
- obtaining and recording information on the extent of land in Zambia under irrigation, and the quantity of water it uses, the quantity, nature and values of crops under irrigation, and general information and statistics on hydrographic conditions in Zambia;
- inspecting any works on the course of any public stream and ordering a private landowner to repair these works as may be deemed necessary in the public interest and, when failing to comply within the time specified in such a order, executing it and recovering the cost from the person in question;
- supervising all public streams in Zambia, protecting the source of supply of any public stream and, if necessary or expedient, cleansing, deepening, widening or otherwise improving the channels of such a stream; preventing the leakage or flow of any public stream from the surface into subterranean channels; preventing any waste or unlawful diversion, abstraction, or storage; removing any obstruction unlawfully placed in a public stream; and preventing any unlawful act to diminish the quantity of water in any part of a public stream;
- supervising and regulating the diversion, storage, distribution and use of water in any public stream;
- investigating any existing or potential source of water power;
- for the purpose of protecting any source of supply of any public stream, by statutory notice, defining the area of such a source and prohibiting or restricting the entry of persons into such area; and
- requiring individuals to whom the right to use water has been granted under this Act to erect adequate diversion sluices at their own expense, and to record and furnish

measurements of the volume of water abstracted or allowed to pass at or near the point of abstraction by the use of instruments specified or applied for the purpose.

## Sustainability

Sustainability considerations are pertinent to the legislation of all three countries examined in this chapter. The social and economic benefits of resource sustainability and recovery are critical to development in Southern Africa. Such sustainability takes into account not only ecological considerations, but also social and economic factors.

In South Africa, the National Water Act (1998:section 1.xviii) introduced the innovative concept of the 'reserve'. The reserve comprises the quantity and quality of water required to satisfy the basic human needs of all people who make use are, or may make use of particular water resource; and protects aquatic ecosystems in order to ensure ecologically sustainable water development and use.

The reserve is therefore an unallocated quantity of water that is not subject to competition with other water demands. A certain minimum volume of water is required in South Africa's rivers to ensure that the ecological integrity of these river systems is protected. The Reserve is designed to give effect to the constitutional imperatives of the right of access to sufficient water for basic human needs, as well as the right to have the environment protected through legislative and other measures that secure ecologically sustainable development, and promote justifiable social and economic development.

The preamble to the Namibian Draft Water Resources Management Bill (2001) stipulates that the management of water resources must harmonise human and environmental needs and protect water quality, while acknowledging the role of water in supporting ecosystems. The Draft Bill provides for the establishment of water management areas by the minister for the purpose of protecting any water resource, riverine habitat, watershed, wetland or water-dependent environmental uses at risk of depletion, contamination, extinction or disturbance from any source (including aquatic and terrestrial weeds (section 86.2).

In Zambia, the Water Act criminalises acts by any person who wilfully or through negligence pollutes or fouls any public water, thus rendering it harmful to humans, flora or fauna (Water Act of 1970:section 55). The 'polluter pays'mechanism is incorporated in the Water Act. It provides that, if the minister is satisfied that public water is being polluted, s/he must instruct the person responsible for the pollution to take adequate measures to abate or prevent such pollution within a specified period.

## Conclusion

The three case studies indicated not only the existence of (and in the case of Namibia, a proposal for) legislative codes on water. Each country has opted for the enactment of comprehensive water 'constitutions' – statutes that protect and promote rights to water (and the benefits of water resources) and that impose obligations on the government in the public interest.

Prior to the new millennium, Zambia, Namibia and South Africa embarked upon water law reform processes. Public consultation and the development of legislation in compliance of the different countries' constitutions are important features of these processes. Ultimately, the principles of equity, efficiency and sustainability are found in



all three of these statutory instruments. The extent to which South Africa, Namibia and Zambia will deliver on these principles is part of the critical challenges for the new millennium that are shared throughout the region.

The legislative practises and usage in the water sector in Southern Africa present formidable challenges to the characterisation of water as a mere commodity. For this reason, contemporary social, economic and political conditions have demanded legislative intervention in the water sector to create corresponding rights and obligations in relation to this resource.

> "Our history has been a bitter one dominated by colonialism, racism, sexism and repressive labour practises … The result is that in every sphere of our society – economic, social, legal, moral, political, cultural, environmental … No political democracy can flourish if the majority of its people remain in poverty, without land, without their basic needs being met and without tangible prospects for a better life" (RDP 1994).

# PART IV:
# SELECTED KEY ISSUES

# Chapter 10
# From bucket to basin: A new water management paradigm for poverty eradication and gender equity

**Barbara Schreiner, Barbara van Koppen and Tshepo Khumbane**

## A new water management paradigm

South Africa is the first country in the world that has adopted national water law in which water is seen as a tool in the transformation of society towards social and environmental justice. The Water Services Act of 1997 and the National Water Act of 1998 aim to:

- redress the inequalities and racial and gender discrimination of the past;
- link water management to economic development and poverty eradication; and
- ensure the preservation of the ecological resource base for future generations.

In short, this legislation enshrines the value of 'some, for all, forever'.

By law, the interests of people who still have to carry buckets of water to their homes or tiny plots to ensure sub-standard levels of welfare are at the centre stage of integrated water management up to basin level. In many areas of South Africa where competition for water is becoming fierce, the law prioritises the protection of the marginalised. Thus, this new legislation represents a fundamental shift from the conventional water management paradigm that:

- suggests that water management can be an aim in itself;
- fails to diagnose water-related poverty and gender inequalities within and across water use sectors; and
- ignores the ultimate distribution of water-related health and wealth.

Neither the technical, nor the economic, legal or governance aspects of this old paradigm can ever effectively contribute to poverty eradication and gender equity.

The National Water Act also stipulates the formation of new basin-level governance bodies, called catchment management agencies (CMAs), which will be the key vehicles to implement the new water management paradigm. The minister of Water Affairs and Forestry will form these CMAs in the 19 defined water management areas of South Africa and gradually assign water resource management powers that are currently carried out by the Department to these new governing structures. Public participation and representation in the CMAs are legally required from the inception of the CMAs onwards. According to the Act, important tasks of the CMAs include co-ordinating water management with domestic water supply programmes, and promoting community participation.

In this chapter, the far-reaching implications of the new paradigm are highlighted, as well as the challenges ahead, on the basis of the initial implementation of the new water legislation. Generic aspects of pro-poor and gender-inclusive water management are

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examined. The unique political context of South Africa – moving from the apartheid era to democracy in 1994 – largely facilitated this paradigm shift. The substantial inequalities that still remain in South Africa are also the legacy of apartheid history. However, wherever equitable water allocation and poverty eradication are envisaged, a similar paradigm shift is needed in water management. Similarly, the issues emerging from the implementation of the new paradigm are generally valid where poverty prevails, social inequalities persist or even widen, and competition over finite fresh water resources grows, whether in Southern Africa or elsewhere.

## Linkages between water scarcity, po verty and gender

### *Water scarcity: A poverty characteristic*

At the heart of the new paradigm are the linkages between poverty, gender and water. Water deprivation is an intrinsic dimension of the general state of deprivation that is poverty. For poor people, water is so scarce that even the basic human needs of health, food and income for which water is indispensable, are not met. Water scarcity, defined from a human perspective, is the extent to which human needs for water for domestic and productive purposes remain unfulfilled, both in terms of water quantity and quality. In this sense, only poor people face water scarcity, usually even in circumstances where the natural endowments of water resources are abundant. Society 'manages' poor people's demand below acceptable levels. New, pro-poor demand management would *increase* their demands.

### *Domestic water use*

The lack of access to safe, affordable and accessible domestic water is generally acknowledged to be a typical feature of poverty. When the first democratic government of South Africa assumed power, 12 million South Africans still lacked adequate supplies of domestic water, especially in the rural areas of former homelands where the majority of South Africa's poor black people are concentrated. Moreover, the labour and cash costs of domestic water supply were often exorbitantly high for poor people, especially poor women for whom water has never been a 'free good'.

The South African Bill of Rights guarantees the right of access to sufficient water. The inability of poor people to pay for water would deny them this right. Recognising the severe domestic water deprivation among large groups of previously disadvantaged people, the South African government launched a countrywide campaign immediately after its election in 1994, to improve people's access to domestic water. The National Water Act of 1998 stipulated a 'water reserve'that allocates, first of all, water to meet the basic domestic water needs of all citizens – currently set at 25 litres per person per day. In 2000, the government went a step further and guaranteed 6 000 litres per month for free for each household. Cross-subsidisation occurs at the local levels of urban and rural municipalities, as well as funding provided directly by national government to local governments for the provision of services to indigent people. Local governments are central points of water services delivery, and capacity-building initiatives undertaken by the Department of Water Affairs and Forestry that aim to equip local governments to perform this task are beginning to bear fruit.



While 6.5 million people have obtained access to new water supplies since 1994, around 7 million South Africans still get water from open streams, boreholes, or stagnant sources, some of which are polluted by domestic and agricultural users, industries and mines. Water-borne diseases such as cholera remain widespread. The government, institutions like the Mvula trust, NGOs, research institutes and communities continue their efforts to address poverty as an issue of utmost priority.

Better water and sanitation services at lower costs with less drudgery are also important means of improving gender equity. Excessive burdens resulting from low-quality water supply are not only a poverty issue, but also part of the general unequal division between genders of unpaid household chores in South African society and elsewhere. This is not to deny contributions by males to this aspect of family welfare. The issue is that responsibilities for household chores need to be more equally divided between members of households. At project and community level, it is thus important to strengthen women's roles in the decision-making around communal water supply and sanitation initiatives. Women's stronger roles in planning and decision-making have already proven not only to empower them, but also to render these initiatives more effective. As the contributions of men and women at household level are different and complementary, gender-balanced community initiatives benefit from the different, complementary experiences and perspectives that women and men bring (UNDP 1999).

### *Productive water use*

While the linkages between water for domestic purposes and poverty are widely recognised, the important role of water for productive uses in combating the lack of food and income, perhaps the core dimension of poverty, still receives too little attention. Access to water is an important condition in increasing the income of the 40% of South Africans who still live below the income poverty line. The large majority live in rural areas, as part of a population that is expected to grow further because of high birth rates and continuing off-farm unemployment (May 2000). Agriculture, livestock, forestry, fishery, small industries and environmental tourism development are all critically dependent upon water.

The proportion of the available water resources that is currently used by the poor is almost negligible. Inequalities in water use are huge, primarily due to the unequal distribution of water used for productive purposes. For example, in the Mhlatuze Basin in KwaZulu-Natal, around 10% of the people, typically the more affluent, use 99% of the available water resources. A similar skewed division is found in the irrigation sector at national level, with 95% of irrigated land and water use in the hands of a minority of white large-scale farmers whose increasingly mechanised farms provide less and less employment. Only 5% of water used for irrigation benefits black farmers in South Africa.

Further studies mapping the Gini-coefficient in water use are under way in South Africa. Quantification is not only important to create systematic insight into inequalities in water use and the relation between productive water use and poverty, but will also allow the designing of scenarios to address inequalities and to operationalise water management as a means for poverty eradication. A quantitative assessment of current inequalities and scenario development will especially highlight what the 'haves'would have to 'sacrifice' for the current 'have-nots'. The example of the Mhlatuze Basin implies that *doubling*

current water use by the majority of poor people from 1% to 2% would still hardly affect the absolute quantities of water used by the water-thirsty minority, who would move from 90% to 89%. A *doubling* of irrigated area and water use by smallholders in South Africa would require the minority of large-scale users to save water and reduce their use from 95% to 90%.

Various factors are analysed below, which underlie this uneven distribution of water use and hamper poor people's increased income generation through water-dependent economic activities. Two different issues are distinguished. The first issue is that available natural water resources remain untapped by poor people or hardly contribute to income generation. In the section below, this is discussed by focusing on cropping. Poor people's relatively limited water use is often a matter of their inability to use more water more productively, which is, among other reasons, due to a lack of appropriate technology development.

The second issue, which increasingly compounds the first one, is competition over water resources. In a further section, the focus is on the situation in which poor water users have to compete with more powerful (potential) water users that have stronger bargaining positions and more money to pay for water. In this situation, poor people risk even being deprived of the water they already use, while any future access to water to meet their still unmet needs risks being forfeited forever. Compulsory licensing, the legal tool provided by the National Water Act, is discussed. This is used to reallocate water to previously disadvantaged individuals in such conditions.

In the last section, it is highlighted how CMAs can become vehicles both in linking water management to economic development and poverty eradication, *and* in ensuring poor people's higher shares in water use, even under competition. CMAs can reach this goal by actively promoting community participation in integrated water management for multiple uses, in a bottom-up way, from communal water tenure arrangements to basin-level structures, through local governments, also linking water use to poverty-focused economic development.

## Water management to eradicate income po verty

### *Water-related income poverty: Causes and potential for change*

Water for productive use is only one input in an enterprise of which the profitability depends upon a range of factors. Major factors in the inequalities in productive water use and the contribution of water to income poverty eradication are the immense differences in the scales of enterprises of poor and affluent entrepreneurs. For example, inequalities in water consumption in irrigated agriculture more or less reflect the unequal distribution of irrigated land. The policy implications for more equal water use when addressing this overarching factor are straightforward: increasing the scale of the enterprise, or, in the case of agriculture, increasing farm size for those who already have some land, and ensuring new access to land for the many landless. In South Africa, this means the accelerated implementation of land reform, which to date occurs much slower than originally envisaged (Cousins 2000).

Without denying the need for continued land reform, poor farmers particularly benefit from agricultural intensification and improved water use and management precisely



because their farm sizes tend to be small. Better water management practices also make the application of higher yielding varieties, better fertilisation and pest management more rewarding. The disproportionate allocation of water can compensate for the restricted access to other resources (Chambers et al 1989). The validity of this argument has extensively been proven for small farmers in South Asia, where the inverse relationship between farm size and productivity per unit of land was repeatedly confirmed. Experience in South Africa appears to confirm this as well. Community gardens with very small plots or peri-urban agricultural farmers intensively cultivate limited land with high value irrigated crops. Relatively high water allocation per unit of land for small farmers and the promotion of water-intensive enterprises in general are legitimate means to compensate at least slightly, for the still great inequalities in water use per capita.

The ultimate contribution of water to the eradication of income poverty depends on the net gains of the enterprise as a whole. Profits from irrigated farming also largely determine the incentives for farmers to invest in infrastructure and the need for subsidisation. The need for an encompassing strategy that ensures higher profits, is especially clear in the smallholder irrigation schemes in South Africa that partially or fully collapsed after the withdrawal of centralised state support for seeds, fertilisers, pesticides, and credits, energy costs, training and collective marketing in the 1990s. The irrigation infrastructure, especially pumps and advanced technology sprinklers, often appeared too expensive to operate solely from farm profits. Moreover, the technical design of these schemes requires a form of central management that hundreds of resource-poor farmers, from various tribal authorities, without any experience of former participation in management of the scheme, are unable to establish immediately. Lack of clarity about the responsibilities for scheme maintenance and operation, and longer term ownership further discourage farmers from engaging in scheme operation and maintenance (Shah et al 2000). Many irrigating farmers of these former 'islands of privilege' now face the same problems as most dry land farmers. Input provision, roads and markets are weak. Knowledge about traditional land and water management technologies that could have been upscaled, remains under-researched and untapped. The development and availability of new private or collective technologies appropriate for small-scale enterprises and affordable by poor farmers, suffer from a serious backlog compared to countries like Zimbabwe, Kenya or Malawi. The redesign and rehabilitation of collective schemes have hardly started as yet, where assets have not yet deteriorated, or been stolen or appropriated by wealthier farmers who are taking over.

In 2000, the Department of Water Affairs and Forestry and the National Department of Agriculture, supported by the International Water Management Institute, initiated a dialogue between the relevant government line departments at all levels in order to formulate a new integrated strategy for small-scale agricultural water use. These initiatives will culminate in the drafting of a new policy. An encompassing strategy is being formulated that aims to ensure that more water is used by small-scale farmers and that water is more productively used by strengthening backward and forward linkages.

Experiments have been initiated to develop treadle pumps suited to specific South African conditions. In collaboration with international NGOs, like International Development Enterprises and Approtech (which very successfully introduced the treadle pump and other appropriate technologies in Bangladesh, India and Kenya), widespread

testing, adaptation of prototypes, local manufacturing, marketing and dissemination are under way in South Africa. Research into traditional and possible new water harvesting and soil conservation technologies has also started.

For all these initiatives, state support and smart subsidies are indispensable. The small-scale agricultural sector hardly received subsidies in the past and faces specific obstacles in developing new opportunities to use more water for higher incomes. Equal treatment of such unequal parties and the development of one blanket subsidy policy for all make little sense.

## *Gender dimensions of irrigated agriculture*

The issue of gender in the domain of productive water use is around the question: In *whose* enterprise is water an input? Gender equity means strengthening the enterprises of both men and women and, in the case of agriculture, fostering equal access to water, input, credit and markets. Among the poor, the incomes of both men and women are required to meet basic family needs. Moreover, in households headed by males both women and men are responsible for different household needs, and both incomes are needed to meet this variety. In fact, women tend to spend a higher proportion of their incomes on family needs than men. In households headed by females, women's incomes are usually the major source of income. A last rationale for strengthening women's independent economic security is that the latter has been identified as the crucial factor at the micro-level that leads to a reduction in fertility rates at the macro-level (Safiliou 1986).

Especially in the former homelands of South Africa, an intra-household analysis of agricultural production shows that men and women often have separate enterprises, or intra-household production sub-units (Safiliou 1988). In the majority of farm households women are the decision makers, and farming is their main occupation, if not full-time engagement. Culturally, men are often more engaged in cattle-rearing. Their contribution to farming is generally limited to ploughing, a task that was performed by the state in the former irrigation schemes, and is today often undertaken by private entrepreneurs. Another important reason for women's predominant roles as farmers in South Africa lies in the long established employment policies that are strongly gendered. Off-farm employment in mines, industries and services has been restricted to men, while women are still often supposed to provide for basic living needs that are just enough to raise a new generation, care for the sick and wait for their husbands to return as pensioners.

Out of 176 households with irrigated plots in the Tongwane sub-catchment area in the Northern Province, women are the farm decision makers on 62% of the irrigated plots, and on another 14% they decide jointly with their husbands. Similar results are found in other studies in Southern and Eastern Africa (Makhura & Ngqaleni 1996; FAO 1998; Safiliou 1985; 1994). The study in the Tongwane sub-catchment area also found that, for 36% of the female decision makers, land was not registered in their own names, but in their husbands' names. Among male decision makers, 10% cultivate land registered in the names of their female kin rather than in their own names. This is important for any intervention that takes land titles as the main selection criterion for farmer support. This criterion would exclude 28% of the actual farm managers in the Tongwane Basin (Naledi-IWMI 2000). In this respect, the South African National Water Act is unique in providing the scope to vest water rights and membership in the actual water user, irrespective of his or her type of land rights.



Policy makers and intervening agencies have to be aware of this intra-household specialisation in the farming sector. In the past, major gender inequalities have been *created* by agricultural and irrigation agencies targeting men only (often the local élite), assuming that the male household head is automatically the main decision maker, or by using primary land titles as the main selection criterion. Ineffective targeting of water and land resources, credit, input and marketing facilities have had a severe negative impact on both women's status and project efficiency (Hanger & Morris 1973; Dey 1980). Men continue to be the privileged members of water users associations and particularly dominate in decision-making committees (Chancellor 1996). On the other hand, if agencies actively inform and include both male and female farmers in project-planning and in the allocation of resource rights from the start, gender equity and project efficiency are reached, usually with the consent of husbands and the male élite. The Provincial Irrigation Unit in the Nyanza Province in Kenya is a well-documented example (Hulsebosch & Ombarra 1995). Traditional chiefs and agricultural extension workers in the Northern Province in South Africa also favour female farmers' stronger land rights. Giving women their own land rights would better motivate them to increase productivity, as it would protect them against men's appropriation of the fruits of their labour (Van Koppen 1999).

## *Implications for economic concepts*

An integrated water management paradigm that prioritises satisfying basic domestic water needs, redressing racial and gender inequities in water use for productive purposes, and strengthening the role of water as a tool for economic development and poverty eradication, challenges economic concepts of the conventional water management paradigm. First, it sheds new light on the statement that water should be treated as an economic good (Dublin 1992). The statement itself has "the virtue of being sufficiently vague to allow agreement, while leaving the implied operational content – over which there may be strong disagreement – unstated" (Perry et al 1997). Instead, as Perry et al (1997) argue, the issue is not *whether* water is an economic good as it is, but what *kind* of economic good water is, a private or public and social good, and hence which values govern analysis and decision-making. Proponents of water as a private good define its value as the maximum amount that the user would be willing to pay for the use of the resource. The distribution of water should be determined by the overriding value (and not more than a value) of the consumer's sovereignty on a free market. However, their opponents find this a misleading analysis: it does not take into account that willingness to pay largely depends on the ability to pay, and ignores the unequal distribution of incomes (Perry et al 1997). Thus, valuing consumer sovereignty is incompatible with the other widely endorsed value of a society, in which all people's basic needs are met, including the basic consumptive and productive needs in which water plays a role. In fact, both the public-good and private-good adherents tend to agree on the importance of the value of poverty eradication for society. Whether private markets, or public interventions and subsidies, or a mix, are most effective in creating such a society is the question to explore.

Secondly, rather than only considering the added value or 'beneficial use' in the aggregate sense of the contribution to the GNP, the new paradigm highlights the distribution of water-created values of health and wealth within society. For example,

mining may generate more value per drop than smallholder agriculture. However, as long as job creation in mining is limited and mainly confined to men, smallholder agriculture that serves many poor people, both men and women, and their dependents, is much more effective in alleviating poverty, even when the total added income is small. Within water dependent sectors, like mining or environmental tourism, better inclusion of poor people to share the gains also improves the well-being of the poor. The importance to consider intrasector *distribution* of gains also challenges the existing notion that 'the sector' can be represented by one single representative.

## Legal tools to protect water use by poor people

Competition for water adds a new dimension to water management. In a pro-poor water management paradigm, poor people's current water use is protected or even expanded, while other poor people are still able to access water as new entrants and satisfy their unmet water needs. The legal tool that the National Water Act offers to reallocate water in severely water-stressed areas is 'compulsory licensing'. Under such specific conditions, the government, as custodian of the nation's water resources, may curtail the water use allocations of large users, in favour of previously disadvantaged water users. Compulsory licensing is the ultimate tool for the government to reallocate water use. It builds upon the four other ways in which the government authorises water use.

Firstly, all users are without registration or payment, authorised to take water for, among others, "reasonable domestic use, watering gardens and stock watering", but not for commercial purposes, as stipulated in schedule 1 of the Act.

Secondly, the law authorises the continuation of *existing* lawful use. On the one hand, this confirms precisely the racist and discriminatory practices in past water use that the Act aims to overcome – at least to the extent that water use by whites was lawful according to the old law. On the other hand, water use by previously disadvantaged people – even if their water rights were unclear, or embedded in loose agreements between the former homeland government and local chiefs, or never registered or recognised by any authority – can still formally be declared 'lawful use'today.

In order to assess all current water use, the Department of Water Affairs and Forestry launched a massive registration campaign. After completing the first round of registration, an analysis is foreseen of the gaps in reaching all people and uses, with the help of satellite images and aerial photographs, as well as the verification of registered water uses. This much better insight in current uses will be a sound basis for any management. It will also provide the basis to charge water fees. For the latter, it is especially important to identify the large water consumers. Small users, for example farmers cultivating less than 1-2 hectares, are not included in this registration campaign, because, as can be expected, they will not be obliged to pay even if they market substantive parts of their crops.

Since the promulgation of the National Water Act, all *new* water uses have to be authorised. The government does so, thirdly, by issuing general authorisations for small uses in areas with relatively sufficient water, and, fourthly, by issuing licenses. Licenses may be issued for a maximum of 40 years. The terms and conditions of a license will be regularly reviewed. Should an amendment of a license condition severely prejudice the economic viability of an undertaking, the licensee may claim compensation. Licenses may be surrendered in order to facilitate the application for a license for that water allocation



by another user and, thus, represent a monetary value. Today, particular attention is paid to license applications from small-scale black farmers and direct attempts are made to speed up processing them and to give them priority over other license applications.

In future, the government will call for compulsory licensing of water users in water-stressed areas where, for example, problems are experienced or expected from over-utilisation and competing water uses. Such calls for compulsory licensing by the minister will apply to all water users, including those authorised under the continuation of the 'existing lawful use' component of the Act, and those operating under a general authorisation. On the basis of all applications for licenses, the responsible authority will propose an allocation schedule. After further rounds of public comments, a final allocation schedule will be compiled and implemented. A main consideration in the allocation schedule is how to "allocate to each of the applicants to whom licenses ought to be issued in order to redress the results of past racial and gender discrimination in accordance with the constitutional mandate for water reform" (National Water Act Part 8. Section 45). Only if the viability of the water-related enterprises is severely affected by a change in licensing, is the state obliged to compensate the losing water users.

Compulsory licensing has a strong potential to empower the poor. Whether this goal is reached will depend upon many factors, such as good information among poor women and men of their rights; accurate and credible measurement and registration of the uses of competing parties; poor people's strong voice and their effective negotiations in the forums in which the allocation schedule is compiled and through which the new allocations are to be reinforced; and the commitment and skills of the department's staff and others, such as NGOs, to facilitate the processes at stake. The challenge is to create effective negotiation between many poor, marginalised, small-scale water users and large-scale users who are literate, well-organised and well-informed about the law and the ways to object to the law, but who, for the first time in history, have to sacrifice some of their age-old exclusive water allocations. Brand-new governance structures, well rooted in poor people's organisations, will be indispensable.

An important gender issue in registration and licensing processes and in the creation of new formal and informal governance structures is who is recognised as the titleholder and in whose names within the household are water use licenses or membership written. The registration forms require both the name of the actual user and the name of the titleholder of the property, such as land, on which the water is used. This would provide for female farmers and water users who cultivate the land of their in-laws, provided the administrators are conscious and accurate about the intra-household organisation of production. Special attention is needed because administrators and registrars are notoriously weak throughout the world in accounting for intra-household and gender issues.

## Catchment management agencies for poor people' s empowerment

### *Governance challenges*

South Africa is a pioneer in CMAs, new governance structures for water management at basin level. These institutions will be key in implementing the new integrated water management paradigm embedded in the National Water Act, as briefly sketched above.

CMAs will be the vehicles to meet poor people's basic consumptive water needs and productive needs, linked to economic empowerment, and the protection and expansion of water use under growing competition.

The core of the National Water Act – such as the overarching goal to redress racial and gender inequalities – is equally valid for CMAs. Linking water management to economic development and poverty eradication and co-ordinating water resource management with the provision of services into holistic integrated water management are also stipulated as explicit tasks of the CMA. The implementation of the government's policy stipulating that information is a public good, accessible to all, will be especially relevant for CMAs. The new government policy to charge water users not only for the capital and operational costs of water provision, but also for general water resources management tasks is currently being put in place and will be implemented simultaneously with the establishment of the CMAs. In the long run, water users are expected to finance their own CMAs.

CMAs will function directly under the minister and will be steered by a governing board representing public interests. CMAs will have a chief executive officer and technical staff. Important powers will gradually be delegated from the Department of Water Affairs and Forestry to these new agencies. These powers include the compilation of catchment management strategies, fee collection, water use registration, the authorisation and licensing of new uses and compulsory licensing.

The main innovations of the CMAs are:

- the new basin boundaries;
- the new role of the public; and
- the new task of the CMA to promote community participation.

The first step in establishing a CMA is to formulate a proposal and to propose an advisory committee for the nomination of the governing board. These first steps largely shape the organisational design, if not formally, then in practice. Globally, experience has shown that any new organisation is primarily formed in the early design stages. Once the key composition of the organisational design – such as the governance structures, operational bodies and the constituency of members and their mutual relationships – starts to crystallise, there are generally no forces or processes that can fundamentally challenge this organisational design (Shah 1996). Public participation and community participation are key elements in the design. Below, two hypothetical scenarios of public participation and community participation are distinguished in these initial steps, which are at the extremes of being unlikely and likely to generate a CMA that effectively contributes to poverty eradication and gender equity. Again, the focus is on generic elements.

## *Scenario one: Reinforcing inequalities*

The scenario that is likely to marginalise previously disadvantaged water users further is characterised by a form of public participation in which those who were in power during the apartheid era within the government and among consultants and large-scale water users capture the new public space. They would primarily serve their own interests and the interests of large-scale users despite claiming to 'represent the public'.

Current water management by the government entails a certain degree of continuity and accountability towards 'the public'. However, in this new scenario of water governance, decision-making on water management may become less transparent. In



particular, the accountability of consultants towards the large public of water users risks being weak, because of the temporary and ad hoc nature of the involvement of consultants assigned to time-bound projects. After project closure, consultants' responsibility for problems that were created during the process more or less ends, while the burden to deal with these problems lies with the government and the new institutions. Another risk in this scenario is that the new 'public'bodies may focus on the easiest and most rewarding water management tasks, leaving the tedious and more problematic aspects of water management to the government.

In this scenario of 'public participation'there is hardly sharing of existing *information* during the process of establishing a CMA with those not on board as yet, let alone active capacity-building beyond the small group of those involved. The language of communication is that of the powerful minority, which excludes the large majority of previously disadvantaged people. Moreover, complex, technical language is used that hides the political issues and important policy choices to be made.

The CMA proposal itself is essentially written by the small minority in charge of the process of establishing a CMA, repeating existing information. There is little effort to identify major information gaps, such as insight into the distribution of water-created health and wealth and paths to link water management to economic development and poverty eradication.

Outreach to a wider public is primarily done because it is legally required. The main purpose of such reaching out is to be able to claim 'consent'to the proposals of those who lead the process by a minimally required number of token people from marginalised communities. However, these token participants remain confused about the aim of the process, even main concepts remain unclear, there is no clarity about follow-up, there is no feedback, and so on. Their genuine water concerns, such as domestic water needs, are ignored. Other questions or disagreements remain unreported. Their participation in decision-making is at best about minor issues. Realistically, they have no power to influence decision-making. The few token participants in the process are portrayed as 'representatives' of their communities, even if they themselves openly disagree, because they were never selected by a constituency on such a basis and for such a mandate (invitations never required such a selection process), and they lack realistic opportunities to report back. Or the requirement of 'representation' is downscaled and replaced by the easier requirement to 'bring perspectives'. Nevertheless, the small group in power claims that this form of 'inclusion'has led to consensus and agreement in joint decisions by 'all stakeholders'.

Wherever *representation* is specified, for example for the important positions, such as the advisory committee or governing board, it is done on the basis of 'sectors'. This ignores the critical differences *within* sectors and reproduces an artificial, unrealistic distinction between sectors, in spite of the aim of CMAs to manage water in an integrated way. Oversimplified sectoral representation ignores demography and the legitimacy of all people's water needs, even if quantities used are small, and the legitimacy of the right of all to decide about factors affecting their lives. Moreover, technical and legal expertise are overemphasised as selection criteria, suggesting that other forms of knowledge are irrelevant. Without any simultaneous programme of capacity-building, such criteria merely reinforce the existing inequalities in South African society.

### *Scenario two: CMAs for poverty eradication and gender equity*

In the scenario that is likely to contribute positively to poverty eradication and gender equity, the participation of previously disadvantaged communities in establishing a CMA is an integral part of the organisational design of the CMA from the very beginning. The new public space is primarily opened up to bring those on board who have typically been excluded from decision-making on water management in the past.

The basis of all water management is recognised as beginning on the ground, in communities, especially among women. There is special attention to water needs and existing water tenure arrangements in previously disadvantaged communities. Local capacity to use water for improved well-being is reinforced. Only water management issues that, by their very nature, require being addressed at higher, more central levels are brought to those levels. This is an issue-driven process depending upon both local priorities, especially among the poor, but also upon national requirements, such as the sharing of international waters.

Where competition over water prevails, forums are established for conflict resolution between the poor and better-off, between the same racial groups but especially between black small-scale water users and white large-scale users. Information about poor people's water rights under the National Water Act and information on other relevant arrangements are provided in local languages and in ways accessible to the illiterate. Negotiation skills are developed among all parties involved. Public enforcement, for example, through 'public shame', is developed as absolute conditions for setting water allocation rules and concretising the rules.

Decision-making support tools and maps are developed that integrate localised hydrological and socio-economic data to facilitate transparent joint decision-making. Access to registration databases is decentralised to facilitate water management.

As the obvious, possibly low-cost condition to strengthen water as a tool for poverty eradication and economic development and to solve water-related conflicts, synergy is fostered between the relevant national and local government departments and policies (including the Integrated Sustainable Rural Development Strategy), and institutions with a pro-poor and gender-inclusive agenda such as NGOs, community-based organisations (CBOs), trade unions, the ANC, the South African Communist Party, and others. In this scenario, those who still carry buckets become the water managers from local to basin level.

There can be little doubt that the requirement of the National Water Act in terms of redressing the inequalities of the past, and the general goals of the South African government to eradicate poverty, will be best served by the second scenario. The challenge is to create the appropriate tools and mechanisms to ensure that this scenario is achieved in the establishment of the 19 CMAs.

Experience to date has revealed a number of areas that must be focused on to achieve the establishment of pro-poor and gender sensitive institutions and water management:

In-service training is essential for staff of the Department of Water Affairs and Forestry on the new water management paradigm, and on pro-poor consultative processes and institutional development. Many of the staff currently involved in the development of CMAs are, by training and experience, technical water management professionals, mainly scientists and engineers. There is a dearth of knowledge and experience among these staff,



and among many of the consultants commonly used by the Department around institutional development and poverty issues.

- New tools should be developed to support the implementation of the National Water Act. For example, current economic tools do not facilitate the analysis of the economic and social impact of water use. Further work must be done to develop tools that assist decision makers to understand the value of water as used by poor communities.
- Appropriate communication tools should be developed. Little emphasis has been placed, to date, on the development of appropriate communication tools. Easily accessible brochures, in local languages, must be developed to assist in explaining what a CMA is, how a CMA will function, and how local communities can get involved in making decisions around water management. Some work is currently being done by the Department on the use of technologically advanced systems such as computerised three-dimensional 'fly-bys' of catchment areas, to examine their potential as communication tools in marginalised and largely illiterate communities.
- There is a need to build on what exists. The new system is not being developed in a vacuum. Poor rural communities already have their own water allocation and tenure systems, as well as existing community organisations and mechanisms for communication. Rather than assuming a *tabula rasa* scenario, existing practices must be understood and strengthened where appropriate. New decision-making systems should take these existing practices into account.
- A system of monitoring and evaluation must be developed that looks more broadly than the technical water monitoring systems currently in place, which monitor, for example, water flow and water quality. Systems must be developed and put in place that can monitor the impact of water allocations on poverty in rural communities, with a particular emphasis on desegregating information according to gender.
- While the development of pro-poor, transparent and consultative CMAs is crucial to the process of ensuring that water allocation contributes to poverty eradication in South Africa, catchment management strategies are equally important. The catchment management strategy for any water management area will set out the policies, strategies and plans for the management, protection and development of water resources in that area. A proactive pro-poor approach must be taken in such strategies to ensure that the interests of the poor are carried through into all decisions regarding water resources management in the catchment area and are transformed into reality.

## Conclusions

Concerns for poverty and gender have raised new issues, both in the interpretation of the integrated water resources management paradigm and in its implementation. A range of factors must be addressed in an integrated approach, including how to facilitate access to water for those previously deprived of such access; how to value and provide for water for productive use by poor households and communities; and the development and adaptation of appropriate and affordable technologies.

The examination of poverty and gender issues throws new light on the understanding of water as an economic good and calls for a more sophisticated understanding of the relative distribution of water-related health and well-being value within a society, particularly one in which high levels of inequality exist.

It also throws new light on issues of water scarcity, and the understanding that even in areas of physical water abundance, poor communities experience de facto water scarcity. Similarly, in areas of physical water scarcity, the impact is much more severe for poor communities than for affluent communities. The process of increasing water use efficiency in the face of increasing water scarcity, in the interests of gender equity and poverty eradication, must also focus on the redistribution of water allocations within the catchment.

Finally, water resources management is not the sole mandate of water professionals. Water professionals have a key role as facilitators and managers, under a common mandate developed by water users themselves, including the poor, small water users, and potential water users.

If the above approach is not adopted, not only will opportunities for poverty eradication remain untapped, but the possibility exists that current inequalities will be heightened and further entrenched. The conventional paradigm aggravates poverty. The new paradigm not only contributes to poverty eradication, but also to enhanced water resources management.

Ultimately, the challenge is not to provide 'some, for all, forever', but rather to provide 'enough, for all, forever'.

# Chapter 11
# Managing water from farmers' fields to river basins: Implications of scale

**David Molden and Douglas Merrey**

## Introduction

The broad goal of improved water management is to enhance human welfare in a manner that is sustainable and does not destroy the environment. It is important to find means for rural poor people in developing countries to improve their livelihoods and living standards through enhanced access to and the productive use of water. Obviously, there are marked differences around the world, even within countries and regions, in terms of the degree to which water scarcity or inequitable access to water resources affects peoples' lives. But hundreds of millions of people in rural Asia, Africa and Latin America lack access to clean water for basic needs. For most of these people, gaining access to more water for enhancing crop, livestock or fish production could have a huge impact on their livelihoods.

Three important dimensions of improved water management — productivity, equity and sustainability – are fundamental to the discussion of scale in this chapter. 'Productivity' can be defined in various ways: returns to labour, returns to capital investments, and production per unit of land or per unit of water. From the perspective of farmers, they will wish to optimise returns to their scarcest resource, but tempered by the degree of risk they are willing to take. For the purpose of this chapter, water is seen as the scarcest resource, and therefore productivity is defined as the net value produced per unit of water consumed in the production process.

'Equity' is also a problematic term. For the purpose of this chapter, the focus is on access to water as the scarcest and most constraining resource for rural development in large parts of the developing world. At every level, huge inequalities in access to water are currently evident: people with insufficient drinking water are living next to huge commercial irrigated farms in Southern Africa, while people at the tail end of irrigation schemes, whose water is diverted and consumed by those near the head, are unable to produce crops in many parts of Asia and Africa. These inequalities are largely a function of the political and institutional environment: poor people often do not have recognised rights to water. Even where their 'right'is acknowledged, these rights are not adequately enforced and inequitable investments are made in the infrastructure necessary to provide access to water.

'Sustainability'is no less problematic a term as it too has many dimensions. The term is used here to refer to the sustainability of the systems for making water available for productive use. This has an environmental component (if soils or the aquifer are degraded, then the system will eventually collapse), an economic component (if sufficient returns are

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not generated, then it will not be possible to maintain the system), and an institutional component. The institutional framework is the key in achieving economic and environmental sustainability, as well as in achieving high productivity and reasonable equity. For the purpose of this chapter, the institutional framework for water management is therefore taken to be the key in achieving a sustainable, productive and equitable water management system.

Water management is undertaken on a variety of geographical scales. Farmers applying water to their vegetable crops are managing water; ditch tenders distributing water among farms in an irrigation scheme are managing water; and engineers overseeing releases from dams are managing water. The remainder of this chapter addresses the problem of scale, and the related problem of 'scaling up', or moving from pilot projects at a micro-level to large-scale projects on whole river basins. Interventions that make sense at a local level often have profound unintended consequences on higher scales, and the types of interventions appropriate on micro-scales are totally different from those that are appropriate on higher scales. Examining proposed water management interventions from the perspective of a river basin system, and from an historical and institutional perspective, is essential before embarking on major intervention programmes.

The objective of this chapter is to outline spatial, temporal and institutional scale considerations important in the development and management of water resources in developing countries. First, concepts of spatial and temporal scales are introduced. This is followed by a discussion of local scale interventions and the implications at basin scale, and the two dimensions of institutional scale are examined. The conclusion emphasises the broad implications for the development and management of African river basins.

## Issues of scale: From bathtubs to basins, days to decades

One of the pleasures in life is bathing, especially after hard, dirty work. Some people savour the experience, and will try to make it last as long as possible. Others are more frugal with water out of concern or necessity, and their experience, though enjoyable, is shorter lived. Bathing may seem like a very personal experience, but when thinking about water resources, the experience is often very public. The reason has to do with scale. To illustrate why scale is important in water resources, consider two questions: Where did the water come from? And where will it go next?

In relatively wealthy urban settings, storage, diversion and delivery facilities have been built to deliver water to houses whenever the taps are turned on. Water is available for a shower the instant it is required. After a shower, where does the water go? Except for the water that evaporates from skin or from a towel, water is conveyed away from the house and away from the urban area where it is (hopefully) treated, and then disposed of. Many coastal cities discharge the drainage water into the sea, leaving no further opportunity for human use. But if the city is upstream from the coast, drainage water is usually directed back to the river. There, the water may be captured again and diverted to another city or to an irrigation system. Some of this water that does not evaporate from the surface may again re-enter the river system and be available for use.

In contrast to an urban setting, the luxury of such hydraulic infrastructure is not available in many rural African village settings. A lucky village is equipped with a well and pump. Women often walk great distances to fetch water and carry the heavy load to



their houses (albeit that they may enjoy a few moments of socialising at the well). Long showers are generally not feasible in such a situation. Bathing water is often carefully captured and conserved, and used to water trees or gardens. In this case, there is very little return flow to rivers. The processes of bathing, cleaning and watering plants deplete nearly all of the scant water supply. The benefit derived from each drop used by the household is extremely high in this case. In small villages, the volume of water is not huge, and in many cases is replenished locally through recharge from rainfall. Compared to an urban setting, there is little interaction with other users in the basin.

In both cases water is utilised on a very local scale – that of a household. In the first case, water use on this local scale has an impact on water use on larger, basin-wide scales. Because many people want the luxury of piped supply, major civil works have to be installed that alter the natural flow paths and quality of the water. In the case where the water flows to the sea, a finite resource is depleted. In other cases, it is fortunate that water can be re-used – although in a degraded state. In this case, important scales of analysis are at the use level, the water delivery service scale, the river basin scale, and possibly national and international scales. Thus the act of taking a shower involves household decisions, water supply management, allocation of basin resources, national strategies on water use, and international relations that control trade.

In the case of the village, there are just two important scales of analysis – that of the individual user, and that of the village community. The user has to manage a very limited supply. The village community may construct and manage its water facility. The use of village water in this case will have very little affect on the overall basin water resource.

The aspiration of many people is to move from the situation of a basic village water supply to one where ample supplies are available on demand. The consequences of upgrading supplies are significantly dependent on other uses in the basin. When the intensity of water use is low within a basin, local considerations dominate thinking about water resources because other users in a basin do not notice the impact of an additional supply. With intensification of basin-wide use, local considerations remain important, but basin level considerations increase in importance, because an action taken by one group affects another group. If the village diverts additional water that impacts on the downstream urban supplies, a contentious situation develops. Because demand and supplies change over time – primarily driven by population growth and income levels – very little is static with regard to water resources. Decisions are made daily about how to use water, as well as once-off investment decisions, but other factors slowly creep into the background unnoticed – competition, pollution and resource degradation that must eventually be dealt with. What is valid today may not be true tomorrow.

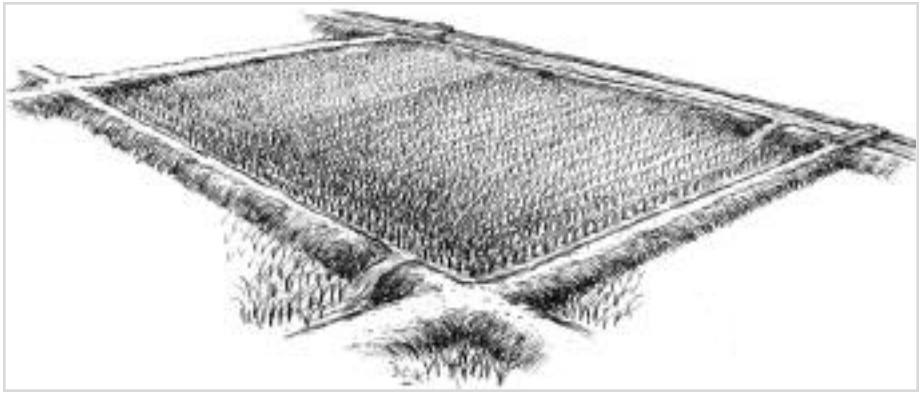
Scale issues influence the impact of investment, policy and management decisions in terms of water in ways that are often difficult to foresee, usually because interest mainly lies in a local setting with a relatively short time horizon. The more intensively water resources are used, the more these issues of scale appear, requiring a better science for understanding them, and requiring institutions equipped to deal with these problems.

### *Concepts and issues of spatial scale*

To illustrate issues of scale, consider the different perspectives on water use in an agricultural area. On farm scale, farmers receive water from various sources: rain, an

irrigation canal, ponds, drains or groundwater. Various field scale practices and processes play a critical role. These include frequency, timing and volume of water application, tillage practices, fertilizer use, insect control, and more. Figure 1 illustrates the situation from the perspective of an observer standing next to the field.

*Figure 1: A field scale perspective*



If this field is seen from a balloon in the sky, a different perspective on an irrigated area would be available. The landscape may include rain-fed and irrigated fields, trees, villages, roads, canals, drains and storage ponds. Water management practices and processes on this scale include the allocation and distribution of water to farms; rainfall, runoff, and storage; and practices and processes related to the non-irrigation uses of water. Figure 2 provides a schematic overview of an irrigated area in the Olifants River Basin, Northern Province, South Africa.

Finally, a satellite image (figure 3) shows this irrigated area as an integral part of a river basin. Water management processes and practices on the basin scale include allocation between sectors; water storage, management of floods and droughts, regulation of water quality, watershed protection, and other tasks. In much of arid and semi-arid sub-Saharan Africa, the dominance of rain-fed agriculture and pastoral landscapes has important water and production implications. Alterations in landscape from trees to grasslands, or vice versa, can change runoff into streams (Calder 2000). In many arid situations, water evaporates from surfaces before reaching river systems – and soil and water management practices in these areas offer potential for improved productivity and livelihoods (Rockström 1999).

When river water passes from one country to another, water resources become an international issue. In addition, especially for physically water-scarce regions, international relations and trade, as discussed by Allan earlier in this volume, play an increasingly important role in agricultural water. In some cases, on-farm water management is therefore directly related to international relations, and trade agreements affect how water is used on farms.

Key processes change when moving up and down spatial scales. While the boundaries between scales are fuzzy, one way to know whether two scales of analysis are different is



*Figure 2: The mezzo scale perspective: Farms below the Arabie Dam on the Olifants River, South Africa*

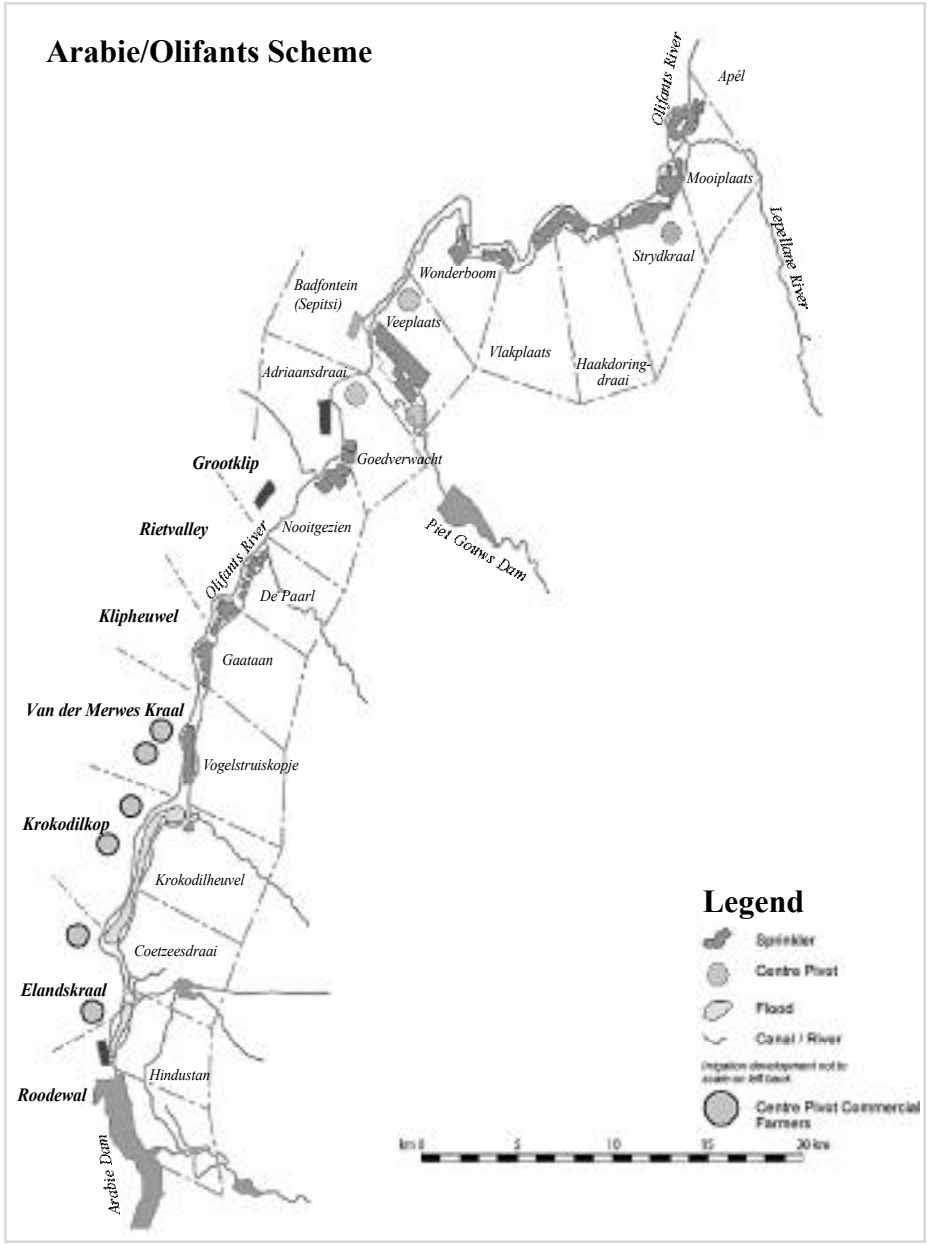
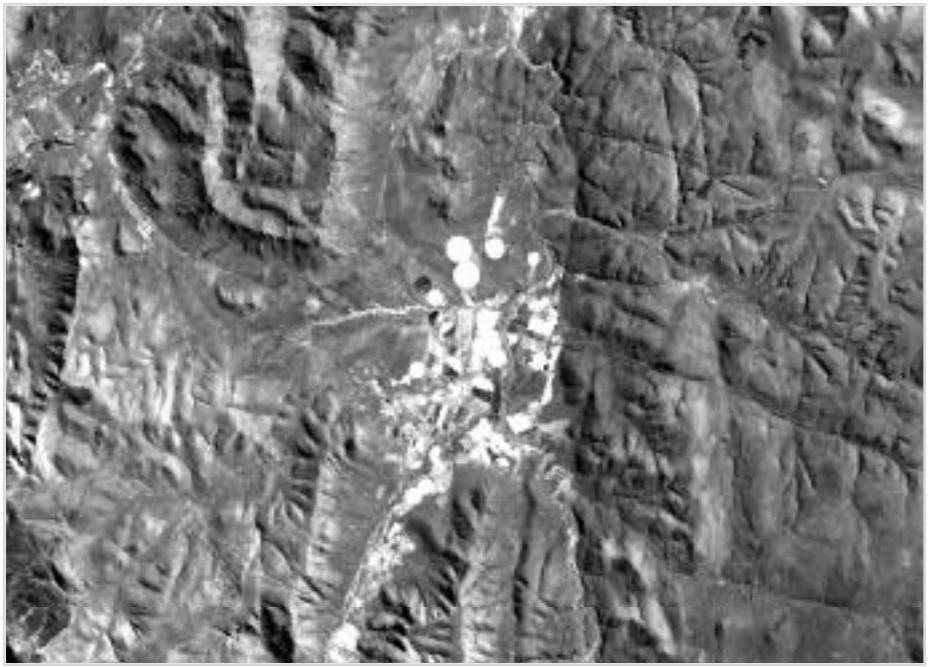


*Figure 3: Landsat image of the Olifants River, South Africa*



to test whether key physical and institutional processes of interest are different. The problem is that change processes are considered on one scale, but the impact of this change on other processes on a larger scale cannot be perceived easily. In the example, installing a water supply system, which includes managing processes of service provision, may have basin implications that affect other processes significantly on a different scale such as water allocation, or the pollution of rivers.

The question is when to consider these spatial scale effects. The answer lies in the existence, extent and quality of lateral flows or return flows from the scale of interest (Van Noordwijk, forthcoming). If the change on a local scale has little or no influence on lateral flows, or if a change in lateral flows has only a marginal impact on human or natural use outside the area of interest, then higher level scales do not have to be considered. For example, Lovell (forthcoming) points out that, in managing groundwater in areas of crystalline basement, such as Romwe in Zimbabwe, water storage takes place in areas of weathering and fractures and there is little regional movement. Thus local considerations dominate, and unlike large sedimentary aquifers, it is not necessary to take into consideration the entire river basin scale. In the village example at the beginning of this chapter, scale considerations may not be important. But in many instances, such as the urban water supply example, consideration of the scale of interest is essential.



## Concepts and issues of temporal scale

Opening and closing a tap is an action that many people are fortunate enough to do several times during a single day. The construction of a reservoir to service irrigation schemes or cities in a given area is a once-in-a-lifetime event. Sometimes farmers plan for water delivery events lasting a period of days. Other times, seasonal plans are made, while occasionally, long-term strategic plans are developed. It is clear from these examples that time scale also plays an important role in water resources thinking.

*Fast* variables tend to change over a relatively short timespan (Carpenter et al 1999). Examples are flow rates in a canal, or soil moisture content. *Slow* variables take a relatively longer time to change. For agricultural water, important slow variables are groundwater levels, the degree of competition for water resources, and salinity build-up. Day-to-day, weekly and seasonal planning efforts focus on fast variables. Strategic planning largely focuses on slow variables. Because the trajectory of slow variables is often difficult to change, politicians tend to ignore these, leaving them for their successors. In the next few paragraphs, the focus is on important slow variables, or changes in land and water use patterns in a river basin.

Phases of river basin development are defined and illustrated in figure 4, building on work by Keller et al (1998) and referring to the related work of Turton (1999f). The rainfall onto a basin or sub-basin, plus any trans-basin diversions represent the gross *inflow* into the basin. Even if all feasible diversion and storage structures were built, it is not always possible to tap the entire volume of gross inflow. Some water is non-utilisable by humans. It would be an almost inconceivable task with present day technology and economics to block the flow of the Congo River completely, for example. Some water may be required to meet important natural reserves and is considered committed water. The volume of water *potentially available* for depletive use within the domain is the gross inflow less non-utilisable flows, less any water commitments for downstream uses.

The actual *available water* for human use at any time in the course of river basin development is a function of the existing infrastructure. With all feasible structures built, the available water is, in principle, equal to the potentially available water. As time passes, and more infrastructure is built, more water is made available. When a new structure comes on line, there is an increase in the volume of available water as indicated by the stair-step pattern in figure 4.

Water is also made available by expanding human activity on land resources. Replacing natural vegetation with agricultural cropland makes additional rainwater available for human use ('green'water, if this water would not otherwise have entered into the cycle of renewable water resources). Humans tap into basin water resources by either diverting water from rivers, or capturing rain. Basically, water is taken from natural reserves for use.

As demand increases and more water is made available, more water is depleted. More land is put into agriculture, more irrigation water is diverted, and demand for urban and industrial water increases. Eventually, the depleted water approaches the available water, and a new structure may be required. In a highly developed basin, depletion approaches the potentially available supplies. The potentially available water represents the maximum water that can be made available, unless more water is brought in through a trans-basin diversion.

In some cases, water depletion even exceeds the potentially available resource – in the long run, a non-sustainable situation. For example, in many areas of the world (Postel 1999), there are severe problems with falling groundwater levels. In other areas, water is so intensively used that flows are reduced to a point where pollutants and salts cannot be washed out of the basin. In other cases, people mine into what should be natural reserves by removing excessive quantities of natural vegetation, or removing water from wetlands.

*Figure 4: Phases of river basin development*

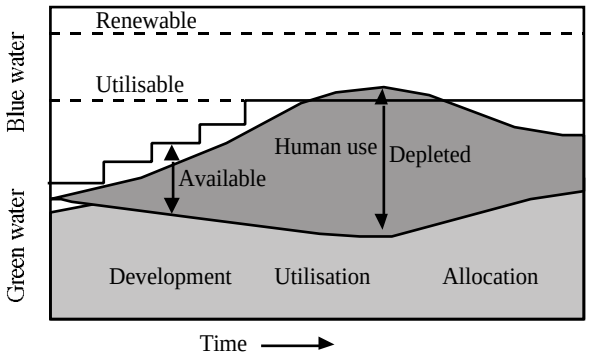



Figure 4 illustrates three important phases of river basin development implicit in the above discussion:

- *Development*: In this phase, the volume of naturally occurring water is not a constraint. Rather, expansion in demand drives the construction of new infrastructure and expansion of agricultural land. Institutions are primarily engaged in expanding facilities for human use. Turton (1999f) refers to this as the supply-side phase.
- *Utilisation*: Significant construction has taken place, and the goal now becomes to make the most out of these facilities. Water savings and improved management of water deliveries are important objectives. Early in this stage, intersectoral competition is minimal. Institutions are primarily concerned with sectoral issues such as managing irrigation water, or managing drinking water supplies.
- *Allocation:* When depletion approaches the potential available water there is limited scope for further development. This is referred to as a 'closed basin'. Efforts are made to increase the productivity or value of every drop of water. An important means of accomplishing this is to reallocate water from lower to 'higher value'uses. Valuation of water to achieve both sustainability and equity in allocations among competing demands becomes a major issue. Managing demand becomes increasingly critical. Infrastructure construction is limited to those that aid in regulation and control. Little scope remains for 'real water savings'. Institutions are primarily involved in allocation, conflict resolution and regulation. Several important management and regulatory functions gain prominence, including intersectoral allocation. Turton (1999f) refers to this as the demand management phase.



In many closed basins in the allocation phase, depletion by human uses exceeds what is environmentally desirable, and often what is environmentally sustainable. The situation is out of balance and cannot be sustained. In such stressed areas, basin water depletion will inevitably fall to minimally sustainable levels. Whether basins will suffer a painful collapse, as in the ancient irrigation areas of Mesopotamia that were destroyed by salinisation, or return to a more acceptable state, is a major current water management issue.

Concerns vary during different phases of development. These concerns may exist at all times, but their importance or emphasis changes over time as illustrated in figure 5. In the development phase, infrastructure construction plays a dominant role. In the last 50 years, institutions have been established to build major dams, canals, drinking water treatment and wastewater plants. Most agencies are dominated by civil engineers who have the important job of getting high quality work done quickly.

*Figure 5: Various concerns at different phases of river basin development*

| Development | Utilisation | Allocation |
|---|---|---|
| Construction | Improving organisation and management services | Shifting to higher value uses |
| Managing supply distribution | Investing in and improving organisation and management | Managing demand |
| Economic water scarcity | Localised water scarcity | Physical water scarcity |
| Low value of water | Increasing value of water | High value of water |
| Fewer water conflicts | Within system conflicts | Between system conflicts |
| Large structures | Modernisation/rehabilitation | Measurement, regulating |
| Utilising groundwater | Conjunctive management | Regulating groundwater |
| Diluting pollution | Emerging pollution/salinity | Cleaning up pollution |
| Including/excluding poor in development of facilities | Including poor in organisation and management decision-making | Poor people lose access to water |

Constructing canals and managing canal water are two different types of tasks, and the shift from construction to management is often painful. Infrastructure projects, especially those serving large areas and numerous people are difficult to manage. The task is to provide water service to people with varying levels of expectations and demands subject to variations in climate. Even in ideal situations, it can take a long time to learn how to do this. In the early stage, water utilisation may not be so effective – reliable and equitable service deliveries can be difficult standards to reach. Responses vary. Some institutions quickly adapt, and improve water delivery service. In other cases, problems persist. In response, people tap water on their own initiative from alternative decentralised sources like groundwater, small ponds, or drains. These decentralised approaches existed before big projects, were replaced by such projects, and are now finding their way back into the mainstream.

Eventually, with growing demand, the physical supply of water becomes limiting. When water depletion approaches available supplies, there are two typical responses. If there is

more water remaining for development (available water is less than potentially available water), exploitation through more infrastructure development is physically possible. Later, after the easiest locations have been exploited, or as concerns about social and environmental impacts increase, infrastructure development gets more costly. Finally, during the allocation phase, the quantity of water resources is the constraining factor. Different kinds of infrastructure development prevail during the allocation phase: measurement and regulation structures to control water become more important; rehabilitation and modernisation efforts are common; there may be scope for trans-basin diversions.

Over time, the value of water increases. When water is plentiful, it has low value, but as the basin closes, its value rises dramatically. This leads to a shift from concern with developing the supply of low-value water to a phase where managing demand prevails. When low-value water is plentiful, conflicts can be mitigated with more supplies. As supplies become limited, the potential for conflict increases.

Scarcity takes on different characteristics in each phase of development. During the development phase, scarcity is felt because there is no way to tap water. Scarcity is a reality for many people in Africa who do not have cost-effective technology to access water. Water may be very close by, either underground or in rivers, but there may be formidable economic or institutional barriers that deny access. In the utilisation phase, the technology may be present, but when it is poorly managed, people feel water scarcity. This is common where head-tail problems exist. A water accounting study of the Arabie Scheme in the Olifants Basin of South Africa shows that there is sufficient water to meet agricultural demands, but due to the economics and lack of supporting services for smallholder agriculture, and the general lack of water management, people suffer from water scarcity (Small & Stimie 2000). During the allocation phase, the absolute supply of the physical water resource causes scarcity – a situation called physical scarcity (Seckler et al forthcoming).

Water scarcity in each phase of development has significant implications for poverty. During the development phase, an important consideration is to identify the beneficiaries. Will infrastructure benefit poor people? Will more powerful people capture the benefits? The problems change during the utilisation phase. Even though conveyance structures exist, management may not meet the needs of the poor. During the allocation phase, water is reallocated among sectors and people. When water moves away from agriculture to cities and industries, will the poor and less powerful be able to maintain their right or access to water? Will poor people be able to capture the economic gains when water moves to higher valued uses?

Similarly, environmental concerns change over time. During the development phase, huge changes in nature can take place. Hydraulic infrastructure alters natural flow regimes and the landscape changes with growth in agricultural areas and cities. During the utilisation phase, water use and depletion intensify, further removing water that has environmental functions. A common 'solution' to scarcity is to tap into natural reserves of ecological significance for more water, resulting in damaged wetlands, or loss of biodiversity in ecosystems generally. During the early phases of development, dilution can be sufficient to solve pollution problems. During the allocation phase, dilution is not an option, because there is simply not enough water. Clean-up at the source becomes increasingly critical.

With land and water development, the ability is created to control more water resources. During the development phase, water is removed from nature. In the allocation



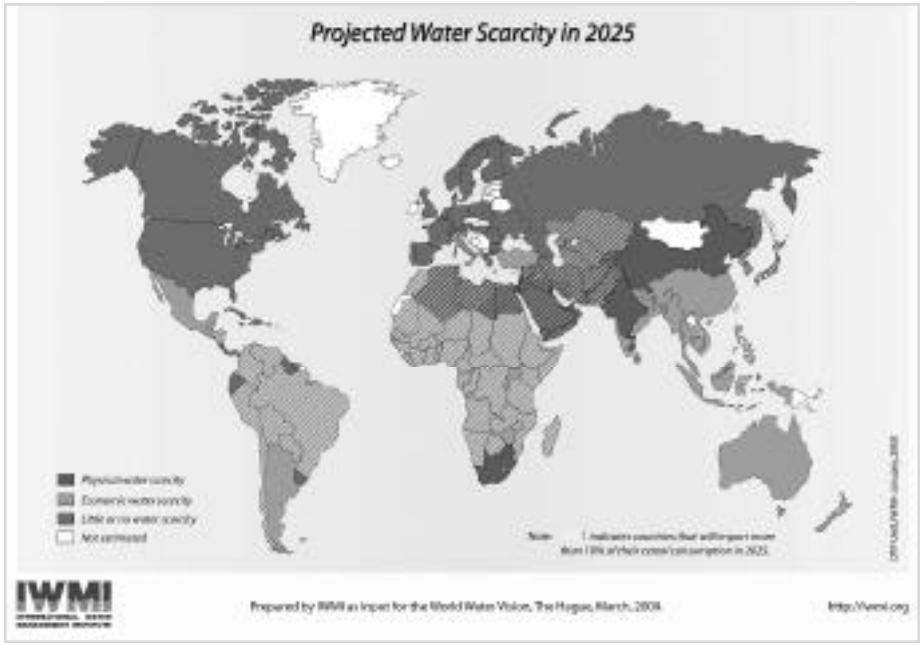
phase, people are in a position to allocate supplies to nature – nature, along with cities, agriculture and industry becomes a competitive user of water. In many developed countries, there is a desire to allocate more water to nature. In California in 1995, urban uses accounted for 11% of water use, agriculture for 42.5%, while environmental reservations accounted for 46.5% of water (Svendsen 2000). In Australia, the New South Wales government recently reduced allocations to irrigation by 10% so that allocations to the environment could be increased (Hatton MacDonald & Young 2001).

It is hypothesised that if the phases of development could be plotted for various basins in Africa, the following pattern would emerge. Most basins in Southern and North Africa would lie in the allocation phase, many of them reaching levels of unsustainable use. Some basins in Kenya are also in this phase, but most basins in sub-Saharan Africa would fall in the development phase with very little infrastructure constructed. This means that there are two very different sets of problems and issues within Africa. As figure 6 shows, most African countries face an 'economic'scarcity of water, and will find it very difficult to raise sufficient resources to construct the water infrastructure needed to meet demands in the next few decades (Seckler et al forthcoming).

## Implications so far

To summarise, it has been shown that there are important issues of spatial and temporal scale that deserve consideration. Moving between scales, change is perceived in

*Figure 6: IWMI global water scarcity map*



important processes of concern. A change in process on one scale may have implications for processes on other scales. Lateral flows, especially return flows of water, are often key factors in determining whether there will be scale effects. Timescales are perhaps less obvious, but equally important. The state of slow variables, such as the degree of competition or groundwater levels, significantly alters perceptions of water scarcity and the needs of institutions. But what does this all mean? What are the implications for Africa?

Much of the work in agricultural water management undertaken by the International Water Management Institute (IMWI) is targeted at farmers' fields or irrigation schemes. Within farmers' fields and irrigation schemes, the following are promoted:

- interventions that increase agricultural *productivity* such as those that increase yield or save water, or are more cost effective;
- interventions to manage water allocation and distribution among farmers to promote *equity* and to facilitate *productivity*; and
- institutional interventions to change institutional arrangements to help farmers organise themselves to operate, maintain and improve their systems, and to represent their own interests to *sustain productivity* and *equity.*

But the results of local water management interventions may not bring the desired results on larger scales. This is because interventions are often developed and tested in a farmer's field or at an irrigation system at one point in time and on a relatively small spatial scale. The consequences of 'scaling up' are often surprising and counter-intuitive from a policy maker's perspective.

A common perception, and often a serious misconception, is that irrigation farmers 'waste water', because only half of the water delivered to farmers reaches crops. To save water for reallocation elsewhere in the basin, interventions are most often targeted at the farm level, and include drip and sprinkler irrigation, canal lining, and water pricing, basically to convert more delivered water to crop evapotranspiration. The desired impact at the basin scale is often not what is expected (see example of Egypt at the end of this chapter). In some cases, farmers save water with more precise technology, but use this to spread irrigation of their own fields, thereby actually depleting more water resources and further complicating competition in water-stressed basins. In other cases, farmers have ingeniously tapped into return flows using pumping technologies, and effectively captured almost all water flowing into the drains. From a basin perspective, there is very little water to be saved (Molden et al 2001).

Unfortunately, far less is known about what to do and how to do it on basin scale than on local scale. This is especially true for irrigated agricultural-based river basins in developing countries. Issues and problems on basin scale are not the same as those on local scale, and are not amenable to easy solutions. Solutions that work in rich countries are not necessarily transferable to Africa.

## Institutional scale issues

'Ignorance' about how to manage river basins in developing countries is particularly problematic when designing effective institutional arrangements on this scale. It is known how to establish local water users' organisations, but the techniques to do this, and the organisational designs that work at the local level, are not amenable to scaling up: the



methods are too intensive; small groups operate in a face-to-face manner, which is not possible with hundreds of thousands of stakeholders; and small groups have more shared than conflicting interests (except in conditions of extreme scarcity) while larger numbers of stakeholders have far more conflicting interests that are difficult to resolve.

Many wealthy developing countries have developed effective basin management institutions. But these are not transferable to Africa in any direct manner. They have evolved in those countries over decades and even hundreds of years, based on local physical, social, cultural and historical conditions. Further, their success is often a function of preconditions not present in most poor countries: human resources, financial resources, educated populace; shared language and culture; good physical infrastructure (roads, communications, as well as water management); effective legal and institutional frameworks; strong community institutions, and more (see Shah 2001).

Institutional scale issues are every bit as complex and problematic as water resource scales. Only horizontal and vertical dimensions are discussed here. Horizontal scaling up (or out) of institutions refers to moving from pilot institutional development projects with one or a few communities to spreading the programme geographically to include larger numbers of communities. Scaling out in this sense is ideally a learning process. Korten (1980) has identified three stages in this learning process. *Learning to be effective* is the first stage, where there is a high investment in capacity-building and knowledge generation. *Learning to be efficient* is the second stage, where the effort shifts to reducing inputs while trying to maintain effectiveness. *Learning to expand* is an orderly phased expansion of the programme. By this last stage, there may be some sacrifice in effectiveness but, if successful, the programme will become stable and large-scale (quantitative scaling out). Where few effective water user associations may have existed at the beginning of such a programme, for example, thousands of them may be found throughout an irrigation scheme, regional river basin, or country a decade or so later.

But such horizontal scaling out is relatively easy to accomplish: it is a matter of finding ways to replicate a process on a larger scale that has been demonstrated to be successful on a smaller scale. Vertical scaling up when moving up the ladder from the grassroots level to create institutions over a large geographical scale that may include thousands of people is an entirely different phenomenon. The geographical scale creates problems of communication not faced at the level of small communities or micro-watersheds. People cannot all get together in small face-to-face groups to work towards a common understanding of problems and devise solutions. Some kind of representational structures are necessary. These have a mixed record in Asia and Africa – accountability is difficult to achieve, as the local constituents have no way of checking on the behaviour of their representatives.

In Africa, transportation infrastructure is poorly developed, making it difficult and expensive for representatives of groups scattered over thousands of square kilometres in a river basin to come together on a regular basis. Electronic communication infrastructure is even less well developed: whereas internet access, television and other media enable the sharing of information over a wide area at little cost in rich countries, this luxury is not available in most African river basins. It is therefore very difficult to create the kind of public awareness of the larger river basin issues that is found in water-scarce basins in rich countries (for example, the Murray-Darling Basin in Australia).

Finally, while small-scale groups are usually relatively homogenous in terms of their perceptions, values and interests, heterogeneity becomes the dominant characteristic on larger scales. For example, in a South African river basin like the Olifants, the members of a local irrigation board or water users'organisation on a smallholder irrigation scheme constitute a relatively homogenous group with common interests. But on the basin scale, bringing together representatives of industries, mines, large-scale commercial farmers, smallholder 'emerging' farmers, urban and village domestic water supply providers, national parks, the tourism industry, environmentalists and others is a formidable task. The logistics is the easy part. In such large basins, there may not even be a shared culture and language as people come from different ethnic backgrounds. The really difficult part is to develop shared values, rules and procedures – indeed a shared language – that will enable such diverse groups with conflicting interests to work out how they are going to manage a closing river basin.

As river basins close when water becomes scarcer, the management of conflicting priorities becomes increasingly problematic. Where the economic and political power of stakeholders is unequal and there are no countervailing institutions to maintain a 'level playing field'among stakeholders, it is very likely that poor people will suffer. Inequalities in access to water will be accentuated and poor people will be deprived of water. Some countries, including South Africa, have enacted legislation intended to prevent and, in fact, reverse such water poverty. South Africa is actively working to implement this new framework, but it is too early to judge success (see Wester et al 2001). Other African countries are at even earlier stages of this endeavour.

## Conclusions

Problems associated with issues of temporal, spatial and institutional scales in developing and managing water resources have been outlined. What are the implications? A few ideas are sketched below.

First, it is clear that a 'science of river basins'is needed that will be multidisciplinary in nature, and will combine basic science with action: interventions in river basins should be based on firm scientific knowledge, which currently is often not the case. Africa faces more serious problems in this regard than other continents, because less good quality data is available for African river basins, and there are too few scientists and scientific institutions working on river basin issues.

Second, more in-depth long-term studies are necessary of how river basins change over time, as well as assessments of the impact of interventions. Planned interventions at whatever scale have to be carefully examined: if farmers invest in water savings or productivity enhancing technologies at local levels, what will be the impact at higher levels or downstream? If interventions are made at higher levels – new infrastructure, new allocation principles, new institutional arrangements – what will the consequences be for overall basin productivity, equity and sustainability? And what is their relevance for local water use?

Third, a flexible, action-oriented approach has to be taken towards building institutions for river basin management: learn lessons from others, then use lessons to re-examine the approach and make suitable adjustments. Change is inevitable, and in areas where water resources are rapidly being developed, these changes can be quite dramatic.



The implication is that an institutional solution that is valid today, may not be valid tomorrow.

Finally, it is suggested that Africa and its supporters have to make much greater investments in both research and institutional capacity-building than has been the case to date. If such investments are made, and if there is sufficient political interest, it would be possible to overturn Africa's apparent disadvantages: rather than repeating the errors of the past in other regions, Africans can learn from these experiences and design their own path to river basin development and management. The three phases of river basin development discussed above, are not inevitable: it is not necessary to wait for a basin to close, for example, before addressing environmental and social impacts. Basins can be managed and developed in a manner that fulfils the demands of social and economic development while maintaining the environmental qualities of the basin.

### The Nile basin in Egypt: Where diversions exceed available water

Almost everywhere on earth, saving or conserving water, especially in agriculture, is extremely important. A common objective is to free water from agriculture, and direct water to other environmental, urban or industrial uses, or to increase agricultural uses to feed a growing population. This objective clearly pertains to multiple uses of water on a basin scale.

The problem is that this basin scale objective must be achieved by local actions, but it is often not clear how local actions will affect basin-wide water use. Local scale solutions – improving farm management of agricultural water, or installing low flush toilets – may or may not lead to basin-wide savings. These demand management strategies will decrease the required diversions of water. These can be very useful to system management and may decrease costs. But will they free water for use elsewhere? Not always. The answer is found in considering what happens to return flows. If they are being used downstream, as in the case of upper and middle Egypt, no additional water will become available. If they are discharged into the ocean, like effluents from Cape Town, then low flush toilets can make a difference.

Egypt's Nile illustrates these concepts well because there is very little rain, and the High Aswan Dam essentially holds most of the annual available supply of 55.5km$^3$ (Molden et al 1998). Over the course of the agricultural year of 1993/94, for example, uses along the Nile diverted 65.5 billion m$^3$ (greater than the 55.5km$^3$ available because of return flows). The depletion by crops, cities and industries was 40.3km$^3$, with 13.7km$^3$ flowing out through the drains and the Nile to the Mediterranean Sea. Much of this water is essential for environmental maintenance. Farm-level application efficiency is in the order of 40-50%, indicating great scope for saving. But from the basin perspective, because of the high degree of re-use, over 80% of available supplies are used beneficially, assuming that at least 8km$^3$ of environmental flows are necessary. There is indeed little wastage, and little that can be saved. Improving efficiencies on farms through demand management practices will thus add little additional water. Diversions can exceed the available supply, but depletion cannot go above this available volume. In other basins, the situation is similar, but more complex because of rain and additional reservoirs.

# Chapter 12
# The interbasin transfer of water between SADC countries: A developmental challenge for the futur e

**Piet Heyns**

## Introduction

The transfer of water from one river basin with an apparent abundance of water to another river basin that is less endowed with water resources, is an ancient practice that finds its origin in the Kingdom of Urartu (Eastern Anatolia in Turkey) more than 27 centuries ago. Excellent examples of major achievements of this nature in ancient times can be seen in the old civilisations of China, Persia, Egypt, South America and the Roman Empire

This technique was mainly used to supply water for domestic use to cities, and water for irrigation purposes in rural areas with suitable, arable land. The magnificent hydraulic architecture of the large and sophisticated aqueducts spread throughout the Roman world is perhaps best reflected in the eleven aqueducts built over a period of 540 years between 312BC and 224AD to supply Rome with domestic water. These aqueducts stretched over a total distance of 500 kilometres and supplied the city with water at an estimated rate of 13 cubic metres per second ($m^3/s$)

In spite of huge civil design and construction constraints, the engineers of old managed to develop complex systems of waterworks that represent the three major features of modern interbasin water supply projects:

- the impoundment of the seasonal runoff in a river in some form of artificial lake to regulate the discharge of water when required;
- the diversion of water across a divide between different watercourse systems, or between catchments in the same watercourse system; and
- the conveyance of water over long distances via tunnels, pipelines and canals.

Interbasin water transfer schemes are not unknown in the Southern African Development Community (SADC) and the concept is well established in practice. The main purpose of these water transfer projects is to ensure more efficient water resource management. This is achieved by linking catchments with different runoff characteristics and thus the impoundments in those catchments. In this way, it is possible to improve operating procedures and optimise operations so that the available water resources can be spread more evenly across the region. This increases the assurance that water will be available for use and that the devastating effects of droughts can be alleviated, or that floods can be controlled.

SADC faces a high rate of population growth and there is a critical need for socio-economic development to alleviate poverty and improve the standard of living of people in the region. The expansion of mining, industrial and manufacturing activities to provide job opportunities and the pressure on the agricultural sector to meet the food demand within SADC, place an increasing burden on the available local water resources. Water is

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one of the main driving forces to sustain development, but in many cases, the local water resources have already become insufficient. This situation is further exacerbated by frequent periods of drought in Southern Africa. This calls for effective, integrated water resource management. The most appropriate solution seems to be the construction of the necessary infrastructure to transfer water from areas with relative abundant sources to areas with scarcity and an elevated water demand.

The transfer of water has therefore not only been unavoidable in the past, but will become even more important in future to achieve the objectives of regional economic integration as advocated in the SADC Treaty. Perhaps the implementation of large, regional water transfer schemes will be one of the major infrastructure development challenges in SADC over the next 20 years.

Even if the long-distance transfer of water is technically possible and economically viable, there are many other ethical, social, legal, financial and environmental considerations to deal with when interbasin water transfers are planned and undertaken, especially when transboundary issues are also at stake. The purpose of this chapter is to examine the framework within which the future development of interbasin or intrabasin water transfer schemes should be contemplated in the shared watercourses in SADC.

## The hydrological scenario

Some of the largest river systems in Africa are in the SADC region. Most notable is the Congo River with a mean annual runoff of more than 1 260 cubic kilometres per annum ($km^3/a$), which accounts for 30% of the mean annual runoff in Africa. Further south, the Zambezi River has a mean annual runoff of 110 $km^3$. This is nearly 12 times less than the runoff in the Congo. Still further south is the Orange River that is the most developed river basin in the whole SADC region, but with a mean annual runoff of only 11 $km^3$ or approximately 115 times less than the Congo and 10 times less than the Zambezi.

The big differences in the runoff in these major rivers reflect the given situation with hydroclimatic conditions prevailing in Southern Africa. The runoff in the river systems reduce dramatically from north to south and south-west in the region. The predominantly summer rainfall in the more southern parts of SADC is erratic, unreliable and unevenly distributed. Furthermore, the occurrence of runoff is variable and complicates the accurate assessment of the magnitude of available surface water resources. However, it is estimated that the total renewable freshwater resources in SADC is approximately 1 800 $km^3$ and the total virgin mean annual runoff of all the major shared river systems in the region is about 1 450 $km^3$ (see figure 1).

When the results of analyses made in South Africa are used as a basis for calculation to determine how much of the available freshwater resources in SADC can be mobilised for utilisation, then at least 60% of the runoff can theoretically be mobilised economically. This means that about 1 000 $km^3$ of water in SADC can be harnessed for use and can be made available for local consumption or could be redistributed from areas of abundance to areas of paucity.

The information about the impoundment of water in figure 1 should be treated with caution, because it is not an indication of the actual consumptive use of water. The water in the large impoundments on the Zambezi and the Cunene, for example, is not all used



*Figure 1: Major shared rivers in SADC*

| Watercourse system | Mean annual runoff ($km^3/a$) | Present impoundments (% of runoff) |
|---|---|---|
| **Buzi** | **2.5** | None |
| **Congo** | **1 260.0** | Insignificant |
| **Cunene** | **5.5** | 57 |
| **Incomati** | **3.5** | 40 |
| **Limpopo** | **5.8** | 82 |
| Maputo | 2.5 | 60 |
| Okavango | 10.0 | None |
| Orange | 11.0 | 152 |
| Pungué | 3.0 | Small diversion only |
| Rovoma | 28.0 | None |
| Save | 6.3 | 63 |
| Umbeluzi | 0.6 | 30 |
| Zambezi | 110.00 | 225 |

*Figure 2: Water scarcity*

| Level of scarcity | $m^3$ per person per annum |
|---|---|
| **None** | >2 000 |
| **Occasional** | 2 000-1 700 |
| **Periodic** | 1 700-1 000 |
| **Chronic** | 1 000-500 |
| Absolute | <500 |

*Figure 3: Water stress*

| Level of stress | Withdrawal/availability ratio (%) |
|---|---|
| Low | <10 |
| Moderate | 10-20 |
| Medium | 20-40 |
| High | 40-60 |
| Catastrophic | >60 |

consumptively – some is used to generate hydropower – while most of the water impounded on the Save and the Orange is used consumptively for domestic, industrial and irrigation purposes. As a result, the water in the Zambezi and the Cunene can be seen as underutilised when viewed from the consumptive use perspective. The same may apply to some of the other impoundments as well.

Different levels of water scarcity can be defined in terms of the annual per capita volume of water that would be required to ensure and maintain sustainable socio-economic development (see figure 2).

According to estimates by the State Hydrologic Institute in Russia, the per capita availability of water in the world during dry years is already below 2 000 $m^3$ for 47% of the world population and below 1 000 $m^3$ for about 35% of the world population. This may look serious from a global perspective, but is not the case in Southern Africa when examined within the context of the overall water availability and demand situation in SADC.

The present population in SADC is estimated at about 210 million people that will increase to about 375 million by 2020. The estimated water availability in the region is 1 800 $km^3$. This means that the present average per capita availability of water in SADC will decrease from about 8 600 $m^3$ to 4 800 $m^3$ over the next 20 years. There seems to be no cause for any concern according to figure 2.

Similarly, water stress can arbitrarily be defined as a function of the ratio between water withdrawal and water availability as reflected in figure 3**.**

The estimated freshwater withdrawal in SADC is about 25$km^3$, and by 2020, the demand may be in the order of 45$km^3$. In this case, the water stress ratio will increase from 1.4% to 2.5%, which is below the 10% of the low water stress category in figure 3 in both cases. Furthermore, these demands are well below the estimated useable availability of 1 000 $km^3$ mentioned above, and again it seems as if SADC will not be in any kind of trouble.

This scenario of apparent adequacy in SADC changes dramatically if the yield of the Congo River is not included and if local conditions are analysed more closely. Without the Congo, the present annual per capita water availability drops to 2 600 $m^3$ and will reduce even further to 1 450 $m^3$ by 2020. From figure 3 it is clear that this overall scenario shifts SADC from the category of 'no scarcity' to 'periodic water scarcity', but in some countries the situation is considerably worse. For example, South Africa already falls in the category of periodic water scarcity and will move towards absolute water scarcity by 2020. Interbasin water transfers between the internal river systems in South Africa and importing water from Lesotho eased this situation somewhat, but more water imports will be inevitable within the next 20 years.

A country like Namibia already falls in the category of absolute water scarcity when only the internally available freshwater resources are considered. The only reason why Namibia is able to manage the situation at present is because it is using internationally shared water from its perennial border rivers to augment its internal water resources. This critical situation will deteriorate further over the next 20 years and implies that even more water will have to be abstracted from the regional watercourses touching Namibian territory, or may even have to be brought in from further afield.

Botswana is in a somewhat better position than Namibia, but is already receiving water from South Africa and will most probably have to look at the future importation of water from the Zambezi.

## Existing and possible future water transfer schemes

Figure 5 shows the major existing interbasin water transfer schemes on the internationally shared watercourses in SADC. From this figure it can be seen that only five SADC countries have interbasin water transfer schemes on shared rivers in operation. It can also be calculated that the existing water transfer schemes on the internationally shared rivers have a total capacity of 5.0 $km^3/a$.



*Figure 4: Calculated data on water use for 2000, with predictions for 2020*

| SADC country | Available water ($km^3/a$) | Water withdrawal ($km^3/a$) | Population (x 1 000) | | | Irrigated area (x 1 000 ha) |
|---|---|---|---|---|---|---|
| | | | Total | Urban | Rural | |
| Angola | 158.0 | 0.48 | 11.072 | 3.543 | 7.529 | 75.0 |
| Botswana | 9.0 | 0.11 | 1.487 | 0.416 | 1.071 | 1.0 |
| DRC | 1 260.0 | 0.36 | 43.901 | 12.731 | 31.170 | 11.0 |
| Lesotho | 5.1 | 0.05 | 2.050 | 0.472 | 1.578 | 3.0 |
| Malawi | 18.7 | 0.94 | 11.129 | 1.558 | 9.571 | 28.0 |
| Mozambique | 58.0 | 0.61 | 16.004 | 5.441 | 10.563 | 107.0 |
| Namibia | 7.8 | 0.25 | 1.54 | 0.570 | 0.970 | 6.0 |
| South Africa | 50.0 | 13.31 | 41.465 | 20.733 | 20.732 | 1 260.0 |
| Swaziland | 7.0 | 0.66 | 0.855 | 0.265 | 0.59 | 67.0 |
| Tanzania | 89.0 | 1.17 | 29.685 | 7.124 | 22.561 | 170.0 |
| Zambia | 116.0 | 1.71 | 9.456 | 4.066 | 5.39 | 46.0 |
| Zimbabwe | 20.0 | 1.22 | 11.261 | 3.604 | 7.657 | 125.0 |
| **Total** | 1 798.6 | 20.87 | 179.905 | 60.523 | 119.382 | 1 909.0 |
| For 2000** | 1 800 | 2 500 | 210 | 75 | 135 | 2 200.0 |
| For 2020** | 1 800 | 45.0 | 375 | 175 | 200 | 4 000.0 |

*Various sources from the different countries, giving data for different years have been used to compile and estimate the figures for the year 2000.

** Figures rounded off.

At present, South Africa has the capacity to transfer about 4.2 $km^3/a$ between catchments located in shared river basins within the country. South Africa also exports a small volume of water (0.009 $km^3/a$) to Botswana. Similarly, Lesotho can transfer 0.57 $km^3/a$, mainly to South Africa. The transfer capacity from Angola to Namibia is about 0.09 $km^3/a$. Zimbabwe and Namibia can respectively transfer 0.12 and 0.06 $km^3/a$ between the catchments in the shared watercourses within their boundaries.

As far as the possible future water transfer schemes are concerned, the following are of major interest:

- There is an agreement between Angola and Namibia that a maximum of 6 $m^3/s$ may be transferred from the Calueque Dam in Angola to Namibia, but the present transfer capacity is only 3.2 $m^3/s$. In view of the anticipated development of irrigation projects in northern Namibia, the remaining 2.8 $m^3/s$ may be developed within the next 20 years. Plans are already on the table to repair the war damage to the Calueque Dam. Only the existing pumpsets at Calueque need to be upgraded because the transfer infrastructure already exists.
- The North-South Carrier in Botswana is nearing completion and will link the Letsibogo Dam on the Motloutse River in the Limpopo Basin with the Gaborone Dam on the Ngotwane River in the same basin, both dams within Botswana. This water transfer project may have to be upgraded in the next 20 years. One option would be to link a dam on the Shashe River in the Limpopo Basin in Botswana to the Letsibogo Dam, or

directly to the North-South Carrier. The next step to augment the water sources of the North-South Carrier is probably to link the Zambezi River at Kazangula to the Shashe or the Motloutse River.

- The development of phase 1 of the Lesotho Highlands Water Project will be completed by 2004 when the construction of phase 1B, the Mohale Dam, is finished. The proposed

*Figure 5: Existing water transfer schemes on internationally shared rivers in Southern Africa*

| Country | Transfer scheme | Capacity ($m^3/s$) | Purpose |
|---|---|---|---|
| **Angola** | **Angola-Namibia (Cunene-Cuvelai)** (Calueque Dam – Olushandja Dam) | 3.2 | Domestic & irrigation |
| **Lesotho** | **Lesotho – South Africa (Orange)** Lesotho Highlands Water Project (Phase 1A) (Katse Dam – Vaal Dam) | 18.0 | Domestic & industrial |
| **Namibia** | **Okavango – Swakop** Eastern National Water Carrier (Phase 2) (Omatako Dam – Von Bach Dam) | 2.0 | Domestic & industrial |
| **South Africa** | **Incomati – Limpopo** Komati – Olifants | 3.8 | Industrial (power) |
| | **Limpopo** Marico – Limpopo (Molatedi Dam – Gaborone Dam) | 0.3 | Domestic (Gaborone) |
| | Olifants – Sand | 1.0 | Domestic (Pietersburg) |
| | **Maputo – Limpopo** Usutu – Olifants | 3.4 | Industrial (power) |
| | **Maputo – Orange** Assegaai – Vaal | 6.4 | Domestic & industrial |
| | **Orange** Orange – Buffels | 0.3 | |
| | Orange – Lower Vaal | 7.0 | Domestic & irrigation |
| | Orange – Modder | 4.0 | Domestic & industrial |
| | Orange – Riet | 16.0 | Irrigation |
| | **Orange – Great Fish** | 48.0 | Domestic, industrial & irrigation |
| | **Orange – Limpopo** Vaal – Olifants | 7.7 | Industrial (power) |
| | Vaal – Crocodile | 12.0 | Domestic & industrial |
| | **Tugela – Orange** Tugela – Vaal | 20.0 | Domestic & industrial |
| | Buffalo – Vaal | 3.0 | Domestic & industrial |
| **Zimbabwe** | **Pungué-Save** | 1.0 | Domestic & irrigation |
| | **Save** Turgwe-Chiredzi | 2.9 | Domestic & Irrigation |



development of phases 2, 3 and 4 of the Lesotho Highlands Water Project was originally scheduled for completion by 2020, but the continuation of this project is presently under discussion while other alternatives are investigated. A decision to continue with any one of the next phases will certainly come under close scrutiny by the Orange-Senqu River Commission that was established in November 2000 between Botswana, Lesotho, Namibia and South Africa.

- Namibia is planning to complete the final component of the Eastern National Water Carrier, the Rundu-Grootfontein pipeline, within the next 10 years. It will then be possible to import about 4.0 $m^3/s$ from the Okavango River to augment the water resources in the economically active central area of the country. This project will not

*Figure 6: Possible future water transfer schemes on internationally shared rivers in Southern Africa*

| Country | Transfer scheme | Capacity ($m^3/s$) | Purpose |
|---|---|---|---|
| **Angola** | **Angola-Namibia (Cunene-Cuvelai)** (Calueque Dam – Olushandja Dam) | 6.0 | Domestic & irrigation |
| **Botswana** | **Limpopo (Motloutse-Ngotwane)** North-South Carrier (Letsibogo Dam – Gaborone Dam) | 1.3 | Domestic & industrial |
| **Lesotho** | **Lesotho-South Africa (Orange)** Lesotho Highlands Water Project Phase 1B (Mohale Dam via Katse Dam to Vaal Dam) | 12.0 | Domestic & industrial |
| | Lesotho Highlands Water Project Phases 2, 3 and 4 | 40.4 | Domestic & industrial |
| **Namibia** | **Okavango (Okavango-Omatako-Swakop)** Eastern National Water Carrier (Phase 4) (Okavango at Rundu to the Grootfontein – Omatako Canal) | 4.0 | Domestic & industrial |
| **South Africa** | **Mooi – Mgeni** | 25.0 | Domestic & industrial |
| | Tugela – Mhlatuze | 1.5 | Domestic & industrial |
| | Riversonderend – Berg | 3.1 | Domestic & industrial |
| | Palmiet – Steenbras | 0.6 | Domestic & industrial |
| **Zimbabwe** | **Zambezi River** Zambezi at Deka to Bulawayo | 2.0 | Domestic & industrial |
| **Regional transfers in SADC** | **Congo-Okavango/Zambezi** (Cassai/Lualubala – Zambezi/Cuito) | 150.0 **?** | Domestic, industrial & irrigation |
| | **Zambezi – Limpopo** (Katima Rapids to Gauteng in South Africa) | 95.0 **?** | Domestic & industrial |

only make additional water available, but would also improve the overall water management efficiency of the existing water resources. This project already created much controversy between the international environmental lobby that is opposed to the project, and the Namibian Ministry of Agriculture, Water and Rural Development.

Very little development has taken place in the Okavango Basin in southern Angola due to the ravages of the civil war, but it is known that a number of hydropower and irrigation projects were studied prior to the independence of Angola. All these projects will use water from the Okavango. The uncertainties about the consequences of their possible implementation after the war situation has been resolved, are a matter of concern to both Botswana and Namibia. Just to put the cat among the pigeons, a portion of the headwaters of the Cubango can easily be diverted under gravity and over a short distance of about 100 km into the Cunene Basin. The Cunene has a much steeper gradient in its lower reaches than the Okavango and is therefore more suitable for the generation of hydropower. Angola can act unilaterally to effect such a water transfer because the infrastructure required can be constructed entirely on Angolan territory.

The existing Permanent Okavango River Basin Water Commission (OKACOM) between Angola, Botswana and Namibia has been established to deal with such issues and is presently undertaking a study that will lead to the development of an integrated management plan for the Okavango Basin. This plan will make provision, as a matter of course, for the reasonable and equitable share of each basin state in the waters of the Okavango.

- South Africa is presently investigating the possibility to transfer water from the east-flowing, non-shared river systems in the country to the Orange River Basin, instead of proceeding with the development of the remaining phases of the Lesotho Highlands Water Project. Other major interbasin water transfer schemes that are not on internationally shared watercourse systems in South Africa are the proposed Mooi-Mgeni (for the Durban-Pietermaritzburg complex), the Tugela-Mhlatuze (for Richards Bay), the Riviersonderend-Berg and the Palmiet-Steenbras (both for Cape Town) projects.
- Zimbabwe is planning a water scheme from the Zambezi River to supply water at a rate of 2.0 $m^3/s$ to Bulawayo, but the pumping head would be about 800 metres and the length of the pumping main will be about 360 km.
- Although there is at present not much more information available about a future project to link the Limpopo Basin to the Zambezi Basin, it is clear that a regional approach should be followed. Such a transfer scheme can start at the Katima Rapids on the Zambezi River in Zambia (near Katima Mulilo in the Eastern Caprivi in Namibia). From there the water transfer system can continue across the Eastern Caprivi in Namibia and across northern Botswana to a dam on the Shashe River or to the Letsibogo Dam. It will be possible to augment the North-South carrier from either of these two points and the link to Gauteng in South Africa can continue from there. Another advantage of this water transfer scheme is the possibility to construct a branch line from a point in Botswana to Bulawayo. In this case the pumping head for a water scheme to Bulawayo would be about 400 m less and the length of the pumping main would be about 200 km less than pumping the water from the Zambezi downstream of the Victoria Falls at Deka.
- The proposed transfer of water from the Congo River to the headwaters of the Okavango or the Zambezi rivers will be studied in more detail in the near future as a joint SADC project. At present, the magnitude of a viable water transfer is not known. However, if half of the mean annual runoff in the Cassai River in the upper reaches of the Congo Basin in Angola is utilised for transfer purposes, the flow in the Zambezi River can be augmented with about 0.6 $km^3/a$. Similarly, about 1.5 $km^3/a$ could be transferred from the Lualaba River, a tributary in the upper catchment of the Congo River in the Democratic Republic of Congo (DRC) to the Zambezi. If more water would be required, for example, to replace the export of Zambezi water (of say 3.0 $km^3/a$) to Bulawayo, Gaborone and Johannesburg, then a water transfer scheme must be located further downstream in the Congo catchment where the flow available for transfer is higher. This will have other disadvantages such as a longer distance and higher pumping head.
- From figure 6 it can be calculated that, by 2020, the future water transfer schemes in SADC will be able to convey an additional estimated 8.4 $km^3/a$ from as far away as the Congo River. The total transfer capacity may reach 12.5 $km^3/a$ over the next 20 years, but this will still be very small in comparison to the 400 $km^3/a$ of all the water transfer schemes in the world. Even the water transfer schemes in individual countries like Canada (140 $km^3/a$), India (50 $km^3/a$) and the United States (30 $km^3/a$) are larger than the total transfer capacity in the SADC as a whole.



## Types of water transfer schemes

By referring to figures 4 and 6, the different types of national and international water transfer schemes within and between countries in SADC can be defined as follows:

- transfer from a shared watercourse system in one country to another shared watercourse system in another country (transfer from the Cunene River in Angola to the Cuvelai River in Namibia – Calueque Dam-Olushandja Dam);
- transfer from a shared watercourse system in one country to another shared watercourse system in the same country (transfer from the Pungué River in Zimbabwe to the Save River in Zimbabwe – Pungué-Save; transfer from the Vaal River catchment in the Orange River Basin to the Olifants River catchment in the Limpopo River Basin in South Africa);
- transfer from a shared watercourse system in one country to another watercourse system in the same country (transfer from the Omatako River catchment in the Okavango River Basin to the Swakop River in Namibia – Omatako Dam-Von Bach Dam; transfer from the Orange River in South Africa to the Fish River in South Africa);
- transfer from a shared watercourse system in one country to the same shared watercourse system in another country (transfer from Malibamatso catchment of the Orange River in Lesotho to the Vaal catchment of the Orange River in South Africa – Katse Dam-Vaal Dam);
- transfer from a watercourse system in one country to a shared watercourse system in the same country (transfer from the Tugela River to the Orange River in South Africa);
- transfer from one tributary in a shared watercourse system to another tributary of the same shared watercourse system in the same country (transfer from the Orange River to the Riet River catchment of the Orange in South Africa); and
- transfer from one non-shared watercourse system in one country to another non-shared watercourse system in the same country (transfer from the Palmiet River to the Steenbras River or the Riviersonderend River to the Berg River in the Western Cape in SouthAfrica).

These differences in the transfer of water between catchments have an important bearing on the applicable rules of local or international water law and the nature of the negotiations about the development of a particular interbasin water transfer project. In some cases, a country may be able to act unilaterally with a water project on a shared river system because the whole transfer scheme is within the territory of such a country, but in the case of a transboundary project, co-operation and joint planning will always be a prerequisite.

*Figure 7: The Congo River and Lesotho Highlands*

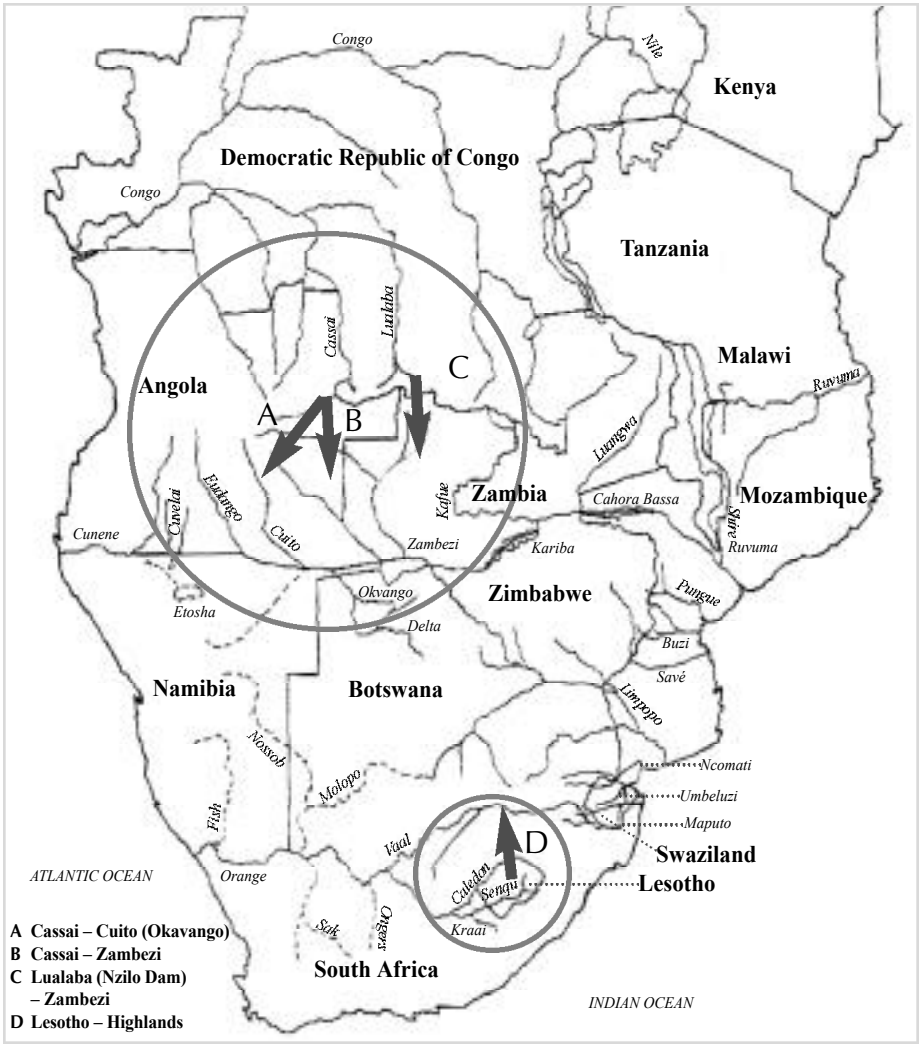
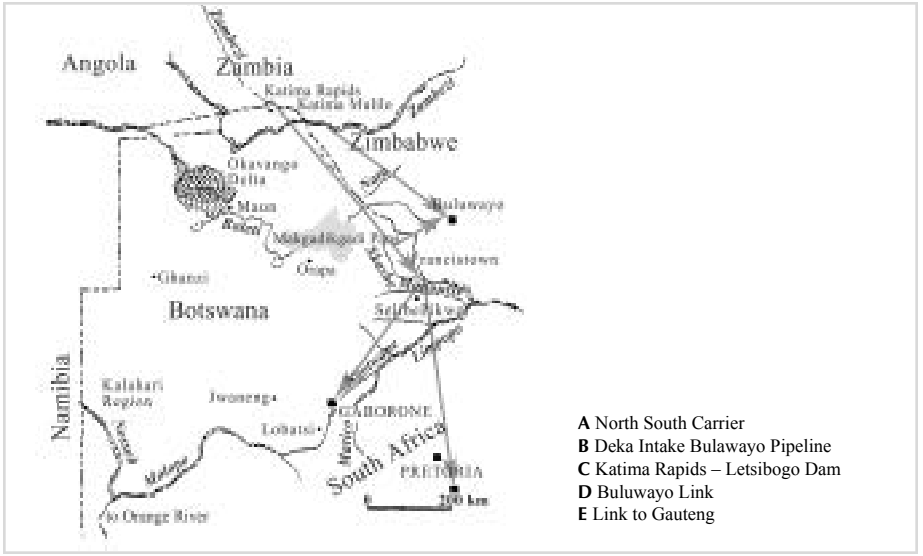





*Figure 8: The Botswana National Water Plan*




## Water transfer schemes as a resource management tool

### *Introduction*

Water transfer schemes have been used all over the world for many years to address the imbalances between supply and demand. The development of infrastructure to eliminate water deficits is inherently complex and often associated with a tendency to generate controversy.

The negative sentiments about water transfer projects can be placed in the correct perspective if there is a better understanding of the reasons for the need to have such water projects, how the viability is assessed and what is done to prevent adverse effects. The construction of water transfer infrastructure will most probably always be possible from a technical point of view, but many other aspects must also be evaluated in detail for a number of alternatives to support decisions about any desired solution. An interbasin water transfer scheme can also be regarded as a water management tool and the means to facilitate integrated water resources management in the broadest sense. Some of these aspects are elaborated further.

### *Compliance with water legislation*

Whenever interbasin water transfer schemes are contemplated within the boundaries of a particular country, the project must comply with the applicable legislation in the country. However, the issue becomes a little more complicated when the transfer scheme will be a transboundary project. In such a case, the rules of international water law will apply.

The simple concessions made between donor and recipient governments may have been adequate enough in the past to facilitate the development of transboundary water schemes, but this is not the case any more. The scope of existing water transfer projects and the scale of future schemes that will be required to mobilise water from shared watercourses to the benefit of all stakeholders, stimulated the development of international jurisprudence. Several instruments of international water law are therefore now available.

Until 1995, the 1966 Helsinki Rules, developed by the International Law Association, were the only guidelines that could be used as a basis for negotiations about transboundary water schemes.

In 1995, most of the SADC countries signed the Protocol on Shared Watercourse Systems. This Protocol later became an instrument of international water law in SADC because more than the required number of signatories to the Protocol ratified the document.

The United Nations adopted the Convention on the Non-Navigational Uses of International Watercourses in May 1997. The existing SADC Protocol was subsequently revised and many of the concepts in the Convention were taken up in the revision. This Protocol was signed in August 2000 in Windhoek, Namibia, by most SADC member states. As soon as the Protocol has been ratified, it will replace the existing Protocol.

Although transboundary water transfer projects are not specifically referred to in the SADC Protocol or the UN Convention, both documents provide guidelines and a framework within which negotiations for the development of transboundary interbasin water transfer schemes can take place. The principle of equity between upstream and downstream countries is promoted and more attention is given to environmental issues. This means that the power of a state to act unilaterally is reduced and shifted to the downstream country that can insist that the upstream country may not cause significant harm to its interests.

The main result of these achievements is that a constructive set of rules of international water law is now available to protect the interests of states sharing the same water resources. However, instruments of international water law should not be seen as providing a legal barrier to prevent transboundary water projects, but rather to make sure that all legitimate concerns are accommodated in the development of a mutually beneficial project.

## *Regional co-operation*

The multiplicity of transboundary river basins in SADC is a key water resource management issue. This relates to the interdependency of sovereign states on shared watercourses and the need for regional co-operation to deal with the joint management of shared watercourses. Aspects such as water quantity and quality, the financing, operation and maintenance of shared water supply infrastructure, balancing national interests and shared interests, as well as jointly protecting the environment in shared catchments, all need careful attention by all parties involved.

River basins are the units for water resources management, but this requires institutionalised co-operation between all countries sharing a common watercourse system. It is inherently impossible without partnership, participation and political will. Good understanding and mutual trust must be developed between basin states to manage conflict in an amicable way, especially as the demands on the river systems increase.



The SADC Protocol complements other instruments of international law when countries are negotiating over the resolution of possible conflicts, but these guidelines cannot replace good conduct, the will to assist and good neighbourliness. Joint water projects are encouraging examples of positive regional co-operation in SADC. This is facilitated when an enabling environment is created through the establishment of river basin organisations such as a permanent, joint water commission or joint operating authority. Fortunately, many of these are already in existence in Southern Africa, but there are a number of large river basins, such as the Zambezi, that do not have such basin-wide institutions. The establishment of water commissions would be a priority to ensure that large, transboundary interbasin water transfer projects can become a reality.

The colonial boundaries in Southern Africa were mostly located along rivers because these water barriers were clearly visible and easy to demarcate as borders. Elsewhere in the world there are many examples of complications where river systems are contiguous along international borders or successive across borders. The utilisation of water from the transboundary Columbia River between Canada and the US, the Indus River between India and Pakistan, the Jordan River in the Middle East and many other are examples where conflict situations have to be managed. Similarly, there are 16 major shared river systems in SADC and these rivers present a large number of possibilities for conflict in a relatively small region.

The potential for conflict also exists in cases where unavoidable development has already reserved a large portion of the runoff for some countries, or where it is perceived that future developments may have an unacceptable impact on the environment. The Limpopo, Orange and Save rivers are well developed in the upstream countries and any project abstracting water from the Okavango River seems totally unacceptable. In other cases, internal conflicts spilling across borders have already caused damage to existing infrastructure such as at the Gove Dam and the Calueque Dam on the Cunene River in Angola, or to the powerlines from the Cahora Bassa Dam in Mozambique. Conflicts in Angola and the DRC may also complicate or prevent the development of future regional water transfer schemes. The countries suffering from civil war have not been able to operate and maintain the existing water supply and power infrastructure, nor could any new developments take place. A classic example affecting water development is the persistent armed conflict in southern and eastern Angola.

The member countries of SADC are acutely aware that future development conflicts may put enough pressure on countries to utilise shared river systems unilaterally or in an unsustainable way. This culminated in the establishment of a Water Sector Coordinating Unit (WSCU) in Lesotho and the preparation of the SADC Protocol. The WSCU recently completed its Regional Strategic Action Plan to deal with a large number of water issues.

However, the Protocol will be very difficult to enforce and remains, in effect, a gentlemen's agreement. The Protocol will not prevent civil war and the destruction of infrastructure, nor will it avoid droughts and floods or a major pollution spill, but it is at least an attempt to facilitate communication, joint co-operation and sustainable development. The Protocol also reflects the concerns of the parties to the Protocol about water scarcity and the regional distribution of water. This falls in the ambit of regional water transfer schemes where each state may utilise, without prejudice to its sovereign rights, an equitable and reasonable share of the water in an international watercourse. Those states that have signed the Protocol at least undertook to abide by the general rules

for integrated and co-ordinated water resource development in SADC. Perhaps there is a brighter future for integrated water resource management in Southern Africa than elsewhere in Africa, or the world.

The right to use shared water sources is not without obligations and commitments. Some of the important obligations of each shareholder is to prevent significant harm to the other riparians, or to inform the other riparians about water utilisation and planned measures, or to do joint planning and development, or to undertake action to maintain the environmental integrity of the water sources utilised.

The Protocol may not be able to prevent wars, but it at least gives guidance to facilitate negotiations about the peaceful use of shared watercourses in a mutually sustainable and acceptable way. This is already a major step forward to prevent conflict before it develops. When interbasin water transfer schemes are developed along these lines, water transfers may even be an instrument for co-operation instead of conflict.

## Technical and financial considerations

### *Meeting climate change*

Freshwater resources are unevenly distributed due to the prevailing hydroclimate in certain regions. Some areas may have surplus water resources while others have deficits. The consequences of this situation are intensified when human activities increase in areas with water deficits. This issue is further compounded by the expected changes in the global climate due to existing anthropogenic effects. Global warming will most probably reduce the availability of water resources significantly in the more arid regions while there may be an increase in water availability in regions where there are already surplus water resources available.

The effects of climate change may therefore increase the need to develop interbasin water transfer schemes to augment local water resources and to manage droughts or floods in SADC.

### *Enhancing water security*

As socio-economic development move people from a rural, agriculturally based community towards a more urbanised and highly industrialised society, the security of water supplies for domestic use, power supply, mining and industrial activities becomes more critical. A project that can transfer water from an internationally shared river may not only secure the availability of water, but it will also vest the interests of the recipient country in an equitable and reasonable share in a particular, shared water resource.

In arid areas, water security can be improved by linking a number of dams in one or more catchments spread over a wide area. In this way, the chances increase significantly to impound runoff caused by the unevenly distributed rainfall storms over any one of the catchments.

### *Increasing efficiency*

In the more arid areas, where the unreliable, seasonal runoff must be impounded for later use, the efficiency of such infrastructure is reduced due to severe evaporation losses. The only way to manage this effect and to increase efficiency is to reduce evaporation. That can be done in three ways:



- The impounded water must be used as quickly as possible; or
- the water must be transferred from a dam basin with less favourable evaporation characteristics to one with more favourable characteristics; or
- the water must be transferred to a natural subsurface storage facility such as a suitable aquifer.

However, the water in a dam in an arid area cannot just be used as quickly as possible because there is no guarantee that there will be any runoff event into the dam during the following rainy season. The stored water must therefore be conserved to bridge years of no recharge and continuous demand. This inevitably results in the loss of water that could have been used.

The conjunctive use of a surface water facility and an aquifer is only feasible when appropriate conditions for such a possibility exist. The same applies to the availability of dams with more efficient and less efficient basin characteristics that can be linked for water transfer purposes.

In Namibia, a set of conditions exists on two ephemeral river systems where it is possible to transfer water from dams with less favourable basin characteristics to more favourable ones through an existing interbasin pipeline network that links three dams. This is referred to as the integrated use of the dams and makes it possible to double the total of the 95% assured safe yield of each individual dam (7 $mm^3/a$ to 14 $mm^3/a$). This can be even further improved upon by linking the three dams to a sustainable groundwater resource and later, as the demand on the system increases, to a perennial river. This would make it possible to use the water from the dams on a high yield, low reliability basis. If any failure in runoff recharge into the dams should occur, then the groundwater source or the perennial river can be used as a back-up to supply in the water demand. The link to these sources will serve as an ‘insurance policy’to facilitate the more efficient use of the existing dams.

### *Considering other alternatives*

Whenever an expensive interbasin water transfer scheme is considered, it is clear that all other possible alternatives must be considered. This may include the assessment of more localised considerations such as the actual site of a dam, the mode of transfer (canal or pipeline), how to reduce costs, or to improve efficiency, but the evaluation of the possibility to utilise other water sources in the recipient area must also be investigated.

The development of alternative water resources must be practical and possible. Some examples are:

- water demand management
- rainfall modification
- desalination
- icebergs

One of the most important alternatives to increase the availability of water sources is the optimal utilisation of existing water resources and water demand management before the next step in augmenting the water supplies is considered Water demand management is a complex issue involving aspects such as public awareness to save water, water pricing, reducing unaccounted for water, water conservation, the prevention of pollution and the re-use of water.

The modification of rainfall to enhance runoff may not be a viable solution in arid areas where no moisture is available and it may not be a practical solution where the rainfall variability is already insignificant. In other words, rainmaking will not necessarily increase the average rainfall normally received.

The desalination of brackish water located in the interior of a country, or seawater at the coast may be an option to supply more water, provided that sufficient brackish water sources exist in the area of scarcity or that the area to be served is near to a source of seawater. Such an example exists in Namibia where the long-distance transfer of water from one of the northern perennial border rivers to the central Namib Desert coastal towns of Swakopmund and Walvisbay has been discarded as less viable than the desalination of the sea water at the coast. It was also determined that the availability of brackish water sources at the coast is insufficient to desalinate and that water demand management can reduce the use of the existing water resources in order to bridge the time until the desalination plant is in place and operational.

Similarly, the importation of freshwater by hauling icebergs to Walvisbay or the shipping of freshwater from the mouth of the Congo River was found to be impractical and cost ineffective. This would be more so if the recipient area is located further inland due to pumping costs.

Water transfer schemes are expensive, but water saving technologies can also be very expensive. The re-use, recycling or reclamation of effluent is already used in the arid areas of SADC, and the most notable of these is the domestic sewage reclamation facility in Windhoek in Namibia. In spite of these possibilities, the re-use of effluent can be as much as three times more expensive than the use of freshwater, while the cost of wastewater treatment can be eight times more expensive than freshwater. Similarly, the use of more efficient irrigation methods can be five times more expensive than other systems and although it is estimated that the refurbishment of irrigation systems all over the world will save up to 20 $km^3$ of water per annum, the costs are prohibitively high at an estimated US $700 to 900 million per $km^3$.

### *Systems analysis*

Integrated interbasin water transfer schemes link river systems with diverse hydrological conditions and impoundments with different basin characteristics. Water availability must be estimated and managed in order to meet variable demands. These conditions created the need for sophisticated methodology and computerised models for systems analysis to support decisions on the optimal operation of the transfer infrastructure. In this way, behaviour under a wide range of conditions can be modelled in order to accommodate the uncertain climatic conditions associated with droughts. This innovative and advanced technology has been developed in Southern Africa and is presently applied in South Africa and Namibia.

### *Financial aspects*

The obvious solution to transfer water to augment scarce local water sources is complicated considerably by technical and financial implications. The fact that the more abundant water sources are in most cases remotely located from the demand centres implies that the water must be transported over long distances. The quantity of water to be transferred and the distance involved normally require the construction of huge water transfer schemes that are technically possible. However, the financing of these projects is often quite complicated because they need large capital investments. When transboundary issues are considered, there may be cost-sharing issues, royalties to be paid or compensation required. The redemption of the capital and interest on the investment, as well as the operation and maintenance cost, will most probably be prohibitively high. The recovery of these costs from the consumer would make the water unaffordable, unless it is subsidised. The only short-term solution would be to use the presently available water resources more efficiently in order to delay the inevitable implementation of long-distance interbasin water transfer schemes as long as possible.



### *Protecting the environment*

The interbasin transfer of water is not without environmental complications, but the total scenario must be investigated to determine all positive and negative aspects in order to take informed decisions that will balance developmental needs with environmental consequences.

Rivers normally have upper, middle and lower reaches as they pass through the catchment area. In the upper reaches, the catchment is mountainous, slopes are steep, the water is relatively unpolluted, the runoff is accelerated and erosion is enhanced. In the middle reaches of the river, the slope is gentler, the tributaries from the mountains converge, the river widens and sedimentation takes place. Urban and agricultural development usually takes place on the plains created by the river. Here a completely new set of environmental conditions and threats emerge, for example, inundation due to floods and pollution due to human activities. The lower reaches of the river system normally end in an estuary or delta at the coast and are virtually 'the bottom end of the sewer' by way of expression, because the natural deposition of useful materials that support and enhance a healthy environment is often confounded by pollutants that threaten the aquatic systems.

From the above it is clear that there can be many permutations of possibilities to transfer water from the upper, middle or lower reaches of one river basin to the upper, middle and lower reaches of another basin, or similarly, when transfers are done within a basin. These permutations can be further expanded when the mode of water transfer is considered: when a gravity or a pumped system is used or whether the transfer is through a pipeline, a tunnel or an open canal.

In the environmental context, the provision of water to habitats threatened with desiccation may prevent the loss of biodiversity, but can also detrimentally modify watercourse systems that naturally dry up or are subject to high and low flow conditions. Other concerns are the effect that the transferred water will have on the modification of the water quality, the aquatic ecosystems and water-related diseases in the recipient water sources. Water transfers should therefore be treated with great caution to prevent imprudent water transfer projects.

## Ethical conduct

Ethics play a role in the development of interbasin water transfer schemes. The argument is that it is a basic human right to receive water when there is a shortage and that it is a token of charity or a sign of goodwill between neighbours, or an act of solidarity between states if water is provided to alleviate scarcity.

Ethical values will always be different across the SADC region and note should be taken of the rich diversity in cultural backgrounds, religion, values and beliefs of those sharing life-giving water resources.

Water transfer schemes can have important social and cultural implications that can extend beyond economic and environmental considerations. People may have to be relocated and would lose their ancestral and spiritual values. The displacement of traditional lifestyles may cause a complete loss, but if it is replaced with improved social infrastructure, better housing, education, health facilities and job opportunities, displaced people can be integrated into the economy without necessarily losing their ancestral rituals. Such displaced people may be compensated in monetary terms or by providing better facilities than what they were used to, but some of the lost cultural values may be so unique that there is no adequate substitute. Perhaps these should then be seen as part of the whole evolutionary process in the development of mankind.

New water projects, in general, and water transfer schemes, in particular, are often opposed because those against the project wish to protect the national heritage and spiritual values to which the affected populations are attached. These sentiments can also be misused by the opponents of major water projects to achieve their own selfish and unethical objectives. The beneficiaries are often unwittingly dragged into the mix and exploited. Perhaps the opposition to the proposed hydropower development on the lower Cunene River is a good example to illustrate this point. Ethical considerations were blown out of proportion by outsiders in an attempt to prevent the development of a technically optimal solution which would have brought substantial benefits to the local people. These advantages were ignored because the real issue was the possible inundation of the Epupa Falls, and the financial losses of a few tourist operators.

The bottom line is that water transfer schemes should satisfy social and ethical criteria by keeping the planning procedures open and transparent, but even the best of intentions can be confounded by emotional indiscipline. Professionals have an ethical obligation to use the best researched, most accurate and correct information to support honest and true arguments in the debate. It is not always possible to achieve this objective due to time constraints and cost considerations and many projects had to be completed in the past by using the best information available. Today the engineers who have done most of the pioneering work, are blamed by the environmentalists for the development of less than absolutely perfect water schemes. The present debate about the development of dams is a good example.

In spite of these perceptions, the paramount ethical value of water is the way in which it is able to support life, society, the environment and development. When this resource must be harnessed, it must be done in such a way that one party cannot take the moral high ground to blame others if the water project is not completely successful in the long run.

Another case in point is the dreaded ‘killer canal’ as the environmentalists prefer to call the Grootfontein-Omatako Component of the Eastern National Water Carrier in Namibia. Based on prior experience with long-distance open canals in Namibia and South Africa, as well as economic, financial and technical considerations, it was decided to construct a 260 km canal. Labour intensive methods were used to provide job opportunities over more than seven years for a large workforce in a country with few job opportunities. The canal was never intended to be used at full capacity immediately after



completion and this partially filled canal became a death trap mostly for wild animals on the commercial farms crossed by the canal. The decision to proceed with a canal was based on the best available information and although the loss of animal and human life in open canal systems elsewhere in Namibia were well known, nobody anticipated a wildlife disaster of this magnitude. What makes it even worse is that it is doubtful whether a full environmental assessment would have identified such an impact because no other example of this nature exists in the world. Subsequent studies showed that the cost to implement mitigation measures is extremely high and if it were known prior to the decision to continue with the construction of the canal, it would most probably also have been found to be too expensive to implement. The end result is that the engineering profession is blamed.

It is clear that social, cultural, aesthetic and emotional values, as well as environmental impacts in addition to the financial, economic and technical feasibility of water projects, will always direct and modify decision-making. However, the ultimate decision to proceed with a project in complex transboundary interbasin water transfer matters will remain a political decision.

One of the most productive concepts to prevent conflict situations is the obligation on developers to embark upon a comprehensive transparent, participatory decision-making process when considering a new water project. Good communication with all stakeholders and their participation in the planning process are essential to ensure a successful project.

Adequate compensation for affected parties, acceptable environmental mitigation and the assurance that the project will meet the expectations of the beneficiaries must be supported with accurate and factual information in order to convince the public of the most optimal solution.

## Water transfer de velopment criteria

In view of the above, certain criteria for the justification and success of an interbasin water transfer project can be defined:

- The recipient basin must face a substantial deficit to meet future water demand after all possible water demand management measures have been implemented and other alternative water sources have been investigated.
- The supply basin must have adequate future water resources available so that only surplus water is transferred, unless the recipient basin is prepared to compensate the supply basin for losses in productivity.
- A comprehensive environmental assessment must be done to identify the adverse impacts of the proposed transfer scheme in both the supply and recipient catchments in order to design appropriate mitigating measures.
- The acceptability of a water transfer scheme will be determined by the degree of socio-cultural disruption or improvement in the supply basin and the receiving basin, as well as the extent to which that can be accommodated.
- The net benefits of the water transfer scheme must be shared equitably between the supply and recipient basin.
- The technical, economic, financial and environmental feasibility of the transfer scheme must be beyond reasonable doubt to ensure that the water can be used beneficially and that the project will not be a burden on the economy.

- An internationally acceptable legal framework and competent river basin institutions should exist to ensure that of the most beneficial transboundary water projects are developed and properly operated.

## Conclusion

One of the main advantages of interbasin water transfer projects is that a diversity of sources can be linked together to increase water availability in a reliable way by utilising the available water resources on a sustainable basis. This will certainly ensure that water transfer schemes remain one of the most attractive alternatives when other water sources cannot meet the requirements. The key is that increasing water demands should not just be accommodated with new water schemes unless the existing local water supplies are used efficiently and proper water demand management measures are in practice.

An acceptable legal framework for regional co-operation on internationally shared watercourse systems is in place in the SADC region. Each individual country has several obligations in this regard and should put proper legislation in place to control pollution, protect the environment and support economic policies aimed at optimising the value of the water supplied for domestic use, mining, industry and agriculture.

The magnitude of the water transfer schemes that will be required in the next 20 years poses special challenges because the benefits of all water projects normally come at a price. Water transfers will have adverse effects on the ecological functioning of watercourses and the environment. Sound environmental assessments can identify those effects and when the proposed mitigation measures are implemented, the anticipated deterioration in environmental quality can be managed and contained. Protection of the environment should therefore not be a reason to prevent the development of water transfer projects,

The spatial redistribution of water resources calls for a balanced approach in the planning of such projects. Full cognisance should be taken of all ethical, social, economic, financial, legal and environmental considerations while technical feasibility and economic viability should be beyond any doubt. Adequate research, detailed resource investigations and comprehensive environmental assessments will be necessary to provide the most accurate data before informed decisions can be taken about the development of a particular water transfer project. This will also facilitate sound and generally acceptable engineering designs.

Experience in SADC clearly shows that interbasin water transfer schemes can be an effective tool to enhance joint regional co-operation, and improve water resource management.

The success of regional infrastructure projects like the electricity supply grid and the road transport network in Southern Africa is well known. The next step towards regional integration may be the development of a water network that will have the flexibility to ensure that the importation of water from the northern rivers will alleviate the scourge of water scarcity in the south.

# Chapter 13
# Managing shared watercourse systems in Southern Africa: International relations or foreign policy?

**Roland Henwood and Nikki Funke**

## Introduction

The question around the nature of hydropolitics and the level of interaction between states, and the categorisation of these interactions, is important as the implications of its answer are beyond mere methodological aspects. The management of shared watercourse systems and the stability of regions and countries can be severely affected by these issues. If the interaction between different states relating to hydropolitics is categorised as part of the foreign policy of these states, the nature of the interaction between them may be very different from a situation where the interaction reflects the characteristics of so-called international relations. The fundamental difference is that international relations are more general in nature and characteristics, while foreign policy tends to fall within a more specific sphere of interaction that brings other aspects, such as national interest, into play. This leads to different policy options and reactions to political developments, especially in situations where problems and tensions arise.

In order to find some explanation for the issues raised, it is important to start by differentiating between the concepts ‘international relations’ and ‘foreign policy’. This will enable the conceptualisation of the nature of the interaction between states in Southern Africa as it is manifested in the water sector. The focus will also be on recent developments, such as increased tensions between countries, that may serve to clarify the nature and consequences of water politics in Southern Africa. The structures and procedures for the management of shared watercourse systems in Southern Africa need to be briefly explained as well, as these structural and procedural provisions will have a direct bearing on the nature and development of hydropolitics in the region.

## Clarification of concepts

The concepts ‘international relations’, ‘international politics’and ‘foreign policy’ are clarified in order to analyse the effect of different categorisations on the nature and characteristics of water politics in Southern Africa.

### *International relations*

‘International relations’can be defined in very specific and narrow terms or in broader and more inclusive terms. The definition of Evans and Newham (1990:194-195) explains international relations as interactions across state boundaries by state-based actors. This is an example of a specific and exclusive definition. International relations can also be defined as a state’s dealings and contacts with other states and international organisations.

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This includes bilateral and multilateral relations (Berridge & James 2001:134). A definition that is more inclusive and broader in scope explains international relations as referring to all forms of interaction between governments, non-governmental and social roleplayers. International relations may include foreign policy analysis, but will also include aspects such as the analysis of international trade, tourism, communication, values and ethics (Holsti 1992:10). International relations also refer to the organisation and management of transborder relations between different actors and their implications for the establishment, maintenance and transformation of order in the world system (Nel & McGowan 1999:11). In essence, international relations will include aspects that can be characterised as 'low politics', implying issues that will not create undue tensions or cause sudden or uncontrollable tensions to arise.

It will be in the interest of states in Southern Africa if hydropolitics can remain within this sphere, as it increases the possibilities for co-operation and the peaceful resolution of disputes. This will contribute to the successful management of shared watercourse systems in Southern Africa.

### *International politics*

The concept 'international politics' can be defined in different ways. Berridge and James (2001:134) define it as "a less common way of referring to international relations." Holsti (1992:9) explains the study of international politics as more specific than that of international relations. In this sense, it analyses the interactions between states as one of the dimensions of a pattern of actions by a state, as well as the responses and reactions of others to this pattern. International politics can also be described as the interactions between state actors across state borders that have a specific political content and character. International political relationships are created when states engage in the activity of making policy (Evans & Newham 1990:193). This will normally impact on and lead to the foreign policy dimension. In terms of this definition, the interactions that develop between states as a result of shared watercourse and river basin management systems can certainly be classified as international politics. The implication is that water-related issues lead to the foreign policy dimension when it deals with shared watercourse systems. This may have important consequences for the different roleplayers in terms of the nature of the interactions between them, as will become more apparent in the following section.

### *Foreign policy*

The concept 'foreign policy' refers to a more specific field of activity with a smaller range of characteristics and actions underpinning it than any of the previously defined concepts. Foreign policy can be defined in a narrow sense as the political and security policy that a state will adopt in response to the outside world. It can also be defined in a broader sense that will include all policies that a state will adopt in response to the outside world, thus also including policies such as economic or trade policies (Berridge & James 2001:94). Foreign policy also refers to the objectives (decisions) and actions (policies) between states. Foreign policy analysis is focused on the actions of the state to influence its external environment and the conditions under which those actions are formulated (Holsti 1992:9). Foreign policy is based on the definition of a particular situation. This will reflect the internal and external environment and factors that impact on the foreign policy



process of a state. The regional environment is of crucial importance in this equation. Foreign policy will also reflect and will be guided by the national interest of the state. This is referred to as 'high politics' and will include matters of security, peace and conflict, as well as questions vital to the wealth and welfare of a state and its people (Evans & Newham 1990:123-124).

Indications are that the current status of water politics and the institutional and procedural deficiencies in the Southern African region make it very difficult to keep water politics out of the foreign policy sphere. The consequences are an increase in regional tensions that may lead to an escalation in tensions and reverting to military solutions to existing problems. In a situation such as this, the paradigm for problem-solving becomes security-based, making it very difficult to prevent the escalation effect that leads to conflict.

Before a categorisation of the interactions of states in the Southern African region can be achieved, the link between water politics (scarcity) and conflict needs to be explored.

## An analytical framework to analyse conflict induced by water scarcity

In the context of international river basins, the relationship between water scarcity and conflict is rather complicated. To come to a better understanding of the link between the two concepts, it is important to "focus on the major determinants and consequences of water scarcity to show how these may lead to acute conflict" (Elhance 1999:253). It thus becomes clear that a situation of water scarcity may increase tensions both within and between riparian states and, if not managed properly, may lead to conflict.

An analytical framework, highly simplified, suggests possible environmental and socio-economic causes for water scarcity, as well as the resultant effects, which ultimately have a definite political impact. *Global climatic changes* (for example, global warming or the depletion of the ozone layer), *natural phenomena* (such as drought and desertification), *population growth* (with its related increase in the demand for water), as well as other *human activities* (such as over-exploitation of water for mining purposes) can cause water scarcity in one or more of the states sharing a river basin (Elhance 1999:255).

The direct consequences of water scarcity are environmental degradation, increased mortality and morbidity rates, a lower quality of life, as well as diminished agricultural and industrial production (Elhance 1999:255). Though the initial impact is mostly social, this soon also influences a country's economic and political situation as a result of the linking of these problems to the national interest and well-being of the state and its people, as explained in the section on foreign policy.

Thus, the reduced quality of life can lead to migration within and across riparian states. This may give rise to social unrest and domestic upheaval, in terms of an increase in the crime rate, xenophobia or armed conflict. The host country's economy is put under strain as a result of the increased burden on social services such as health and education. Jobs also suddenly have to be provided for immigrants, which in a Southern African context is virtually impossible for most governments. Ultimately, host countries may experience increased levels of *national insecurity*, as a result of large-scale migration across international boundaries. This situation can be reinforced by domestic insecurity as a

result of social unrest and a decline in the overall national economy. Another direct cause of national insecurity can be the effects of water-related basin-wide human activities: *economic*, *environmental* and *military* (Elhance 1999:256; Brew 1998).

A discussion is relevant here of the dispute between Namibia and Botswana over Namibia's proposed construction of a pipeline to extract water from the Okavango River, which flows through both countries and culminates in the Okavango Delta in Botswana. Namibia's acute water shortage in 1996, which specifically affected its capital, Windhoek, had a negative impact on the country's economy. At that point, the pipeline seemed the most cost-effective option for the Namibian government (Hopwood 1996; *The Star* 9 December 1996). Botswana's citizens, however, especially the residents of Maun close to the Delta, perceived this as a threat to their livelihoods, as well as to the tourist industry, should the Delta's ecosystem be damaged or even destroyed (Nicoll 1996). Adverse effects on the Delta would in turn impact negatively on Botswana's economy (James 1996). The issue was perceived as a threat and thus engendered increased levels of national insecurity. Although the technical evaluation that was undertaken to assess the impact of the pipeline on the Delta indicated a negligible impact, popular perceptions made the pipeline a high-risk undertaking.

Another example of conflict with a hydropolitical link, touching upon territorial sovereignty, also involved Botswana and Namibia. This conflict arose over ownership of the Sedudu/Kasikili Island and was resolved by the International Court of Justice. This dispute led to serious tensions between the competing governments after military occupation of the disputed island by Botswana (Ashton 2000c:79-86). Botswana acquired extensive military equipment at this time, and though not necessarily linked to the hydropolitical situation, it was seen as a warning to those opposing the interests of the country (a controversial move, if Botswana's peaceful domestic and international history until this time is considered). This reaction seems to substantiate the argument that "national insecurity in one or more of the riparian states can create the potential for acute interstate conflict" (Elhance 1999:257).

It is also important to stress how water scarcity may have a detrimental economic and ultimately political impact, due to its negative influence on agricultural and industrial production (Elhance 1999:257; Baxter 1996). Several Southern African states, such as Botswana, Namibia and Zimbabwe, rely heavily on agriculture in their economy. A shortage of water can thus cause serious economic difficulties. If industrial growth, which is of great importance to developing countries, is impeded by a lack of primary and intermediate commodities and food for the industrial workforce, it may cause a slowdown or regression in economic development. The result can be domestic unrest, which in turn may increase national insecurity. The issue of water therefore becomes politicised.

Ultimately, however, the simplified nature of the above framework needs to be emphasised. There is no inevitable link between water scarcity and acute conflict. It is necessary to take into account various intervening variables: historical, geographic, cultural, behavioural, political and strategic, to give an exact account of the hydropolitical situation in any international river basin (Elhance 1999:257). According to Homer-Dixon (1999:136-168), a link can be made between conflict and resource scarcity. However, the link between conflict and scarce resources is not a clear and simple causal relationship. The different conflict types to be identified are:



- *Simple scarcity conflicts*: An example is South Africa's agreement with the military government of Lesotho to build the Lesotho Highland Water Project after the *coup* in 1986. Before this, the Lesotho government refused to enter into an agreement with the South African government for the project (Homer-Dixon 1999a:140). This example is a rather contentious one. Another example of simple scarcity conflict that could arise is the situation of the Ovahimba people of Namibia once the proposed dam is built in the Cunene River, as the plan is to move them to marginal land that is already inhabited. This will certainly create intense conflict if support and management systems are not created for such exigencies.
- *Group identity conflicts*: An example is South Africa where shortages of land, firewood and water have driven people from rural areas into squatter settlements on the outskirts of cities. The intense competition for and shortages of these resources were exacerbated and led to even more conflict and interethnic rivalries (Homer-Dixon 1999a:12). Pakistan also suffered serious conflict due to urbanisation and resource scarcity in the early to mid-1990s (Homer-Dixon 1999a:164).
- *Insurgencies*: Insecurities in land tenure and land scarcity led to the Zapatista insurgency in Mexico, triggering a severe economic and political crisis (Homer-Dixon 1999a:164).

These examples of resource-based conflict fall into the category of subnational conflict, which is characterised by its diffuse, general and internal nature. This type of conflict, if it results in system collapse due to a failure to manage its consequences, or if it leads to the fragmentation of a country, may lead to interstate conflict (Homer-Dixon 1999a:165-166). In this sense, resource-based conflict directly threatens peace and stability, especially in a regional context. The experience in Africa has shown conflicts that develop a resource-based war economy such as in Angola (oil and diamonds) and the Democratic Republic of Congo (diamonds and timber), for example. The important aspect in this sense is that these conflicts are not even based on a resource that is directly linked to sustaining life.

The brief analysis of a possible link between water scarcity and conflict provides sufficient background for an overview of the regional context of water politics and its possible effect.

## Water scarcity and conflict in Southern Africa

Only about 2.5% of the world's water is suitable for human consumption. This obviously limited supply is placed under stress by the continuous growth in the world's population (Van Wyk 2000:57). Southern Africa seems particularly prone to water scarcity. The minimum requirement for a country's survival in terms of available water is 1 million cubic metres per 2 000 people. Projections for Southern Africa are not optimistic. It is foreseen that by 2025, absolute water scarcity will prevail in South Africa, Zimbabwe, Malawi and Lesotho (Van Wyk 1998:63; Brew 1998). The principle of 'absolute water scarcity' is not uncontested though, as some hold the belief that water supplies can be supplemented through transfers, changing patterns of consumption and technological development (Falkenmark 1989b:113). In addition, Falkenmark argues that the lack of resources and capacity of most governments in Africa prevents the options of transfers and technological development as real solutions to water scarcity. The implementation of these solutions may lead to even more problems and tensions.

Examples are given below of problems encountered with recent actions and proposals by governments in the region to alleviate the destructive effects of water scarcity on national development initiatives that led to situations of potential conflict:

- States are afraid to lose their sovereignty. An example would be Namibia's decision to bypass the Permanent Okavango River Basin Commission (OKACOM) structure when announcing its plan to drain water from the Okavango River by means of a pipeline in 1996. This was done despite the agreement that all planned use of the river should be discussed within this structure (Turton 1999a:8).
- In northern Namibia, a dam in the Cunene hydro-electrical project could displace 2 000 Ovahimba.
- Namibia's intention to drain water from the Okavango River has caused a diplomatic row with Botswana.
- South Africa's plans to solve its water demands by making use of the Zambezi River holds the danger of leading to a political confrontation (Van Wyk 1998:60-61).

These examples indicate that states in Southern Africa have not yet realised the full implications of living in a security community. It implies that they constitute a group of states of which security issues are so tightly interlinked that one state's national security cannot be regarded independently from that of the other states (Van Wyk 2000:58). It is simply not feasible for states to follow water-related policies that may benefit their individual situation in the short term, if the region as a whole has to suffer in the long term.

The adverse *social*, *economic* and *political* effects of some of the development projects currently under way should be examined. The Lesotho Highlands Water Project (LHWP) primarily aims at storing, regulating, diverting and controlling the flow of the Orange/Senqu River by means of delivering specified volumes of water to a designated outlet point in South Africa. Although this provides temporary relief from water stress and 'buys time'by transferring water from one basin to another, the limits to development are serious. This may be seen in the negative *social* impact, for example. The LHWP displaced 1 500 people and had a detrimental effect on the livelihood of 20 000. In *economic* terms, 1 600 hectares of arable and 3 200 hectares of grazing land were lost to the Basotho. Full relocation is necessary for 63 villages. Some *political* effects also became evident. In 1996, the Lesotho security forces opened fire on workers at the LHWP. This was as a result of a previous incident of labour unrest when, for the third time that year, 3 000 workers had gone on strike. Although the Basotho workers'committee called upon South Africa to intervene, the matter was dismissed as purely internal (Van Wyk 2000:76). It may be argued that South Africa was acting out of national interest, based on its own water shortage problems, but regardless of the project's negative impact on Lesotho. In spite of these negative traits, the LHWPalso brought huge benefits to Lesotho. Examples are royalties in the amount of R138 million from the LHWP as indicated in Lesotho's 1999-2000 budget (SAPA 18 June 1998) and projected future royalties from South Africa of US $40 million. Of this, 40% will be used as a social fund for poor communities in Lesotho (SAPA 4 March 2000). This strengthens the point made earlier that resource-based conflicts often exhibit very narrow interests, such as intracommunal or intrasocial interests, and do not necessarily reflect the broader context of hydropolitics or other socio-political realities.



It is argued that an effort should be made in future to take into account the effects of water-related activities on other states in the region, in order to prevent regional instability and conflict caused by factors such as migration or, on a more political level, disagreements between governments.

The emphasis is thus placed on water management at a political level in order to prevent water from becoming an issue of conflict.

## Managing water scarcity and conflict in Southern Africa

Although international water management seems the most feasible way to manage water scarcity and conflict, it is plagued by a lack of organisation and the dilemma that "international law as an instrument of regulations on the transboundary freshwater issues is at present inconclusive and weak" (Van Wyk 1998:64). Furthermore, the United Nations International Law Commission has not established any binding framework since 1974. Thus water management is left to bilateral and multilateral agreements that are often not sufficiently capable to serve as conflict resolution mechanisms.

The reality of water scarcity may contribute to a negative security situation in the Southern African region. It is important for the region to move away from a state of *negative* peace, which entails the mere absence of war, to one of *positive* peace, where the focus rests on the prospects of social development (Turton 1999b:1). Failure to co-operate will result in the threat of economic stagnation. If the region's economies are to work at an optimal level, water from the existing shared drainage basins needs to be mobilised and distributed equitably between riparians or other users (Turton 1999b:7).

Water scarcity does not necessarily have to be detrimental if it can be managed effectively. Although many nations experience water scarcity – an insufficient supply of water within their boundaries (first-order resource scarcity) – this may be transformed into a situation of 'structurally induced water abundance'. This apply when coping strategies, based on social adaptation and technological innovation, are developed to create a situation of relative water abundance in the face of endemic water scarcity (Turton & Ohlsson 2000:4). It is imperative that second-order resources, which depend on the level of ingenuity employed in addressing first-order resource scarcity, should be developed on a regional level (Turton 2000:45). This depends on the ability to co-operate and on summoning the necessary political will to do so (Falkenmark 1989a:352). Riparian states have the choice to focus more on self-interest, or to co-operate in order to develop solutions that will benefit the region, especially if an equitable distribution forms the basis of such co-operation.

According to the Swedish Ministry for Foreign Affair's report on *Transboundary water management as an international public good*, the establishment of an International Shared Waters Facility (ISWF) would be highly desirable. Its successful functioning would depend on its drawing from the part played by multilateral organisations so far, as well as its co-operation with initiatives such as the Global Water Partnership (GWP) and other international water organisations. It would serve as an international advocate for establishing common norms and principles and thus would seek to develop increased practical awareness of the 1997 UN Convention on the Law for Non-Navigational Uses of International Watercourses. Furthermore, the ISWF would highlight "the importance of transboundary water management as an international public good and promote the principle of subsidiarity in provisioning the good" (Nicol et al 2001:61-62).

At the Southern African level, the implementation of a regional water authority may be considered with similar functions as the ISWF as discussed above. This seems particularly relevant in light of the inability thus far to solve disputes between states, despite article 7 of the SADC water protocol providing for such a function.

According to Van Wyk (1998:67), a long-term solution might be to revive the SADC Water Sector, which functions at a regional level, as well as to create commissions and regulating authorities. In raising the issue of water to a high political level, it becomes necessary to ensure that it is prominently placed on the 'new' agenda of the reformed SADC. A possibility is the Inter-state Defence and Security Committee (ISDSC).

Lowi (in Turton 1999a:2) deduces that co-operation between riparian states is only possible if the dominant or hegemonic power accepts it or has been induced to do so by an external power. The problem in the Southern African region does not lie so much in South Africa's lack of co-operation, as in the danger of over-exploitation of limited water resources. This may be substantiated by the following facts. According to Van Wyk (2000:77), South Africa is home to a third of the region's population. While it accounts for 80% of the region's water use, only 10% of Southern Africa's total water resources are available in the country.

Furthermore, South Africa's role as leader in the region is controversial, because it is often accused of acting as the de facto upstream state (Van Wyk 1998:67). In the Joint Permanent Technical Committee (JPTC), which includes South Africa and Botswana, South Africa, the downstream riparian, is the hegemon. The Swedish Ministry for Foreign Affair's final report on *Transboundary water management as an international public good* suggests that the funding of transboundary institutions should be combined with a parallel strengthening of national level institutions. This would assist the future input of states into riparian initiatives and minimise the dominance of particular riparians at a regional level (Nicol et al 2001:68-70). This may help South Africa to act in accordance to the guidelines of its National Water Act.

South Africa's National Water Act states that it is necessary to take into account international obligations in the conservation, use, management and development of national water resources. The aim is to promote social and economic development through the use of water within the context of shared water resources (Van Schalkwyk 2000:8). This only occurs to some extent at present, as South Africa continues to exploit the water resources in the region to benefit itself. In order to facilitate stability and co-operation, which is necessary for the region's overall progress both in water and economic terms, due cognisance should be given to the fact that the water security of the region may have a determining influence on its development prospects (Van Wyk 1998:67). It must therefore be kept in mind that water can determine economic survival, the permeation of norms and the infusion of political ideology. Falkenmark (1989b:352) thus views the *emotional* response to water as the ultimate challenge, instead of technology.

The key to successful hydropolitical management in Southern Africa lies in the multilateral sphere. Policies and decision-making in support of regional co-operation depend on institutional capacity and resources. Sustainable economic development in Southern Africa depends on a hydropolitical environment characterised by peace, equity and co-operation on the basis of regional interests, and not on narrow national security-based interests.



## Conclusion

Shared watercourse systems have the potential to create serious tensions between riparian countries. These tensions may lead to different reactions ranging from situations that are relatively easy to control and manage, on the one hand, to serious problems that may lead to a violent reaction with its concomitant results, on the other. Some of the examples referred to in this chapter have borne this out.

The fundamental difference in the reactions of different states in situations where tensions may arise as a result of shared watercourse systems lies in the nature of the interaction between these states. If states view a situation as a threat to its perceived interests, it will react very differently from a situation where threat perception is low. As was argued in the section on the differences between international relations and foreign policy, states will defend their national interests (and sovereignty) in a way differing significantly from how they will react to less important problems. If water-related problems and relations are perceived to develop into a threat, the issue will of necessity become a priority and will move up on the agenda of issues to be addressed. If it is perceived to threaten the national interest, it will become part of the foreign policy sphere in most states. This may lead to a 'securitisation' of the problem, and a reaction that will be less conducive to peaceful resolution. Also important is that it may be a reaction of the citizenry, not necessarily that of a government, that creates the security-driven response. The possibility of a Namibian water pipeline from the Okavango and the reaction from Botswana support this argument. The range of available options to handle a problem such as this is severely diminished if it becomes a security issue.

Regional development and stability demand a different approach to problem situations such as these. The interdependent nature of the relations between the states in Southern Africa dictates co-operation rather than conflict as a basis for interaction. This can only be achieved if shared watercourse systems are managed jointly and to the advantage of all concerned. The 'desecuritisation' of water-related problems is essential. This can only be achieved through provisions that create and institutionalise the capacity to manage shared watercourse systems effectively. A rules-based environment is therefore of the utmost importance.

It must be emphasised that the problem does not lie in the national interests of states, but in the policy options and mechanisms available to promote these interests. An environment characterised by interdependence will be conducive to co-operation if interaction is structured and supported by rules and institutions that contribute to the building of trust and a culture to solve problems without reverting to actions based on narrow self-interest.

Are hydropolitical relations in Southern Africa part of the foreign policy or international relations dimension? An answer to this question poses a number of difficulties. On one level the management of water and water-related infrastructure is primarily the responsibility of engineers and, in this sense, falls within the technology sphere with its rather better defined and specific means of handling developments. These roleplayers are busy with functional activities that fall within the ambit of international relations where it involves shared watercourse systems. On the other level, given the nature, importance and range of hydropolitical issues in Southern Africa and the predominant roles of governments, it should come as no surprise that the foreign policy

approach to problem-solving dominates. However, the emphasis on multilateral decision-making and the importance of SADC offers the hope that the institutional and rules-based approach will dominate in future, allowing for interactions to develop in the ambit of 'normal' international relations. This will require the passing of the phase of bilateral national interest-based approaches to regional developments, and the full acceptance of a supranational institutional and rules-based approach to regional developments.

# Chapter 14
# Water demand management and social adaptive capacity: A South African case study

**Peter Ashton and Bennie Haasbroek**

## Introduction

Water is recognised worldwide as the most fundamental and indispensable of all natural resources (Hudson 1996; Gleick 1999). Almost every country faces a growing challenge to meet the rapidly escalating demand for water that is driven by burgeoning populations (Biswas 1993; Gleick 1993; 1998). Water supplies continue to dwindle because of resource depletion and pollution, while demand rises fast as population growth is coupled with rapid industrialisation, mechanisation and urbanisation (Falkenmark 1994a; 1999; Rosegrant 1997; Gleick 1998). This situation is particularly acute and will worsen more rapidly in many arid regions of the world where water scarcity and associated increases in water pollution limit social and economic development, and are often closely linked to poverty, hunger and disease (Falkenmark 1989a; Gleick 1998). This precarious situation contrasts sharply with those countries that can mobilise sufficient human, financial and technological resources to overcome the adversities posed by water scarcity, and thus to maintain human welfare.

Like most other African countries, South Africa's population has grown dramatically during the past century. Despite obvious iniquities in previous political dispensations, this growth has been accompanied by an equally dramatic increase in the demand for water. Based on *present* population trends and patterns of change in water use, South Africa will reach the limit of its economically usable, land-based water resources sometime between 2020 and 2030 (Basson et al 1997; Ashton 1999). This sobering prospect emphasises the urgent need to find a sustainable solution to the problem of ensuring secure and adequate water supplies.

An examination of South Africa's water resources and the historical development of water resource management strategies demonstrates how these policies and strategies have been shaped to cope with the pressures of economic growth in a situation where water supplies and water demand are unevenly distributed. This analysis also provides a basis to determine whether or not new water policies and legislation (DWAF 1997; Republic of South Africa 1997; 1998; Muller 2000) will change the public's attitude to water. The strong emphasis placed on water demand management in South Africa's water law provides a logical framework for natural resource reconstruction and the embodiment of the principles of sustainable water resource management throughout South and Southern Africa (Asmal 1998; Harris & Haasbroek 1999). However, effective implementation of these policies and strategies remains the key to success.

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## Overview of water a vailability and water demands

South Africa is an arid country with an annual average rainfall of 497mm, far less than the world average of 860mm. Rainfall is both highly seasonal and unevenly distributed, and some 65% of the country receives less than 500mm of rainfall per year (DWAF 1986). Most rainfall is concentrated along a narrow region on the southern and eastern coastline and declines sharply from east to west and south to north. The steep east-west and north-south rainfall gradients are matched by equally steep gradients in potential evaporation (DWAF 1986; Midgley et al 1995; Basson et al 1997). Annual average potential evaporation across South Africa totals 1 800mm/year, exceeding annual average rainfall by approximately 360%. As a consequence of these features, South Africa has been rated as one of the 20 most water-deficient countries in the world (McKenzie & Bhagwan 1999).

These climatic features result in low and unevenly distributed quantities of surface runoff reaching the river systems (figure 1). Total runoff to stream and river flows is estimated at some 50 150mm$^3$/year (Midgley et al 1995; Basson et al 1997). Over 60% of the runoff originates from less than 20% of the land area, and 70% of the country contributes less than 50mm of runoff to stream and river flows each year (Midgley et al 1995).

Low and erratic rainfall, combined with high average temperatures and rates of evaporation contribute to low rates of ground water recharge (DWAF 1986). South Africa has few primary aquifers or high-yielding geological formations and most ground water occurs in small, scattered volumes in secondary, fractured rock aquifers (Conley 1995; Basson et al 1997). Despite the fact that ground water supplies are small and often contain high concentrations of dissolved salts and minerals, they are critically important for many rural communities and farming enterprises located in the drier areas of the country (DWAF 1986).

The expanding agriculture, mining, energy, industry and urban sectors in South Africa tended to develop in areas that are poorly supplied by surface water resources (DWAF 1986; Conley 1995; Midgley et al 1995; Basson et al 1997). The previous political imperatives to build and maintain water supply schemes to support the predominantly white farming community contributed to the uneven spread of demand for water. Seasonal river flows, combined with limited supplies of ground water and growing demands for water in areas located relatively far from suitable water sources, led water resource managers to concentrate on developing large storage reservoirs and water transfer schemes (DWAF 1986; Basson et al 1997). The combined capacity of the large and small water supply reservoirs in South Africa amounts to some 37 000mm$^3$. This is equivalent to almost 74% of the annual average runoff and represents an unusually high level of 'resource capture'(Midgley et al 1995).

Initially, most of the larger reservoirs were built to meet the agricultural sector's growing demands for irrigation water (DWAF 1986). However, this emphasis has shifted to providing ever greater proportions of the water required for urban and industrial development (Conley 1995; Basson et al 1997). All water storage reservoirs are now considered to be multi-purpose (Pallett 1997). The complex South African bulk water supply infrastructure ranks as one of the most sophisticated in the world (McKenzie & Bhagwan 1999).



*Figure 1: Map of South Africa showing the distribution of mean annual runoff (MAR, mm)*

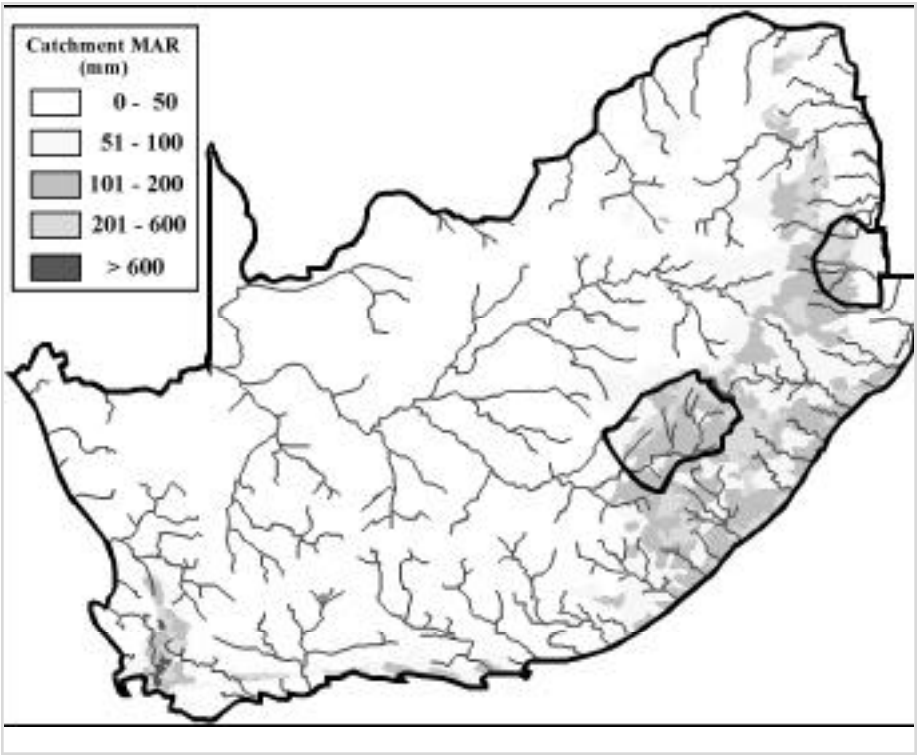



*Figure 2: Estimated annual volume of water used by each sector of the South African economy (1996), plus projected water requirements for 2030*

| Water use sector | Water demand | | | | Overall increase |
|---|---|---|---|---|---|
| | 1996 | | 2030 | | |
| | (Mm$^3$/year) | % | (Mm$^3$/year) | % | % |
| Urban (domestic water use) | 2 171 | (10.8) | 6 936 | (22.8) | 219.5 |
| Mining, industrial and energy | 1 598 | (8.0) | 3 380 | (11.1) | 111.5 |
| Irrigation and afforestation | 12 344 | (61.6) | 15 874 | (52.2) | 28.6 |
| Environment* | 3 932 | (19.6) | 4 225 | (13.9) | 7.5 |
| TOTAL | 20 045 | | 30 415 | | 51.7 |

* Environmental water use is relative to the total water use in different regions and does not reflect the size of the water resource available.

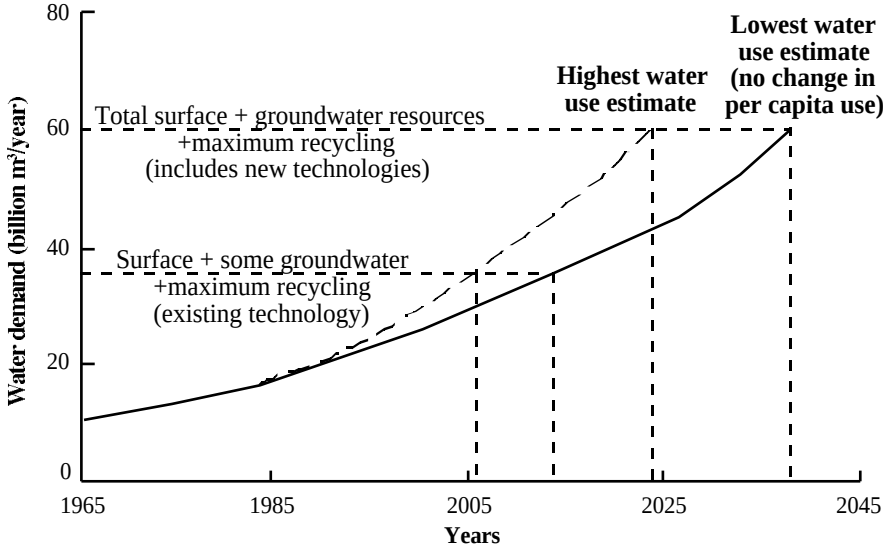
Source: Data taken from Basson et al (1997).

Estimates of anticipated future uses of South Africa's water resources suggest that demands for water in each sector of the economy will increase by between 28% (for the agricultural sector) and 219% (for domestic use) over the next 30 years (Basson et al 1997; figure 2). In several areas, water demand has already exceeded the available supplies and progressively larger volumes of water have had to be transferred from those catchments where water is still available. Further developments and projected increases in water demand at current rates of development will become increasingly difficult to satisfy.

The calculations of future water use appear not to include all the water used by informal farming operations and rural communities, or the water needed for shared watercourses (SADC 1995) and 'ecosystem maintenance'. These could increase the volumes by 20 to 30% above the original estimates (Pallett 1997). If valid, these conclusions suggest that the effective limit of the country's exploitable resources will be reached within 15 to 30 years (Basson et al 1997; Pallett 1997; Ashton 1999; figure 3). Clearly, catchments where water is in short supply will experience water stress long before other catchments. Nevertheless, catchments with larger and more reliable water supplies will also experience escalating water stress as greater volumes of water are transferred to water-short catchments.

Over the past century, most of South Africa's urban, mining, energy and industrial development has been concentrated in the mineral-rich upper catchments of the Orange, Limpopo, Olifants and Komati river systems (DWAF 1986). This is South Africa's

*Figure 3: Highest and lowest projections of water demand in South Africa, against the quantities of surface water, ground water, and recycled water available with existing and new technologies*




Source: Redrawn from Ashton (1999).



'industrial and economic heartland' and accounts for over 65% of its gross national product (GNP). The water demand accompanying this economic development has been coupled with increasing volumes of effluent discharge (DWAF 1986; Basson et al 1997). Continued political isolation and 'separationist' policies ignored many of the needs of South Africa's citizens and neighbours, further compounding the problem. Significantly, it seems that the water available in these international rivers may have been over-allocated, making it difficult for South Africa to meet its international obligations.

South Africa's political transition to democracy added additional complexities. There is now a pressing need to redress the many inequalities of the past and to provide safe and wholesome supplies of water to those communities that presently rely on unreliable water sources of dubious quality (Asmal 1998). These needs and aspirations *must* be met (DWAF 1998a; 1998b; 1998c; 1999a) even though the demand for water will escalate more rapidly and will increase the pressure on dwindling resources. While the volume of water required to meet the basic human needs of all South Africans is relatively small, additional water is needed to grow food and provide for the material needs of the growing South African population.

The treatment and re-use of domestic and some industrial effluent have the potential to 'extend' the available water supplies for domestic and industrial purposes (Commission of Enquiry 1970; DWAF 1986; 1999a; Harris & Haasbroek 1999). This approach has proven very successful in the case of Namibia's capital city, Windhoek (Heyns et al 1998). However, gradually deteriorating water quality requires progressively more sophisticated forms of treatment to ensure that the water is wholesome and safe for use. These treatment costs eventually become uneconomic when compared to alternative supplies (Basson et al 1997).

Overall, the medium term 'picture' of water resource availability in South Africa is bleak. Nevertheless, these problems must be resolved for South Africa to achieve the necessary social and economic development that society demands. This will require a major shift in the public's attitude towards water, and new perspectives and innovative approaches to water resource management are therefore both critically important and pressingly urgent.

## Recent developments in water resource management

South Africa's political transition created a broad awareness that new water legislation was needed to redress the iniquities of previous political dispensations and to take account of its unique situation. This set the stage for a comprehensive process of public participation leading to the development of new water resource management policies and legislation (DWAF 1997; 1998a; 1998b; 1998c; 1999a; Republic of South Africa 1997; 1998). The new South African National Water Act (Republic of South Africa 1998) ranks among the best in the world in terms of its scope and intent, as well as the democratic and participative manner in which it was developed. In character, the Act aims to balance long-term water resource protection and water resource utilisation, while promoting economically sound development, and ensuring that all water use is equitable and sustainable in the long term.

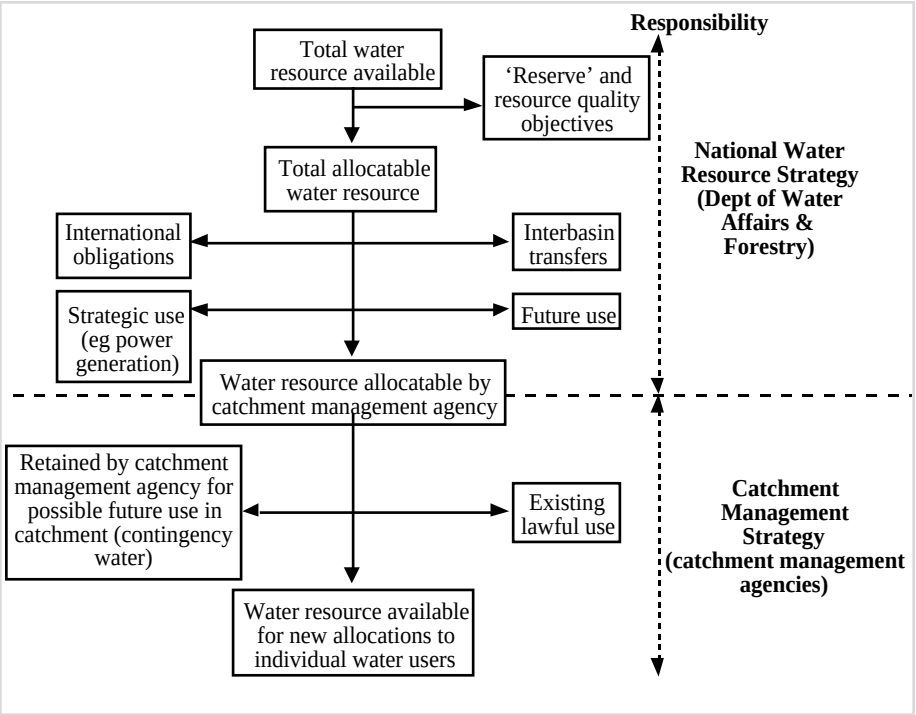
The National Water Act replaces rights to the use of water based on land ownership with a system of administrative authorisations. This is a fundamental and critically important change to the country's water resource management policies and approaches.

All water will now be managed within the framework of the integrated water resource management (IWRM) philosophy, on a catchment basis, through appropriate institutions including the Department of Water Affairs and Forestry, catchment management agencies (CMAs) and water user associations.

The basic approaches of IWRM promote equitable access to and sustainable use of water resources by all stakeholders at catchment, regional, national and international levels (Harris & Haasbroek 1999). Statutory CMAs will be formed to manage all water resources within defined water management areas (WMAs), a tangible move towards implementing the strategies of IWRM and achieving objectives outlined in the National Water Act (Harris & Haasbroek 1999). Nineteen WMAs have been gazetted throughout the entire country (DWAF 1999b) and one CMA will be established in each area. The approximate sequence in which water will be allocated to meet the demands of different water users and the authorities responsible for this process are shown in figure 4.

The available data shows that the demand for water in South Africa has grown by 4 to 5% per year since 1930. This is approximately double the rate of population growth and is clearly unsustainable (Basson et al 1997). In response to this worrying situation, the National Water Act (Republic of South Africa 1998) places heavy emphasis on water

*Figure 4: Approximate sequence in which water will be allocated to meet different demands and the authorities responsible for each activity*






conservation strategies, including water demand management. These new initiatives aim to minimise or retard the growth in water demand through improved education and more efficient use of the available resources (McKenzie & Bhagwan 1999; Watson et al 1999).

## Recent developments in water demand management

To date, there are few examples where water demand has been successfully controlled within a community (see Van der Linde 1998). In contrast, many attempts have been unsuccessful (Schreiner 1998), either because demand management was attempted in isolation, or because the techniques used were not effective at the same magnitude across all water use sectors. Typically, the strategies developed for specific situations have not been integrated into a regional or national approach (Harris & Haasbroek 1999).

The Department of Water Affairs and Forestry recently launched the Water Conservation and Water Demand Management Framework (WCWDMF), comprising a series of concerted efforts to develop and implement coherent strategies for water conservation and water demand management (DWAF 1999a). Central to these strategies is the development of suitable mechanisms to ensure that sufficient water is reserved for the aquatic environment so that the ecological integrity and functioning of aquatic systems are not compromised to a point where water supplies and other benefits fail. Aquatic ecosystems will be maintained according to a predefined condition or management class that allows appropriate (and controlled) levels of exploitation of the water resource (Schreiner 1998; DWAF 1999a). The process of defining management classes for each river system and then providing quantitative estimates of the 'reserve'is still continuing. In the interim, preliminary estimates of the reserve are being carried out in the absence of a classification system. Importantly, the success or failure of these approaches depends largely on the effectiveness of individual water resource managers and the institutions (CMAs) that must be created to implement these strategies.

In normal everyday practice, water resource managers can choose from a wide range of technical, economic and social interventions to manage water demand. Typical

*Figure 5: Water demand management methods and approaches appropriate for implementation during different situations or operational phases*

| Method | Typical operational phase when strategy/approach is applied | | |
|---|---|---|---|
| | **Crisis (drought/ non-payment)** | **Normal operations** | **Long-term(planning and design)** |
| **Technical** | • Pressure reduction<br>• Scheduled use<br>• Valve closure | • Flow control<br>• Manipulate orifices | • Metering<br>• Loss control<br>• Plumbing devices |
| **Social** | • Appeal<br>• Social persuasion<br>• Advertisements | • Legislation<br>• Licences | • Consumer education<br>• School education programmes |
| **Economic** | • Fines<br>• Punitive measures | • Differential tariffs<br>• Tradable allocations | • Supply and demand economics<br>• Marginal prices |

Source: Adapted from Johnson (1995) and Harris & Haasbroek (1999).

examples of such strategies are listed in figure 5. Individual options or combinations of options can be selected according to specific objectives, or the perceived urgency or need of the situation. Each approach (technical, social and economic) can then be applied within appropriate timeframes for each water use sector (Harris & Haasbroek 1999).

The success or failure of each water demand management strategy depends on the commitment of water resource managers to implement the chosen strategies, and the willingness of individual water users to abide by the conditions of each strategy. It is important to note that the water resource manager who decides what strategy to employ will often also be the end-user, for example, within a specific industry. In turn, the public's willingness to accept a particular strategy is controlled by the degree to which individual water users perceive the strategy to be 'justified'by the prevailing circumstances, and the perceived 'legitimacy' of the implementing institution. These measures take time to implement and their consequences also take time to impact on patterns of water use. Ideally, the emphasis should be placed on a fully integrated approach that combines both short, medium and long-term considerations (Harris & Haasbroek 1999).

South Africa's Constitution (Republic of South Africa 1996) guarantees all citizens the right of access to sufficient water for basic human needs. The South African government has interpreted this as being equivalent to a quantity of 25 litres per person per day (DWAF 1999a; Republic of South Africa 1998). The City of Durban has taken direct steps to enforce this principle by ensuring that the first 'lifeline'volume of water (6 000 litres per household per month) is provided free-of-charge. This is equivalent to 50 litres per person per day for a family of four. Thereafter, the principle of 'the more you use, the more you pay'applies and this helps to subsidise the costs of supplying water to the poorer parts of the community. With water services accounts paid by 93% of all account holders, the Durban City billing system is structured so that all households (both rich and poor) receive the first 6 000 litres per month free. An important additional benefit has been a decrease in the overall demand for water to the extent that, in 2000, the demand was equal to that of 1996 (Kasrils 2000a).

Clearly, large local authorities such as the City of Durban have a broad base of ratepayers that allows them to provide 'free' water to poorer members of the community. However, it will be extremely difficult for smaller municipalities and local authorities, particularly those in remote rural areas, to emulate the example set by Durban. This is because these smaller local authorities have much smaller financial resources and simply cannot afford the development and maintenance costs needed to sustain free water supplies.

The Greater Hermanus Water Conservation Programme is an excellent example of an integrated water demand management programme that successfully reduced annual water consumption by some 16.5% (Van der Linde 1998). The Hermanus Municipality used a suite of short and long-term technical and economic techniques combined with an intensive education programme to enhance awareness among all water users and reduce water consumption to within target levels. In the process, water users not only accepted the rationale for the water demand management programme, but also demonstrated their individual commitment to the process. This change in behaviour, or adaptation, of the Hermanus society is considered to be the key to the success of the entire programme (Van der Linde 1998).



Similar developments in other societies have given rise to the concept of 'social adaptive capacity'. This is seen as an index or measure of the ability of a society to adapt its patterns of (water) resource use to increasingly scarce supplies and achieve a sustainable measure of social stability. In particular, it embodies the range of social mechanisms that enable a society to develop and adopt new strategies and actions, which allow it to cope with water deficits that occur when escalating water demands exceed the supplies provided by conventional engineering solutions alone (Turton 1999d; Turton & Ohlsson 1999). There is compelling evidence that a sound understanding of the key insights and concepts embodied in social adaptive capacity will help to identify possible solutions to the looming water crisis that faces Southern Africa (Turton 1999d; Turton & Ohlsson 1999).

## Definitions and terminolog y

The concept of 'social adaptive capacity', as applied to water resource management, has been described in a model presented by Turton (1999b), and Turton and Ohlsson (1999). The definitions of the various terms are listed alphabetically here for clarity.

**Adaptive behaviour:** A clearly demonstrated response to the changing level of water scarcity that can take any one of a number of forms.
**Coping strategies:** The input from decision makers, usually in the form of some policy or set of strategies such as water demand management, that seeks to manage water scarcity in some form or another.
**First-order resource:** The natural resource (in this case, water) that is becoming either scarcer (or more abundant) relevant to population over time.
**Resource capture:** The process by which social groups shift resource distribution in their favour over time.
**Second-order resource:** The set of potential 'adaptive behaviours'that are drawn upon from the broader social context by decision makers.
**Structurally induced water scarcity:** The simultaneous occurrence of both a first-order resource abundance and a second-order resource scarcity, where the social entity is unable to develop or adopt appropriate coping strategies to make use of the available water.
**Structurally induced water abundance:** Where both a first-order resource scarcity and a second-order resource abundance occur simultaneously, for example, when a social entity has adapted to water scarcity by generating a suitable set of coping strategies. Being socially adaptive and technically innovative induces relative water abundance.
**Waterabundance:** The simultaneous existence of both first-order and second-order resource abundance.
**Water deficit:** The condition that prevails when the consumption of freshwater within a social entity exceeds the level of sustainable supply.
**Water poverty:** Where both a first-order and second-order resource scarcity occur simultaneously, for example, a prevailing condition of water scarcity and low levels of adaptive capacity.
**Water scarcity:** A decrease in the volume of water available per capita over time.
**Water surplus:** The prevailing condition that exists when the consumption of freshwater within a given social entity is within the level of sustainable supplies.

## What is social adaptive capacity?

### *Theoretical background*

The theoretical basis for 'social adaptive capacity' in the context of water resource management is contained in a conceptual model developed by Turton (1999a; 1999b), and Turton and Ohlsson (1999). The key concepts embodied in the model described by Turton (1999a; 1999b), and Turton and Ohlsson (1999) have been modified and condensed into a single diagram for improved clarity (figure 6). The definitions and explanations of important terminology used in the ensuing discussion have been adapted and modified from Turton (1999a), and Turton and Ohlsson (1999) (see box).

Two important concepts help to explain the progressive changes in a country's development as the population grows and industrialisation increases (Turton & Ohlsson 1999) by linking the process of water resource development with the changes that take place in social interactions. The term *first-order resource* refers to the natural resource (water) that is becoming scarcer relative to population over time. The term *second-order resource* refers to the set of potential 'adaptive behaviours' and strategies that are drawn upon from the broader social context by decision makers (Turton & Ohlsson 1999). The implications of these concepts for both water resources and the responses of society are summarised below.

In terms of the first-order resource, the left-hand side of the theoretical pattern presented in figure 7 shows a series of typical changes that take place when an increase in water demand is caused by an increase in population numbers. Initially, population

*Figure 6: Factors influencing reflexivity and natural resource reconstruction*

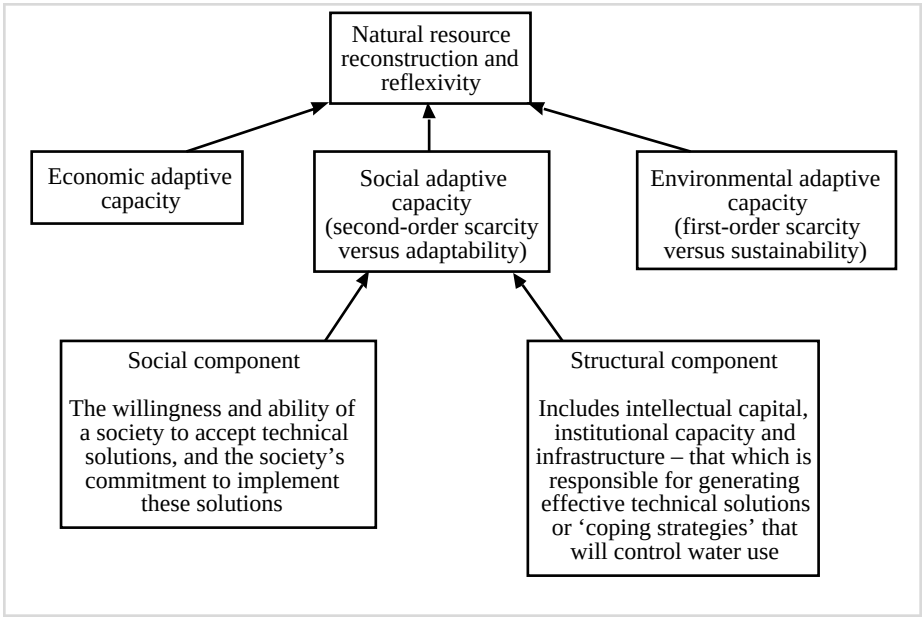
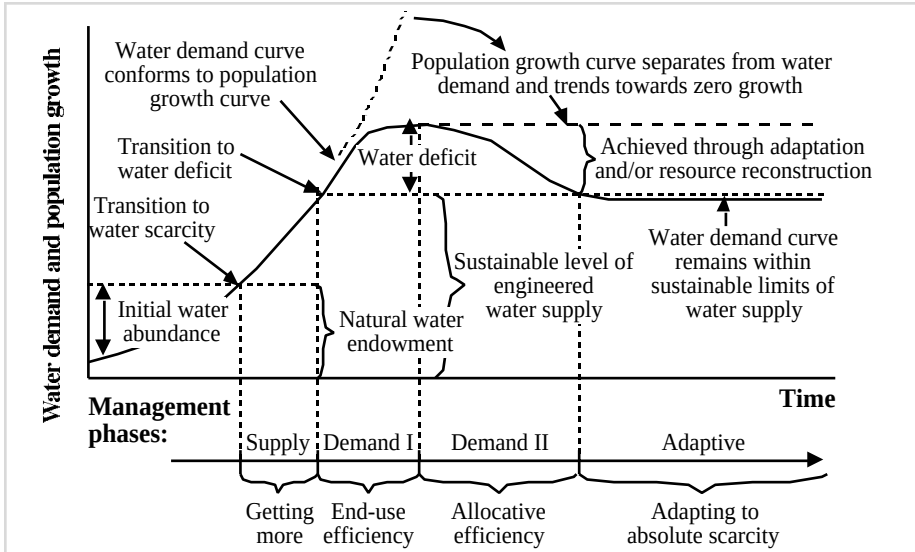





*Figure 7: The realignment of water demand induced by rising population growth to the maximum level of sustainable water supply through improved end-use and allocative efficiencies driven by social adaptations and resource reconstruction*




Source: Modified from Turton and Ohlsson (1999).

numbers are low relative to the volume of water available. The available water supplies are sufficient to meet all demands and represent a situation of 'water abundance'(Turton & Ohlsson 1999). In this situation, water demands increase proportionately as the population grows. However, as soon as the demographically induced water demand exceeds the available limits of water supply, the society enters a situation of 'water scarcity'where the resource becomes increasingly inadequate (Turton & Ohlsson 1999).

Water resource managers typically anticipate and respond to this transition by developing new sources of water, often located at increasing distances from the demand centres. This situation is called the 'supply phase' and has also been referred to as the 'hydraulic mission' phase of a country (Turton 1999f). In effect, this is the time when a series of increasingly complex engineering solutions are developed to mobilise water and resolve the impending crisis in water supplies. The resulting situation has been called 'structurally induced water abundance' (Turton 1999f) and any further increase in water demand can only be met by increasingly more difficult and expensive water supply schemes (Basson et al 1997; Turton & Ohlsson 1999).

In terms of the second-order resource, the transition from initial water abundance to water scarcity is characterised by distinct patterns of social behaviours (Turton & Ohlsson 1999). When run-of-river abstraction can no longer sustain the water demands of economic and population growth, the general public turn to the government of the day to provide sufficient water. The government takes over the role of water supplier, 'delinking'

water users from the water resource, and the general public gradually lose perspective of the real value of the water that is supplied to them.

Where water demand continues to increase in tandem with population growth, the levels of water supplies that can be mobilised by conventional engineering solutions are soon exceeded and a situation of 'water deficit'ensues (figure 7; Turton & Ohlsson 1999). Any further growth in water demand worsens the degree of water deficit experienced. This point usually marks the onset of determined efforts to control and manage water demand through the imposition of stringent water conservation measures and strategies aimed at improving the efficiency of water use. Typically, these strategies try to 'buy enough time' for society to adjust structurally to the growing water deficit (Turton 1999f; 1999b).

From a social perspective, this second transition is reflected in a change in the general social consciousness around water resources, and is often driven by a growing understanding of the issues of ecological or environmental sustainability and an expanding environmental lobby. In addition, there is often a marked (and sometimes abrupt) change in public perceptions as the public begin to reject unilateral decision-making around the distribution of water and demand to participate in water resource management decisions. Water resource managers now have to act as the executors of a 'water trust' that is governed in the public interest. This creates new goals, where efficiency of supply and efficiency of use are important, and the management focus shifts from infrastructure management to water resource management (Turton 1999f; Turton & Ohlsson 1999).

If attempts to control water demand are unsuccessful, water resource managers are forced to implement progressively stricter measures and to reallocate water to more productive sectors of the economy, the so-called 'allocative efficiency' (figure 7). In such situations, water resource managers must develop innovative ways to allocate water within society and keep water wastage to an absolute minimum (Turton & Ohlsson 1999; FAO 2000).

When water deficit becomes prevalent, radical reforms are needed across all water use sectors if water demand patterns are to be separated from population growth. The concerted and sustained effort needed to maintain the overall water demand within the sustainable limits imposed by engineering solutions (figure 7) requires the full commitment and participation of civil society (Turton & Ohlsson 1999). If successful, the shift in water demand away from a demographically induced pattern of continual increase to one that remains within sustainable limits of supply corresponds to the idea of 'reflexivity' proposed by Turton (1999a), and Turton and Ohlsson (1999). This is a clear indication of a society's ability to adapt to conditions of absolute water scarcity (Turton 1999f; FAO 2000). This also reflects the success of 'resource reconstruction' efforts (figure 7) where the available water would have been allocated to the most efficient and effective water use sectors (Turton & Ohlsson 1999).

In terms of the basic theoretical framework provided by Turton (1999a), and Turton and Ohlsson (1999), *effective* social adaptive capacity is based on effective water demand management strategies and techniques, and rests upon two core components:

- a 'structural component' that includes intellectual capital, institutional capacity and infrastructure, and is responsible for generating effective technical solutions or 'coping strategies'that will control water use effectively and efficiently; and
- a 'social component' that can be measured in terms of the willingness and ability of a society to accept the technical solutions as being both legitimate and reasonable, and the society's commitment to the process of implementing these solutions.



The factors influencing reflexivity (and, ultimately, natural resource reconstruction) are shown schematically in figure 6. Here, social adaptive capacity and its two sub-components are of central importance to this discussion (Turton, 1999a; Turton & Ohlsson 1999). While economic adaptive capacity and environmental adaptive capacity are important components of reflexivity and natural resource reconstruction, a detailed examination of these features is beyond the scope of this chapter.

Clearly, if a society's water demands remain linked to population growth, the volume and quality of water available for each person will decline as the population increases (Ashton 1999; FAO 2000). This situation is clearly unsustainable. Ideally, the rate of population growth should also decline and trend towards zero and reduce demographic pressure on the available water resources (figure 7). Theoretically, this population level would then reflect the 'carrying capacity' of the available water resources and the associated social and technical capacity of the society. However, a scenario of zero population growth seems unlikely in the modern African context since population growth rates have remained at high (though variable) levels throughout the last century and show no signs of decreasing consistently towards zero.

## *Is there any 'proof' that social adaptive capacity exists in South Africa?*

Against the theoretical background, the available evidence can be examined to determine whether or not South African approaches to water resource management and water demand management reveal any proof of social adaptive capacity. Turton (1999a), and Turton and Ohlsson (1999) have suggested that evidence of 'water resource reconstruction' would provide at least some empirical evidence that social adaptive capacity is present within a society (Turton 1999f; Turton & Ohlsson 1999).

Earlier, emphasis was placed on the fact that the structural and social components needed for effective social adaptive capacity (figure 6) rely heavily on public perceptions of the legitimacy of the authority responsible for implementing water demand management strategies, and on the 'acceptability'of the strategies proposed for implementation (Lundqvist 1999; Turton 1999f). In South Africa, the engineering response to the onset of water scarcity was clearly demonstrated by a dramatic increase in dam construction and the development of interbasin transfer schemes to deliver sufficient water to the major demand centres during the latter half of the 20th century (DWAF 1986; Conley 1996; Basson et al 1997; Pallet 1997).

The change in the social conscience surrounding the exploitation of water resources that provides evidence for the start of the demand phase in South Africa's water resources management history, originated in three arenas:

- The change in government in April 1994 prompted the establishment of a new Constitution that assured access to water to all the citizens of South Africa.
- A growing population and an expanding economy, accompanied by escalating water demands, led water resource planners to appreciate the increasing urgency of a looming water deficit.
- An increased understanding developed of the need to protect water resources as natural systems, and that each resource has a defined carrying capacity with a so-called threshold that, if breached, could potentially lead to the total failure of the resource.

South African water resource managers have clearly realised the urgent need for concerted actions to curb the growth in water demand. However, several historical circumstances continue to force South Africa to remain partly within the supply phase of water resource management. Of particular importance are the estimated 8 million people in rural areas of South Africa who still do not have access to clean water. In addition, approximately 20 million rural people do not have access to adequate sanitation facilities. Since 1994, the South African government has spent an estimated R3.6 billion on additional (new) water supply schemes to provide potable water to an estimated 5.6 million rural people who previously had no formal water supply system (Kasrils 2000b). While these supply phase developments will have to continue, concerted efforts are now being made to ensure that all new water supply systems are both effective and efficient.

Despite the need to continue the development of water supply systems in South Africa, different water user sectors have started to draw up water conservation and demand management plans and strategies, as required by the National Water Act. This constitutes the first formal evidence for entry into the initial stages of the demand management phase of South Africa's water resources management history. There is already clear evidence in the form of new 'end-user efficiency' strategies in the major urban centres of the country, as well as in certain parts of the agricultural sector. However, while the need for these measures is driven by the realisation that water resources are becoming scarcer, there are also clear financial and economic constraints caused by South Africa's status as a developing country.

Financial and economic features, combined with the relatively inefficient use and distribution of water to some urban areas, provide a strong impetus to the current drive towards an improved end-user efficiency stage in the water demand management phase. In Gauteng, for example, it is estimated that some 25% of the water supplied to users is lost through reticulation and plumbing leaks. Another cause of water loss and inefficiency is attributed to poor maintenance, where municipal councils fail to maintain and repair water infrastructure (Kasrils, 2000a). Financial incentives/disincentives and social suasion have proven to be the most effective measures to initiate and maintain end-user efficiency in urban centres.

If a society does indeed possess social adaptive capacity, this should be evident in institutional capacity and infrastructure, as well as the related intellectual capital to generate effective technical solutions or 'coping strategies' (Turton 1999f; Turton & Ohlsson 1999). As has been shown (figure 6), both the structural and social components must be present simultaneously if social adaptive capacity is to be truly effective. Therefore, the evidence for the presence of these components has to be found and evaluated.

## *Evidence of the structural component*

Although South Africa has demonstrated a large intellectual capacity for managing and coping with water resources, there is still a pressing need to enlarge the knowledge pool even further as the country draws closer to a situation of water deficit. To cope with this realisation, many partnerships have been forged between South Africa and the international community, as well as among different stakeholder groups within South Africa. Locally, the government has established several partnerships with public utilities, the private sector and NGOs, while the principal international partnerships include the European Union and neighbouring countries in the SADC region (Kasrils 2000b).



Many local government institutions have had insufficient capacity to cope with local level water supply and demand management, mainly due to inadequate levels of funding and a shortage of skilled personnel. However, the government has pledged to empower and train local government structures and assist local authorities to assume full responsibility – as Water Service Authorities – for providing water services. At the same time, all water users need to be educated in how to look after their water, and to monitor, manage and maintain it (Kasrils 2000b). The lack of institutional capacity in some local authorities has forced the Department of Water Affairs and Forestry to be directly involved in a large number of projects to provide water services to millions of people in poor rural and peri-urban areas (Kasrils 2000b).

The establishment of CMAs to manage all water resources within hydrological regions (water management areas), will effectively decentralise water resource management at the planning and implementation level, and will also provide appropriate financial perspectives (DWAF 1998a). The board of each CMAwill consist of representatives from different stakeholder groups and funds derived from water sales will be used to develop and manage water resources within the water management area. Each CMA must also develop and implement suitable water demand management strategies. This will help to ensure that the importance of effective resource management is communicated to the people in the water management area. In this way, the adverse impacts of any misuse, as well as the potential benefits from positive management practices will also be felt directly by the users in the water management area (DWAF 1998a).

Against this background of policy developments and institutional changes in South Africa, and the improved understanding of water resource management, it seems that the basic structural components are largely in place for a move towards the adaptive phase as water deficit draws closer. While appropriate water demand management strategies have not yet been fully implemented, it is accepted that the effective implementation of such strategies, as well as the overall effectiveness of catchment management agencies, will be pivotal in determining whether or not South Africa will be able to adapt structurally to growing water scarcity.

## *Evidence of the social component*

The social component of social adaptive capacity relies on two key concepts:

- the willingness and ability of the general public to accept technical and other solutions as being both legitimate and reasonable; and
- the commitment of the general public to implement these solutions.

Although South Africa is still in the first stage of the demand management phase of its water resources management strategy, some positive results have already derived from the implementation of end-user efficiency measures. At this stage, these signs can only be measured as a slight drop in the overall demand for water. In the cases of Hermanus and Durban, there are clear signs that the initial measures have had a positive effect in reducing the demand. The buy-in from water users is based mostly on financial concerns, from the understanding that saving water can also save money.

Unfortunately, financial incentives on their own only have a limited potential to reduce the demand for water because of large inequalities in financial potential that still exist between the different socio-economic strata of South African society. This feature,

and the apparent inequalities in the pricing of water from new supply schemes, compared to existing urban water supplies, will make financial incentives difficult to implement. For example, in the larger cities, $1m^3$ of purified water costs approximately 50 cents (this includes the costs of bulk water capture, storage, treatment and delivery, as well as waste water treatment). In contrast, the residents of rural areas have to pay approximately double this amount because they have to be supplied with water through other, smaller systems (Kasrils 2000b). While this cost is not a high price to pay for water, it can amount to a considerable percentage of a family's income if they are very poor. Here, the Durban Metropolitan Council's approach of supplying everyone with a lifeline volume of water free-of-charge seems intuitively correct. This feature also emphasises how important it is to take into account a person's ability to pay when financial instruments are being considered for water demand management. Here, too, a strong distinction must be made between those who cannot pay and those who will not pay.

In South Africa, water supply and distribution usually consist of three levels or tiers of supply. The first tier of water supply comprises the primary extraction of water from the water resource, and may include both ground and surface water, as well as water that is used directly or indirectly. Examples of indirect first-tier water use include the reduction in run-off that arises from forests and plantation crops (such as sugar cane). Typically, first-tier water includes all of the water supplied by the Department of Water Affairs and Forestry from state-owned raw water schemes and also includes water that is abstracted from rivers for irrigation agriculture. Second-tier water supply is the wholesale (bulk water) distribution of either raw (untreated) water, or water that has been treated to ensure that it is safe for normal domestic use. Typically, water boards or water utilities fulfil this function. Third-tier water supply is the subsequent retail sale of treated water (typically potable water) to individual consumers – individual municipalities typically carry out this function.

Communication plays an extremely important role in the process of monitoring water use within every user sector. The Hermanus case study demonstrated that residents who were provided with informative monthly accounts for service delivery and use were able to monitor their own water consumption and compare this with the average consumption figures achieved by other residents. This simple act of providing additional, useful information was seen as a firm demonstration that everyone was part of the same team.

In summary, many lingering socio-economic inequalities and related factors continue to hamper full expression of the social component of social adaptive capacity in South Africa. Although the Department of Water Affairs and Forestry continues to conduct extensive publicity campaigns designed to inform the general public that water is a critically important resource that is vital to all forms of life, there are still opportunities to improve and intensify the communication process. For example, in addition to the more general communication process, the public should also be informed of the successes and failures achieved in efforts to reduce water consumption. In tandem, these two communication strategies should form the core of a social persuasion process to communicate and emphasise the urgent need for water demand management in South Africa.



## Conclusions

In South Africa, there is a growing awareness among water resource managers and, to a lesser extent, the public that the country's freshwater supplies are an indispensable finite resource that must be protected and managed carefully. It is also clear that both the volume and quality of water available per person will decline as the population of South Africa continues to grow. The overall demand for water in South Africa is a product of the skewed levels of social development, which is itself a product of previously racially skewed access to natural resources such as water. Consequently, South African water resource managers face considerable difficulties when they attempt simultaneously to improve the lot of the poor by providing them with formal water supplies (thereby increasing water demand), while trying to reduce the overall (national) demand for water.

This realisation has enormous social, economic and environmental implications and provides the driving force behind the adoption of new policies and legislation that are designed to reverse past inequalities and to continue to provide adequate water supplies to meet the growing demands for water. More than ever before, a growing awareness of the vulnerability of the country's freshwater resources is forcing water resource managers to review the ways in which water resources have been developed in the past and to develop more innovative and equitable ways of adapting to the inevitable scarcity (Basson et al 1997; DWAF 1998a; 1999a).

Given the rate at which development took place in South Africa during the last century, it was inevitable that the growing demand for water would eventually exceed the capacity of the available supply systems. Unfortunately, while this feature was foreseen and regularly announced by water resource managers, this was not acted upon *by politicians* until relatively recently. The growing awareness of the need to sustain development in economic and environmental terms, coupled with the change in government in 1994, led to a series of dramatic changes in water resource management policies and legislation. Promulgation of the National Water Act introduced bold and imaginative measures to broaden public participation in the management of the country's water resources. The need to meet basic human needs and maintain the integrity and functioning of the aquatic environment enjoys priority in the Act.

So far, most efforts to reduce water demand have been based on two considerations: first, environmental sustainability and, second, the financial cost of new systems compared with the benefits of delaying capital expenditure for new water supply infrastructure. Indeed, water demand management is often seen as one scenario within a larger framework of possible water supply management projects. However, if water demand management strategies are not fully integrated with social and economic initiatives, it will always be difficult to implement these scenarios with maximum efficiency. The new integrated strategies that are under development will help to guide these initiatives and thereby enable them to expand the concepts of water demand management beyond the limits posed by technical measures alone.

The theoretical framework provided by the concepts of social adaptive capacity and natural resource reconstruction shows that South African water resources management approaches fit the characteristics of a typical supply phase situation. The change in government in 1994 marked a formal change in the country's social consciousness and its approach to water resource management. Simultaneously, this event also initiated a

complex series of social and technical processes that sought to redress past inequalities, address the needs of a growing population and an expanding economy, and incorporate ecological considerations in the management of the country's water resources. In effect, these processes also marked the onset of the end-user efficiency stage in South Africa's water resources management history.

Several reasons have been offered as justification for the onset of the end-user efficiency stage of water demand management in South Africa. However, the available evidence suggests that the potential financial benefits and, to a lesser extent, the long-term social benefit of such practices, provided the major incentives. However, the successes attributed to financial measures may prove to be short-lived where significant socio-economic inequalities continue to exist. Integrated strategies and programmes, such as those being developed as part of the National Water Demand Management and Conservation Strategy, must span the widest possible spectrum of approaches if water demands are to be reduced effectively.

Reviews of information for the different South African water demand sectors reveal very little evidence for improved end-user efficiency. In addition, virtually no evidence was found to suggest that intersectoral allocation efficiency has received any attention. Therefore, while the sweeping South African water law reforms have great potential to improve the efficiency and effectiveness of water resource management, little progress has so far been made with the initiation of large-scale actions to curb water demand and improve water use efficiency in all water use sectors.

The key strategies outlined within the National Water Act must be fully implemented if South Africa is to prove that it is indeed socially adaptive. In particular, strong partnerships must be forged between the state and the public, while the implementation of catchment management agencies must be finalised. These processes must ensure full public buy-in and commitment if they are to be successful and the importance of ensuring that all water users are fully informed cannot be over-emphasised. The Hermanus case study provided excellent evidence that communication campaigns provide important tools that help to achieve success.

Clearly, the efforts made to date must be encouraged, supported and extended if South Africa is to become truly reflexive in its water demand patterns. While water use will need to be controlled strictly in all water use sectors, there is good evidence that a growing water deficit will exert increasing pressure on the country's processes of economic and social development. Considerable effort will also be required to circumvent the added threats to water resources that are posed by global climate changes and the HIV/Aids pandemic that is sweeping the African continent (Whiteside & Sunter 2000). This will require far more emphasis on the adaptive phase. New technologies and approaches that can cost-effectively 'create' new freshwater sources will need to be developed. It is anticipated that these approaches will have to form the driving force behind the shift in water resource management that will be needed to support economic growth as the country enters a situation of water deficit in future.

## Note

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# Chapter 15
# Water demand management and tourism in arid countries: Lessons learned from Namibia

**Klaudia Schachtschneider**

## Introduction

Namibia is one of the driest countries in Southern Africa, yet the concept of water demand management has only recently been considered as part of water resource management (Van der Merwe 1999) and is now being incorporated into the country's changing water legislation. For water demand management legislation to be practical in an arid country, it is crucial to understand the circumstances and the driving forces that influence water use. Based on five case studies, this chapter shows different circumstances, attitudes and driving forces that promote or hinder the implementation of water demand management, specifically in Namibian tourist facilities.

Water demand management is a broad concept with many definitions. In this chapter, it is defined as a management approach for the water sector and user, stressing the efficient use of existing supplies, rather than developing new ones, through policy as well as ethical, economic, educational and technological means (Van der Merwe 1999).

In the past, water resource management focused mainly on supply-oriented solutions, providing more water on demand (Turton & Ohlsson 2000). In arid countries, most opportunities for supply-side options have already been used and decision makers now need to resort to alternatives such as water demand management that focus on the efficient use of available water resources. Namibian decision makers are currently including water demand management strategies into the country's new water legislation.

In arid countries such as South Africa and Namibia, water demand management is not easily implemented, since the old policies promoted the idea that water is a free commodity (Turton 1999e). Both in South Africa and Namibia, this has created a strong perception among the public that it is the responsibility of government to provide access to an abundant and cheap water supply. The biggest challenge facing water demand management is to change the perception of society about the true value of water and to instil an attitude of responsibility towards the resource as a whole (Turton 1999e).

### *Background to Namibia's water and tourism*

Namibia is a semi-arid to arid country with low, seasonal and variable rainfall of below 20mm along the west coast to 600mm per annum in the far north-east. Annual evaporation rates range from 2 600mm to 3 700mm, which is many times higher than the average annual rainfall. As a result of this water deficiency, Namibia has very little surface water. Only a quarter of Namibia's water is supplied from surface waters, while the rest is derived from groundwater sources. Currently, the available surface and groundwater sources are almost fully exploited. Decision makers are beginning to understand that the natural aridity, periodic droughts, seasonality and variability of

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rainfall patterns should be taken into account in all development plans for Namibia (Bethune 1996).

Tourism is the fourth largest and fastest growing sector of the Namibian economy (6-9% per annum) with a 7% contribution (N$1.3 billion in 1998) to gross domestic product (GDP). A quarter million tourists made use of Namibian tourist facilities in 1999 and approximately 25 000 Namibians are employed in the sector (Minister of Environment and Tourism 1999).

Tourism uses less than 1% of Namibia's available water, while agriculture (irrigation and livestock) uses 61%. Even though water demand management in the tourism sector will contribute only minimally to an overall reduction in the country's water use, effective water demand management in the tourism sector is still very important. It serves as an example for other Namibian sectors and in many cases reflects a shift from agriculture (the least efficient user). Most international visitors make use of tourist facilities and an effective water demand management strategy gives a positive international message. Many tourist facilities lie in arid, ecologically sensitive areas where effective resource management is crucial to ensure environmentally sustainable operation (Schachtschneider 2000).

### *Background on Namibia's Tourism Draft Policy*

In the past, Namibia's tourism was developed around large-scale, self-catering, state-owned resorts in protected areas. With independence the numbers of private and communal tourist operations have grown markedly, catering for different clientele. The tourism policy for 2000 to 2010 is currently being drafted. It highlights evidence of natural resource over-utilisation within Namibia's tourism industry. On account of the country's fragile resource base, the policy seeks to encourage stakeholders to develop high quality, low impact tourism. This would mean the exploitation of specialist tourist niches for a few high-paying customers. A similar approach has been successfully adopted in Botswana (Ministry of Environment and Tourism 2001).

One niche would be so-called 'ecotourist' destinations that provide a natural and educational experience to a few high-paying guests and that usually operate in very scenic and sensitive areas. The integration of sustainable resource use in the marketing strategy provides ecotourist destinations with unique business opportunities, allows guests to have a unique 'nature'experience and does much to ensure efficient natural resource use within the operating area.

### *Namibia's Water Policy and Act*

The Water Act, no 54 of 1956 is still used in Namibia, although outdated. A new Water Act more suitable to Namibian circumstances is nearing completion. This Act will be based on the recently accepted National Water Policy (2000).

The new policy supports the implementation of water demand management in that:

- The government will be the custodian of all water resources and will have the right to control all water use and disposal.
- Integrated supply and demand planning is required both in the short and long term.
- The policy promotes sustainable water utilisation through appropriate pricing, the promotion of water efficient technology, public information and awareness programmes, information sharing and co-operation between parties, the promotion of wastewater re-use and the active support for research and data collection on water conservation.
- Consideration is given to the establishment of an environmental reserve.
- A catchment management approach is promoted.
- The establishment of Namibian water quality standards for wastewater re-use is stressed.



Until the new Water Act is in place it is difficult to enforce water demand management principles, since there is no control over borehole numbers or water abstraction in most parts of Namibia. The only controlled areas relevant to tourism lie within municipal boundaries or nature reserves. The old Act does not support water demand management initiatives and nobody outside municipal boundaries is required to use water efficiently. Thus, the drive to implement water demand management principles in tourism and other industries is currently not supported or enforced by law. Appeals can be made to businesses to use water more efficiently. In the tourism sector, the best voluntary support has come from ecotourist facilities that include efficient resource use as part of their marketing strategy.

## Recent efforts in water demand management

In 1998, the Namibian Water Demand Management Country Study, funded by the World Conservation Union (IUCN) was conducted nationally to establish and assess the current status of water demand management in the urban, rural, agricultural, mining and tourism sectors (Van der Merwe 1999). The study concluded that, except for a few successful case studies, very little water demand management occurs within any sector. The study recommended that suitable sector-specific practices needed to be implemented and tested, initially through pilot projects. As a direct result, a water demand management pilot project focusing on the tourism sector was initiated.

This three-year study, called Water Demand Management Study of Namibian Tourist Facilities, is run by the Ministry of Agriculture, Water and Rural Development and is supported by the Water Research Fund for Southern Africa (WARFSA). The baseline study, conducted in 1999, showed that visitors only use a fraction of the water (4-20%), while most water is used by staff, on gardens or is lost through leaks. To increase water use efficiency at tourist facilities, water demand management needs to be implemented throughout the facility, which is best achieved by involving those responsible for management at each tourist facility. It is the responsibility of management to decide, implement and control efficient water use in all areas. The second phase of the project focused on facilitating and monitoring water demand management implementation at six selected tourist facilities by management over a period of more than a year. At the outset and in consultation with management, the project developed a list of recommended, suitable water demand management incentives. Management was encouraged to consider, test and implement these over a period of one year. At the end of this time, the response of management was evaluated based to some degree on the number of recommendations successfully implemented and own initiatives taken to promote more efficient water use.

Management responses differed between the study sites, depending on three main driving factors: external controls, ethics and economics. External controls include all

factors that the facility cannot control, such as the aridity of the area (and the inherent lack of water) and imposed restrictions by either a municipality or park management. Ethics refers to the degree of environmental sensitivity inherent in the facilities' business and management approach. Economics refers to the cost of water supply, expressed as total cost recovery. The relationship between the three driving forces differed from site to site, influencing the degree and success of water demand management implementation. The variable circumstances, driving forces and differences in management attitudes towards water demand management, as well as the actual levels of water demand management implementation are described for each of six case studies. The case studies are:

- Spitzkoppe Community Tourism Restcamp, a camp run by a community;
- Bernabé de la Bat Resort in the Waterberg Plateau Park, which is a typical large-scale, self-catering resort in a nature reserve;
- Ongava Lodge, which is a privately owned luxury lodge;
- Swakopmund Municipal Bungalows, which can accommodate many self-catering visitors in an urban setting;
- Skeleton Coast Lodge; and
- Etendeka Mountain Camp – the last two can both be termed 'ecotourist sites', where efficient resource use has been strongly integrated into the business structure. (They are discussed together below).

### *Spitzkoppe Community Tourism Restcamp*

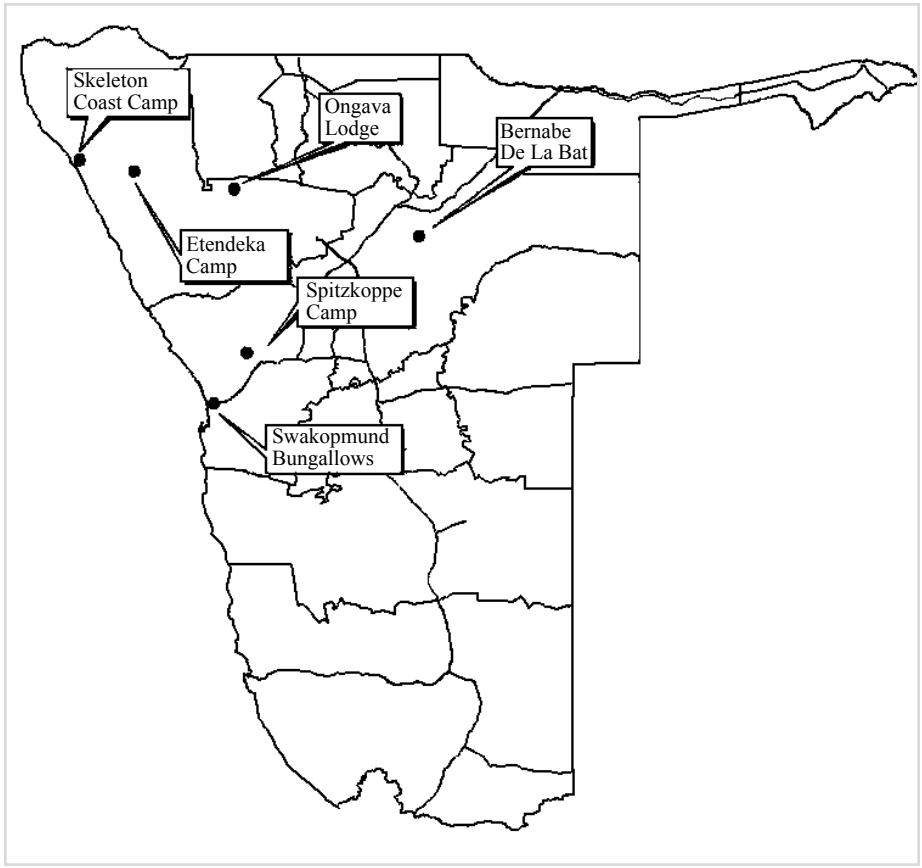
The Spitzkoppe is a scenic granite inselberg, approximately 100 kilometres from the coast. It lies at the edge of the Namib and receives very unreliable rainfall of less than 100mm per annum. Since 1964, the Spitzkoppe has been proclaimed communal land and the Spitzkoppe community of around 600 people live nearby. The main sources of income are livestock and sales of semi-precious stones and crystals mined in the area. Since 1992, the community has ventured into the tourism market, providing an alternative source of income and new development opportunities.

Water is scarce in the Spitzkoppe area. Groundwater reserves are limited and too saline to drink. The government provides set quotas of saline water to supply village showers and toilets. Since 1999, a desalination plant has provided limited volumes of drinking water to the community. This water is provided free of charge, in accordance with the old water legislation. The lack of water limits the development potential of the area. Community members have expressed the wish for access to more water to enhance development opportunities, provided that the government makes this water available free-of-charge.

The Spitzkoppe Community Tourism Restcamp is run by community members and is situated approximately 2 kilometres from the village. The restcamp offers 28 camping sites and two bungalows. These facilities were used by an average of 1 324 visitors per month during 2000. This is a high number, considering the water restrictions of the camp. The restcamp is allowed a monthly quota of only 5 000 litres and camping visitors have to bring along their own water. The water demand management project supports the attempts of camp staff to deal more effectively with water scarcity by combining local knowledge on water savings and project recommendations on appropriate water demand management approaches.



*Figure 1: Map of Namibia showing the location of the six tourist facilities*




Successful water demand management measures at Spitzkoppe include leak control, selling water to tourists, improved public awareness of the water situation, water imports through visitors bringing their own supply for camping, and appropriate technological measures including dry sanitation and bucket shower systems.

The main driving factor behind water demand management at the Spitzkoppe camp is external controls in the form of the lack of fresh water in the area and the resulting water limitations imposed by the water supplier. The water supply to the camp is basically free with a supply cost of N$2.75/m$^3$, so economics is not an important driving factor. On account of the restrictions, camp staff have successfully combined local knowledge and water demand management initiatives to manage their water supply, showing that they are able to adapt to a situation over which they have no control. Should the water supply ever increase, staff would readily use the additional water irrespective of whether it is sustainable to the area or not, knowing that, if they would not use it, it would be used by

other village members. The camp staff operate at the basic needs level and subsequently place first emphasis on their income opportunities and not water efficiency ethics.

### *Bernabé de la Bat Resort*

The Bernabé de la Bat Resort is situated in the Waterberg Plateau Park, approximately 80 kilometres east of Otjiwarongo. The camp used to belong to the Ministry of Environment and Tourism and has recently been privatised. The resort was constructed in 1989, offering accommodation in bungalows and at camp sites for a maximum of 558 visitors. Around 300 people permanently live in the staff quarters, receiving free accommodation and access to water as part of their salary package.

Spring water, originating on the mountain slopes above the resort, is channelled directly into the supply system. The full cost of supplying water at Bernabé de la Bat is a mere N$1.52/m$^3$ water. The water supply is so cheap that economics is not an important driving factor. The new company does not yet have an environmental management plan, and thus does not have any company-scale environmental ethics. The resort lies in a fairly water-rich area with several permanent springs and there is no obvious water scarcity. However, it is the only large-scale Namibian resort outside municipal boundaries that has been constructed to re-use its wastewater for gardening. During the building of the resort, the engineers designed a very reliable supply system integrating wastewater re-use for gardens.

Unfortunately, this design excluded the environmental needs of the stream below the entry point of water into the supply system. Freshwater use of the resort is so high (on average 180 cubic metres per day), and the piping designed in such a way that the downstream section is completely dry throughout the year. Flowing water in the natural stream could enhance the attractiveness of the resort, with increased bird and game-viewing opportunities. While there is no local water scarcity, the water is used inefficiently. Between 29 and 55m$^3$ are lost to leaks every day (mainly in the staff area), while half of the daily freshwater supply is sprayed onto lawns in the staff quarters, despite the availability of semi-treated effluent. Visitors account for only 4% of the total daily water use.

Implementing water demand management at a large-scale resort under such water-rich conditions is complicated by the scale, lack of legal support from the old water law, fragmented management support and the inherent disruptions associated with any recent takeover by a new company, including the lack of environmental ethics. The water demand management tourism project attempted to target management at local and top levels to increase their control over water use, implement better maintenance schemes and promote efficient water use behaviour, especially among staff.

Both local and top management's response to the project recommendations was slow. Thus far the implemented steps to increase water use efficiency at Bernabé de la Bat Resort are an enhanced maintenance programme, which reduced leak losses from 55 to 29m$^3$ per day within four months, and awareness stickers in all bungalows and visitor ablution facilities to sensitise visitors about Namibia's water situation.

While these were two recommendations of the water demand management project, their implementation was enhanced by public statements of the company, intending to improve maintenance at the resort (*New Era* 3 April 2000; *Republikein* 11 April 2000). Management reacted after their public statement with the implementation of the easiest and most visible efforts, reduced leakage and the display of public awareness material.



The most pressing issue of staff misusing water has not yet been addressed by management, since it requires more financial, planning and management input. The water demand management project held a staff workshop to increase the awareness level of staff, but it had no visible impact. Due to the local abundance of free water, staff perceive no value for water, nor any need to save it. A comment such as, "The water is God's gift to us, flowing down this mountain, so it is our right to use it the way we want!" was a typical argument at the workshop (Matthew & Schachtschneider 2000). Staff were sceptical of the project, fearing the introduction of water payment, a concept they are familiar with from the town municipalities.

Turton (1999a) and Van der Merwe (1999) pointed out that pricing is an essential part of effective water demand management. The only way to change staff behaviour at Bernabé de la Bat Resort would be to introduce payment with well-planned metering and billing systems as part of a broader company initiative.

Top management did not respond to the water demand management recommendations at Bernabé de la Bat, since the effort and potential of conflict to increase water efficiency still outweigh the imminent economic company benefits. However, they did implement project recommendations at other resorts, where water costs were so high that water demand management was considered a valuable tool for cost reduction. One camp received a new treatment plant that allows wastewater re-use for the garden and another had all old urinals replaced with a more efficient brand.

None of the three driving forces play an important part at Bernabé de la Bat and thus water demand management was not implemented at the resort. But the company clearly stated that water demand management is regarded as a valuable tool to improve water efficiency at resorts where the cost of water is an important driving force.

### *Swakopmund Municipal Bungalows*

The Swakopmund Municipal Bungalows are situated in the coastal desert town of Swakopmund. The rest camp has 193 bungalows with a maximum capacity of 960 beds and an average monthly visitor number of 5 627. None of the staff members reside on the premises.

Swakopmund's constant water scarcity requires the town council to maximise water use efficiency. This is done through a constantly reviewed and adjusted block tariff water payment system, regular water awareness campaigns and innovative supply solutions, such as desalination plans and the use of semi-purified effluent for gardening.

The Swakopmund Municipal Bungalows are run by the municipality and thus follow the same strong water conservation-oriented approach. Several water conservation steps have been implemented at the Bungalows, including daily monitoring of water use, wastewater re-use for landscaping, implementation of water saving devices such as low-flow shower heads, a very strict maintenance control system and the distribution of awareness material for visitors. On average, the Bungalows use a total of 50 to 70m$^3$/day, depending on the occupancy rate. The total cost of water for the Swakopmund Municipal Bungalows is N$10.44/m$^3$.

There are limits to increased efficiency in the future, due to the age of the bungalows, which were constructed more than 30 years ago without considering water efficiency. Alterations would be extremely costly and the access to suitable technical water saving

devices in Namibia is limited, since the market has not yet been fully developed (Van der Merwe 2000).

The main factor driving the implementation of water demand management at the Swakopmund Municipal Bungalows, as well as in the rest of the town has been water scarcity, which increased people's perceived value of water, resulting in strict municipal water use controls and high water prices.

### *Ongava Lodge*

Ongava Lodge is situated at the western gate of the Etosha National Park, approximately 100 kilometres north of Outjo. Ongava is run by a private company on a 29 000 hectare game reserve, catering for a maximum of 20 high-paying guests per night. An average number of 390 bednights are sold per month. About 44 staff members permanently stay on the premises and have access to free water. Ongava pumps its own borehole water and, apart from the pumping costs, does not pay for water. The full cost of abstracting and supplying water is N$4.15/m$^3$, which is comparatively lower than the supply costs charged by the municipalities of Windhoek and Swakopmund to their water users.

Water use at Ongava does not exceed the borehole water supply, so there is no imminent local water scarcity. However, Ongava lies in a relatively dry area and sells the 'wildlife' experience to guests. The company operates in many such areas, therefore the efficient and sustainable use of resources is part of the international company strategy, as well as part of the company ethics. This approach is actively promoted by top management and is embraced by local management and staff members. This strong ethical attitude of using natural resources sustainably has led to the implementation of several water demand management steps. These include an intensive maintenance programme, the replacement of lawns with more suitable indigenous vegetation, evaporation control and awareness material for visitors in the form of notices and talks. The maintenance programme is so effective that Ongava is the only site with almost leak-free staff quarters. On average, the lodge uses 24 cubic metres of water a day.

Ongava Lodge, like the Swakopmund Municipal Bungalows, was never designed with water demand management in mind and rebuilding is costly. The high lime content in the water makes the installation of some technical water saving devices such as low-flow shower heads impractical.

Considering that Ongava is not faced with water scarcity, the implementation of so many water demand management initiatives is a commendable voluntary achievement in the absence of enforcing policy, cost of water and an outside controlling body. Why does it work for Ongava, when it fails for other sites? The answer lies in the kind of tourism niche they occupy, which caters for a clientele that is more aware and where environmental business ethics are part and parcel of marketing. It results in a win-win solution for guests in the form of an unspoilt holiday destination, for the company in the form of profitability, and for the environment in the form of sustainable resource use.

### *Etendeka Mountain Camp and Skeleton Coast Camp*

These two sites are very similar in their setup, approach to water use and their water availability. Both sites were not monitored to improve their water efficiency, but to study them as ideal cases, where water is already used efficiently. The Skeleton Coast Camp and Etendeka Mountain Camp are situated in extremely arid areas, catering for only a few high-paying guests. Skeleton Coast Camp is situated in a nature reserve where water use is limited by the Ministry of Environment and Tourism. Etendeka Mountain Camp is situated on communal land and a declared tourism concession area. Both sites have to transport their water several kilometres by vehicle, which pushes up the full cost of supplying water to N$229.93/m$^3$ for the Skeleton Coast camp and N$235.98/m$^3$ for Etendeka. In both instances, management stated that the main reason for efficient water use was the obvious aridity of their operating areas. Both follow strong 'ecotourist' principles by operating with minimal environmental impact through efficient and appropriate resource use. The facilities were planned and constructed with water efficiency in mind. The number of water outlets is minimised and piping is standardised for easy maintenance. Water demand management incentives include technical solutions such as wastewater re-use, the installation of low-flush toilets, water efficient showers and kitchen taps as well as the absence of pools and watered gardens. Laundry is transported off the premises to be washed elsewhere. Leak losses are minimal, due to strict maintenance controls. Management encourages all visitors and staff to keep their water use to a minimum through talks, comprehensive notices and pamphlets. All these measures ensure that both Skeleton Coast and Etendeka use no more than 1.5 cubic metres on a fully occupied day.

The efficient water use maintained at Skeleton Coast Camp and Etendeka is in many ways unique and cannot necessarily be replicated at other existing tourist facilities. It shows that efficiency is much higher if a facility is planned appropriately from the beginning. Both facilities constantly strive towards maximum efficiency because they occupy a market niche as 'ecotourist' sites, where visitors expect them to operate according to the principles they represent. The lack of water on site is so acute and the resulting transport costs so high that both sites are driven to water efficiency by all three driving forces.

## Implications for national water demand management implementation

The case studies have shown that water demand management implementation differs within the Namibian tourism industry due to the presence or lack of three driving forces:

- *external controls*: the level of water scarcity and resulting levels of external control over water use in the operating area;
- *economics*: the cost of water supply; and
- *ethics*: different perceptions of staff and management of the value of water and resulting attitudes towards water demand management initiatives.

Four of the six case studies have positive attitudes towards water demand management. Of these, three face serious water scarcity, control their own water supply and have high water supply costs (Skeleton Coast, Etendeka and Swakopmund). Two of these have integrated sustainable resource use into their overall business strategy right from the beginning and have achieved the most notable water use efficiency (Skeleton Coast and Etendeka). Swakopmund Municipal Bungalows cater for a different clientele and, being based in town, do not operate according to an ecotourist approach. The fourth case, Ongava Lodge, faces no imminent water scarcity, no controls and has minimal water

costs. Nevertheless, they have integrated water demand management into their business strategy and have minimised their water use as far as possible.

Two case studies showed negative or reluctant attitudes towards water demand management. Spitzkoppe faces severe water scarcity and controls, but it receives free water. While local knowledge has been used to maximise water efficiency out of necessity, there is a clear preference towards supply-oriented solutions. Bernabé de la Bat, the second site, has implemented no water demand management strategies, faces no water scarcity, no external controls and no water supply costs.

Is it possible to compare these three driving forces, based on the case study findings? It can safely be said that water demand management is most effectively implemented where all three driving forces play an important part. Often water scarcity in an area will affect the cost of water, controls over the resource and the value people assign to it, but not all of the Namibian tourism industry is based in water scarce areas. The ethical and economic driving factors can bring about limited water demand management efforts by themselves, as shown by Ongava Lodge and the company running Bernabé de la Bat.

While the right attitude towards water demand management is a very powerful driving factor on its own, it is unfortunately also the most difficult to implement on a national scale, since there is no common approach or recipe to change individual attitudes. In Namibia, as in the rest of Southern Africa, water demand management faces its greatest challenge in changing perceptions that have been ingrained by inappropriate past policies and the provision of free water. Additionally, it is impossible for the entire Namibian tourist industry to focus on 'ecotourism'.

Economic factors are often thought of as the most important and effective driving force within water demand management (Van der Merwe 1999). Most work has been completed in urban areas, where metering and payment of water are possible. The tourism industry is dispersed over the entire country and the costs associated with the reading and billing at all facilities are likely to be so high that it will not be financially viable.

To implement water demand management successfully in the Namibian tourism industry, decision makers should build on the power of all three driving factors and ensure that all tourist facilities feel compelled to improve their water use efficiency by the pressure of at least one driving force.

This could be achieved by having the new policies complement one another to reach common goals. The water policy promotes the implementation of water demand management strategies, while the tourism policy promotes the idea of specialised tourism with low numbers and high profitability. The case studies have shown that water demand management is best implemented in ecotourist sites where the business benefits from the sustainable resource approach, visitors experience a unique encounter with nature and the environment is utilised efficiently and sustainably. Close co-operation between the water and tourism sectors can ensure that future developments of such facilities receive preference to less sustainable and larger ones.

Another link can be created between the two policies and the building standards for new facilities. Appropriate technology enforcement for new developments can slowly help to replace outdated water technology and provide a marketing opportunity for Namibian entrepreneurs to expand the efficient technology market. Changed building standards and expanded market opportunities could ensure a selection of accessible,



appropriate, suitably robust, affordable and reliable technical water saving devices countrywide.

The tourism policy could support the water policy by promoting the update of tourism rating standards (one to five stars), which could include sustainable resource use as one of the rating components. All tourist facilities interested to receive a rating would need to ensure a certain efficiency in resource use. This change in rating would affect all kinds of tourist facilities that will need to make appropriate adaptations to their resource use. An improved market for water saving devices would help facilities to make the necessary and practical adaptations, taking into consideration the age of the facility and the often inappropriate original design of their infrastructure.

More focus needs to be placed on water awareness, which can increase water use efficiency through better maintenance, improved visitor awareness and appropriate staff behaviour at all facilities. The National Water Awareness Campaign has produced awareness material annually since 1992, keeping the public informed of the national realities of water scarcity and promoting a change in attitude towards water both as a resource and as a habitat for wildlife. While increased awareness does not imply an immediate change in attitude, the awareness campaign is a valuable national tool to complement other water demand management efforts.

The new Water Act itself will provide government with more control over Namibia's water resources, making it possible to control water use at different sites, provided that the necessary manpower is available to do inspections. Negative enforcement in the form of fines and permit refusals would be an option when faced with a severe offender. When interviewed, management at all sites admitted that, although unpopular, fines remain a very effective and necessary incentive to behave appropriately.

## Conclusion

Since independence, Namibia has had the opportunity to rewrite and adapt old policies that are no longer practical, including the water and tourism policies. The aridity of Namibia has forced decision makers to adopt new water resource management approaches, including water demand management in the new water policy. Legal support for water demand management in the form of policies is a crucial cornerstone to implement it as a strategy country-wide, but it is equally important for decision makers to understand the main driving forces that motivate people to adopt water demand management initiatives if the new policies are to be put into practice effectively. Within the Namibian tourist industry, the three driving forces were identified as external controls, economic reasons and ethical principles.

When the new water policy is put into practice, the power of all three driving forces needs to be taken into consideration. The new tourism and water laws can complement each other to achieve a mutual goal – to support environmentally sustainable tourist facilities that cater for a few high-paying visitors, since such facilities have proven to be the most profitable and sustainable within the Namibian tourism industry.

## Note

This chapter is part of an ongoing project and its contents do not represent the final results of the study.

# Chapter 16
# Water and HIV/Aids: Some strategic considerations in Southern Africa

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## Introduction

At first sight, the issue of HIV/Aids and water would appear to bear very little relation to each other. HIV/Aids is a global-scale pandemic that is transmitted between people primarily through sexual contact, while water is a renewable natural resource of which the availability depends on a variety of geographic and climatic factors. However, a closer inspection of the features that characterise the spread of HIV/Aids and its implications for individuals, communities and societies reveals several significant linkages with water, as well as important consequences for water resource management. The links between HIV/Aids and water reflect some of the often unanticipated effects of the pandemic on society, with long-term implications for effective water resource management and the provision of wholesome water supplies to communities. This chapter first provides a strategic overview of the HIV/Aids pandemic in Southern Africa and then examines the extent to which it influences and is influenced by water resource management on the sub-continent.

## The current state of the HIV/Aids pandemic in Southern Africa

When the spread of the human immunodeficiency virus (HIV), which causes Acquired Immunodeficiency Syndrome (Aids), was first formally recognised in the early 1980s (Hooper 2000; Janse van Rensburg 2000), no one predicted the extent to which the pandemic would proliferate or the extraordinary effects it would wreak on global and national economies (World Bank 1999; Whiteside 1999a; UNAIDS 2000a; Whiteside & Sunter 2000). Based on the numbers of people living with HIV/Aids in 1991, the first estimates predicted that a probable maximum of 9 million people would be infected and 5 million would die by the end of the decade (UNAIDS 2000a). While detractors considered these predictions to be alarmist and pessimistic, the most recent monitoring results show clearly that the estimates were at least a three-fold under-prediction (Crewe 2000; UNAIDS 2000a). By the end of 2000, it was estimated that some 18.8 million people had already died of AIDS, while nearly 36.1 million people are now living with HIV (UNAIDS 2000b). In the absence of a miracle, perhaps in the form of freely available antiretroviral drugs, most of these infected people are likely to die within the next decade.

While these global figures are truly alarming, the spread of HIV/Aids in the countries of sub-Saharan Africa has been fearsomely fast, far outstripping the rates recorded in other parts of the world. At the end of 2000, sub-Saharan African countries were estimated to be home to 25.3 million (more than 70%) of all adults and children living with HIV/Aids in

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the world (Crewe 2000; UNAIDS 2000a; 2000b). Surveillance data from sub-Saharan Africa for 2000 indicated that over 3.8 million adults and children were newly infected, while an additional 2.4 million adults and children had died, as a direct result of HIV/Aids or AIDS-related diseases during this year (Karim 2000; UNAIDS 2000b). There is also compelling evidence that the current trends in HIV infection will have a profound impact on future rates of infant, child and maternal mortality, life expectancy and economic growth throughout the region (World Bank 2001). These macrolevel impacts are matched by the devastating burden of suffering among individuals and households. From being considered initially as a serious health crisis, HIV/Aids is now recognised globally as an absolute crisis for human development (Whiteside 1999a; World Bank 1999; 2001; UNAIDS 2000a).

Within sub-Saharan Africa, some of the countries comprising the Southern African Development Community (SADC) have demonstrated a frightening acceleration in their rates of HIV/Aids infection and now have the highest levels of HIV/Aids infections in the world (Karim 2000; UNAIDS 2000a; 2000b; 2000c). In eight out of 12 of the mainland African countries comprising the SADC region, at least 15% of all adults are infected. In some of these countries, the infection rate among adults has risen to between one in four and one in three. HIV/Aids prevalence rates in these countries have more than tripled in the past decade and the evidence indicates clearly that urban and rural centres have similar prevalence rates (UNAIDS 2000a; 2000b). Several authorities have indicated that the system of migrant labour, as well as expanded transport systems are very likely to be partly responsible for the spread of HIV/Aids between Southern African countries, and between urban and rural centres (see Lurie 2000; Janse van Rensburg 2000; Williams et al 2000a).

In common with most other African countries, HIV/Aids prevalence rates are slightly higher among women than men. Both genders show peak levels of infection within the age group 18 to 40, with lower, but still alarming levels of prevalence in the age groups 15-18 and 40-60 (Whiteside 1999a; World Bank 1999; Karim 2000; UNAIDS 2000a; 2000b). The age group 18 to 40 represents the most economically active proportion of society, most of whom are breadwinners and heads of families at this stage of their lives (Whiteside & Sunter 2000; Malan 2001). Apart from its more obvious direct effects on the health and well-being of individuals, HIV/Aids also exerts an enormous variety of indirect influences on every sector of society. All economic sectors within a country are susceptible to the escalating human tragedy and, in turn, exert additional, subtle and overt pressure on the resources of the SADC region as a whole (Whiteside & Sunter 2000). Every country in the region faces a daunting challenge in halting the spread of HIV/Aids, while dealing with the long-term social and economic consequences of the pandemic (UNAIDS 2000a; Williams et al 2000a).

The extent of HIV/Aids infection among adults in the SADC region at the end of 2000 is shown in figure 1. Based on census data that adults (aged 15 years and older) typically comprise some 50% of rapidly growing African populations (World Bank 1998), the data in figure 1 indicates that some 13.3 million adults, 6.6% of the entire population of 201 million living in these 12 countries, are infected with HIV/Aids. Importantly, the data does not show the additional numbers of children who are infected with HIV/Aids as a result of mother-to-child transmission, nor does it reflect the large number of children who have



*Figure 1: Demographic details and HDI ranking for 12 SADC countries, 2000*

| SADC country | Population 2000 (millions) | Per capita GDP 1999 (US$/p/y) | HIV/ Aids incidence (%) | 1995 | | 1999-2000* | |
|---|---|---|---|---|---|---|---|
| | | | | Life expect-ancy | HDI rank-ing | Life expect-tancy | HDI rank-ing |
| Angola | 12.903 | 336 | 2.8** | 50 | 157 | 47 | 160 |
| Botswana | 1.639 | 2 904 | 35.8 | 60 | 71 | 39 | 122 |
| DRC | 52.046 | 110 | 5.1** | 53 | 142 | 48 | 149 |
| Lesotho | 2.156 | 502 | 23.6 | 58 | 137 | 46 | 142 |
| Malawi | 10.778 | 132 | 16.0 | 46 | 157 | 39 | 159 |
| Mozambique | 19.980 | 92 | 13.2 | 52 | 166 | 43 | 169 |
| Namibia | 1.739 | 1 969 | 20.0 | 56 | 116 | 50 | 115 |
| South Africa | 43.265 | 3 281 | 22.6 | 60 | 100 | 48 | 101 |
| Swaziland | 0.928 | 1 255 | 25.3 | 58 | 110 | 46 | 114 |
| Tanzania | 33.744 | 124 | 8.1 | 50 | 149 | 45 | 156 |
| Zambia | 9.191 | 431 | 20.0 | 49 | 136 | 39 | 151 |
| Zimbabwe | 13.109 | 579 | 25.1 | 50 | 124 | 40 | 151 |

* Latest data available was for different years, either 1999 or 2000.

** Unreliable data due to civil war in these countries.

Sources: World Bank (1998), CIA(2000); SADC (2000); UNAIDS (2000c); and Whiteside & Sunter (2000).

been orphaned as a result of HIV/Aids. Examination of the data in figure 1 shows clearly that the adult populations of countries such as Botswana (35.8%), Swaziland (25.3%), Zimbabwe (25.1%), Lesotho (23.6%), South Africa (22.6%), Namibia (20%) and Zambia (20%) are those most heavily infected. The available statistics for Angola and the Democratic Republic of Congo are considered to be inaccurate because of the difficulties of conducting effective HIV/Aids surveillance campaigns due to the prevailing civil wars in these countries (UNAIDS 2000c).

An important feature of the data presented in figure 1 is the apparent absence of a strong relationship between poverty (as reflected by per capita GDP values) and HIV/Aids prevalence. Both relatively 'rich' countries (South Africa and Botswana with high GDP values) and relatively 'poor'countries (Lesotho and Zimbabwe with low GDPvalues) have comparably high prevalence rates. This suggests that there may only be a weak correlation between a country's economic status and the extent of HIV/Aids in its population, despite the realisation that poor people are more vulnerable to HIV/Aids. However, it is important to realise that many other features, including cultural norms and behavioural patterns (UNAIDS 2000a), as well as the migrant labour system (Lurie 2000) also contribute to the prevalence of HIV/Aids within a specific country. Another crucial factor is the fact that, while GDP is good indicator of the overall economic status of a country, it is not an ideal indicator for poverty. This is because GDP values mask disparities between different sectors within the population. An alternative index such as the GINI index provides a far better overview of these intra-population differences and could give useful additional insights into possible linkages between HIV/Aids and poverty.

There is clear evidence that HIV/Aids has contributed to a dramatic decline in life expectancy levels at birth, as well as a reduction in the United Nations Human Development Index (HDI) ranking, an index of quality of life (World Bank 1999; UNAIDS 2000a; 2000b; 2000c). Indeed, when compared with the data available for 1990, life expectancy levels in most SADC countries have declined by between 15 and 20 years during the past decade (Crewe 2000; Karim 2000; UNAIDS 2000a; Whiteside & Sunter 2000). Similarly, population growth rates in most Southern African countries have also declined dramatically in the last five years (World Bank 1999; CIA2000; UNAIDS 2000c; Williams et al 2000b).

Against the background provided by the data on HIV/Aids prevalence in Southern Africa, it is instructive to examine the availability of water resources and the provision of water supplies and sanitation services in these countries. Adequate supplies of fresh water represent one of the scarcest natural resources within Southern Africa and have a clear potential to retard social and economic development (Conley 1995; Basson et al 1997; Ashton & Haasbroek 2002). Evidence for some of the more subtle, yet far-reaching effects of HIV/Aids can also be demonstrated in an analysis of the implications of the pandemic for water resource management in the SADC region. The observations and deductions presented here assume that no new treatment or cure for HIV/Aids materialises within the next three to five years. Therefore, this analysis provides a relatively bleak view of the scale of impacts that HIV/Aids could have on water resource management, as well as the implications of such management practices for people infected with HIV/Aids.

## Water resource management in Southern Africa

In recent years, there has been a dramatic increase in public awareness that the world's fresh water supplies are a scarce and limited resource that is extraordinarily vulnerable to human activities (Falkenmark 1989a; Biswas 1993; Gleick 1998). This consciousness is coupled with the growing realisation that it is becoming increasingly difficult and expensive to provide sufficient supplies of wholesome water to meet the growing needs of communities and countries. These tensions are accentuated by widespread population growth, as well as increased rates of urbanisation and industrialisation (Falkenmark 1991). While it appears clear that the basic reasons for increasing water shortages are well understood by all participants, the potential remains high for tensions to increase when countries experience extreme climatic events such as prolonged droughts (Pallett 1997; Gleick 1998).

The rapidly growing public recognition that water interdependence is already, or will soon become, a fact of life in many countries supports an increasing drive towards co-operative development of water resources in certain areas (Falkenmark 1989a; Biswas 1993; Gleick 2000). This is also reflected in Southern Africa where recent political developments have been accompanied by a wider acceptance of the need for countries to work together to develop and implement joint strategies for the protection and management of regional water resources (SADC 1995; SARDC 1996; Pallett 1997). Large areas of the sub-continent are arid to semi-arid and the basins of most of the larger perennial rivers are shared by between three and eight countries (SARDC 1996; Pallett 1997). Supplies of fresh water are finite and the growing demands for water in some parts of the region are fast approaching the limits of exploitation that conventional technologies



can provide (Conley 1995; Heyns 1995). In many cases, demands for additional supplies of fresh water will need to be met through the use of unconventional technologies, the exploitation of new or novel sources of fresh water, or through the long-distance transfer of ever-larger quantities of water from regions that have ample supplies (Conley 1995; Heyns 1995; SARDC 1996). In the future, concerted attention will also have to be paid to reducing the demand for water and to increasing the efficiency with which water is used (Ashton & Haasbroek 2002).

The current reality of Southern Africa is one of expanding populations, albeit tempered by the HIV/Aids pandemic (Williams et al 2000b), accompanied by escalating urbanisation and industrialisation, as well as rapidly increasing demands for water to redress past social, economic and political inequalities. National water resource management strategies in Southern Africa recognise water as a 'common good'and not as 'private property'. The principles of sustainable resource utilisation underpin national water resource management policies and ensure that all aspects of the water cycle are considered within the geographical bounds of a river basin or catchment area (Heyns 1995; SARDC 1996; Basson et al 1997).

## Patterns of water use in Southern Africa

Broad patterns of water use in the SADC region are shown in figure 2. While the absence of data on the total volumes of water used in each country prevents detailed comparisons from being made, agricultural water use in each country clearly dominates when compared to the domestic and industrial water use sectors (World Bank 1998; SADC 2000). The high proportion of water used for agriculture suggests that each SADC country relies heavily on food grown within its borders to meet national goals of food security (Pallett 1997).

Another extremely important consideration is the degree to which the populations of different Southern African countries have access to sanitation services and safe, wholesome supplies of water (figure 3). To a large degree, the level of urbanisation determines service provision in Southern African countries. As is evident from the data presented in figure 3, there are wide disparities between Southern African countries in terms of the degree to which their populations are urbanised, ranging from Malawi at 14% to Botswana at 64%. Overall, some 69.3 million people (34.4%), out of a total SADC population of 201.5 million live in formal urban areas while 132.1 million people (65.6%) live in rural areas.

An examination of the urban populations of Southern African countries reveals enormous differences in the provision of water supply services, ranging from 17% in Mozambique to 100% in Botswana (figure 3). Overall, some 43.1 million people (62% of all urban residents) have access to safe water supplies, while the remaining 26.2 million urban residents do not have such access. A slightly smaller number (42.3 million, 61%) of all urban residents also receive some form of formal sanitation service.

In comparison to their urban counterparts, the larger rural population of Southern Africa have far lower levels of access to appropriate sanitation services or safe water supplies (figure 3). Out of a total rural population of 132.1 million, some 46.9 million (36%) are able to access safe water supplies while 39.3 million people (30%) have appropriate sanitation facilities. Again wide disparities are noticeable between the levels

*Figure 2: Patterns of water use by different sectors in 12 SADC states in 1998*

| SADC country | Proportion of water used by different sectors (%) | | |
|---|---|---|---|
| | Agriculture | Industry | Domestic |
| Angola | 76 | 10 | 14 |
| Botswana | 48 | 20 | 32 |
| DRC | 23 | 16 | 61 |
| Lesotho | 56 | 22 | 22 |
| Malawi | 86 | 3 | 10 |
| Mozambique | 89 | 2 | 9 |
| Namibia | 68 | 3 | 29 |
| South Africa | 62 | 21 | 17 |
| Swaziland | 71 | 8 | 21 |
| Tanzania | 89 | 2 | 9 |
| Zambia | 77 | 7 | 16 |
| Zimbabwe | 79 | 7 | 14 |

Sources: Gleick (1999) and WRI (2000).

*Figure 3: Comparison of population size, proportion urbanised, and levels of access to safe water and sanitation facilities by the urban and rural populations of each mainland SADC country in 2000*

| SADC country | Population 2000 (millions) | Proportion urbanised (%) | Access to safe water (%) | | Access to sanitation (%) | |
|---|---|---|---|---|---|---|
| | | | Urban | Rural | Urban | Rural |
| Angola | 12.903 | 31 | 69 | 15 | 34 | 8 |
| Botswana | 1.639 | 64 | 100 | 91 | 91 | 41 |
| DRC | 52.046 | 29 | 37 | 23 | 23 | 4 |
| Lesotho | 2.156 | 25 | 65 | 54 | 53 | 36 |
| Malawi | 10.778 | 14 | 80 | 32 | 52 | 24 |
| Mozambique | 19.980 | 35 | 17 | 40 | 53 | 15 |
| Namibia | 1.739 | 37 | 87 | 42 | 77 | 32 |
| South Africa | 43.265 | 49 | 80 | 40 | 79 | 50 |
| Swaziland | 0.928 | 32 | 61 | 44 | 66 | 37 |
| Tanzania | 33.744 | 25 | 67 | 45 | 74 | 62 |
| Zambia | 9.191 | 43 | 64 | 27 | 75 | 32 |
| Zimbabwe | 13.109 | 43 | 90 | 69 | 90 | 42 |

Sources: CIA(2000), FAO (2000a) and UNAIDS (2000c).

of services available within the different Southern African countries. For example, access to safe rural water supplies ranges from 15% in Angola to 91% in Botswana, while access to appropriate sanitation services ranges from 4% in the Democratic Republic of Congo to 62% in Tanzania.

In summary, 90 million (44.7%) of the total Southern African population have access to safe supplies of water while 81.6 million people (40.5%) have access to appropriate sanitation facilities. Importantly, these figures also confirm that some 111.5 million people



(55.3%) have inadequate access to safe water supplies while some 120 million people (59.6%) have inadequate access to appropriate sanitation facilities.

## Implications of the HIV/Aids pandemic for water resource management

In its broadest sense, water resource management involves achieving a delicate balance between the protection of a country's water resources, while simultaneously ensuring that the reasonable demands for water by each water use sector in such a country are met in a timely manner. Large numbers of skilled and semi-skilled individuals from a wide variety of economic, social and technical disciplines are needed to accomplish the broad array of complex and complicated tasks involved in achieving this equilibrium. Key issues for the success of these processes rely on the collection and interpretation of information relating to the geographical and temporal distribution of demands for water, as well as the design, construction and operation of appropriate water supply and treatment works to meet these demands. Depending on their size and complexity, water supply schemes may take between 5 and 15 years to commission from the time they were first conceptualised. It is therefore imperative that water resource managers have rapid access to accurate and current information on the demographic distribution of populations and their likely future water demands (Conley 1995; SADC 2000; Ashton & Haasbroek 2002).

Some important consequences of the HIV/Aids pandemic in Southern Africa have been most easily visible as the dramatic increase in mortality rates and an equally spectacular reduction in population growth rates. For example, population growth rates in several Southern African countries have decreased by over 50% in the last five years (CIA 2000; UNAIDS 2000a). Clearly, demographic changes of this magnitude can have enormous social, economic and environmental implications for the timely provision of water supplies and sanitation services to both urban and rural communities (SARDC 1996; Pallett 1997). Insufficient supplies of water cause unnecessary hardship and stress, while over-provision leads to wastage, environmental damage and economic loss (Ashton 2001). Specific categories of water stress or scarcity and their equivalents in volumes of water required per person per year are shown in figure 4 (Falkenmark 1989a).

A summarised overview of the populations in 12 Southern African countries, together with the volumes of water available for use within each country, is shown in figure 5. This figure also includes projections for possible future (2025) population numbers in these countries and their subsequent likely demands for water, based on population growth rates for 2000. These future projections will clearly be incorrect if population growth rates continue to decline further as a result of HIV/Aids. Nevertheless, the volumes of water available per person in 2000 and 2025 can be used to demonstrate which countries may be likely to experience different levels of water scarcity and stress (Ashton 2001).

Based on a comparison of the categories of water scarcity (figure 4) and the volumes of water available in Southern African countries in 2000 (figure 5), four countries (Malawi, Namibia, South Africa and Zimbabwe) are considered to be 'water stressed', while Botswana experiences 'chronic water scarcity'. If the anticipated population growth projected in figure 5 actually occurs, another two Southern African countries (Lesotho and Tanzania) will join their four water-stressed neighbours, while Botswana will continue to face chronic water scarcity. At least for the next 23 years, the other Southern African

*Figure 4: Categories of water scarcity associated with varying levels of water supply per person per year, the typical scales of problems encountered in each category in Southern Africa*

| Water scarcity category and associated problems | Volume of water available ($m^3$/person/year) |
|---|---|
| *Beyond the 'water barrier':* continual, wide-scale water supply problems, becoming catastrophic during droughts. | <500 |
| *Chronic water scarcity:* continual water supply problems, worse during annual dry seasons; frequent severe droughts. | 500-1 000 |
| *Water stressed:* frequent seasonal water supply and quality problems, accentuated by occasional droughts. | 1 000-1 666 |
| *Moderate problems:* occasional water supply and quality problems, with some adverse effects during severe droughts. | 1 666-10 000 |
| *Well-watered:* very infrequent water supply and quality problems, except during extreme drought conditions. | >10 000 |

Source: Modified from Falkenmark (1986; 1989; 1991).

*Figure 5: Water availability, population numbers and growth rates for SADC countries, and projections for 2025, taking HIV/Aids into account*

| SADC country | Total water available ($km^3$) | Country population 2000 (millions) | Water per person 2000 ($m^3$/p/y) | Population growth rate (%) ** | Country population 2025 (millions) | Water per person 2025 ($m^3$/p/y) |
|---|---|---|---|---|---|---|
| Angola | 205.0 | 12.903 | 15 888 | 2.15 | 21.961 | 9 335 |
| Botswana | 1.6 | 1.639 | 976 | 0.76 | 1.981 | 808 |
| DRC | 1 019.0 | 52.046 | 19 579 | 3.19 | 114.111 | 8 930 |
| Lesotho | 5.2 | 2.156 | 2 412 | 1.65 | 3.246 | 1 602 |
| Malawi | 17.5 | 10.778 | 1 624 | 1.61 | 16.068 | 1 089 |
| Mozambique | 117.0 | 19.980 | 5 856 | 1.47 | 28.776 | 4 066 |
| Namibia | 2.7 | 1.739 | 1 553 | 1.57 | 2.567 | 1 052 |
| South Africa | 52.8 | 43.265 | 1 220 | 0.50 | 49.010 | 1 077 |
| Swaziland | 2.8 | 0.928 | 3 017 | 1.22 | 1.257 | 2 228 |
| Tanzania | 80.0 | 33.744 | 2 371 | 2.57 | 63.636 | 1 257 |
| Zambia | 127.0 | 9.191 | 13 818 | 1.95 | 14.895 | 8 526 |
| Zimbabwe | 15.5 | 13.109 | 1 182 | 0.26 | 13.988 | 1 108 |

* This is the total of surface plus ground water that is generated within the geopolitical boundaries of the country each year and excludes water that flows in from neighbouring states (FAO 2000a). Minor volumes of recycled water are included in the values for water available in South Africa.

** Population growth rates in each country have been adjusted to account for the current prevalence of HIV/Aids in the country (CIA2000).

Sources: CIA(2000) and FAO (2000a).



countries (Angola, Democratic Republic of Congo, Mozambique, Swaziland and Zambia) will have sufficient water supplies to avoid shortages.

Against the background provided by the prevalence of HIV/Aids and the availability of water resources in the countries of Southern Africa, six groups of problems or 'problem areas'can be identified where HIV/Aids impinges on water resources management. These problem areas are first listed, below, and then each is discussed separately:

- Inaccurate estimates of population growth rates and mortality rates lead to incorrect estimates of water demand in specific geographic areas. In turn, inadequate or incorrect demographic information hinders proper planning and prevents construction schedules from matching water demand profiles.
- Changes in the socio-economic profiles of communities receiving services such as water supplies and sanitation are such that there is widespread difficulty to pay for these services. New and innovative funding and cross-subsidisation mechanisms are required to recover the operation and maintenance costs of water supply schemes.
- Loss of key skilled and semi-skilled staff leads to increased staff turnover in all sectors, with concomitant requirements for increased training of new staff, as well as increased cost implications and possible production delays.
- Staff members infected with HIV/Aids show a dramatic decline in productivity as the disease progresses. Additional productivity losses will be attributable to workers having to care for sick family members and relatives, as well as attending funerals.
- Any decline in drinking water quality caused by inadequate water treatment will lead to increased public health risks, particularly for individuals with compromised immune systems. Health risks will be higher in areas where inadequate sanitation facilities are available, leading to an increase in the incidence of water-borne diseases and related mortalities.
- There is a small risk that local ground water resources may become contaminated if individuals bury their relatives in areas that are unsuitable for the location of graveyards. This practice will also prevent these areas from being used for alternative purposes.

### *Inaccurate estimates of population growth rates and mortality rates*

One of the most important considerations that have arisen from the available information on the spread of HIV/Aids in Southern Africa is the difficulty in accurately projecting possible population numbers over a long timeframe (Whiteside & Sunter 2000). Population projections that extend beyond a five to seven year timeframe contain increasingly larger inaccuracies and should be treated with caution (UNAIDS 2000a). This is largely due to uncertainties around probable behavioural changes in response to the anticipated massive mortalities that can be expected as the pandemic proceeds (Williams et al 2000a; 2000b). Population projections are also affected by uncertainties around the numbers of new immigrants who arrive in urban areas each year, either from rural areas or from neighbouring countries (Lurie 2000). Therefore, due caution must be exercised when population projections are made for periods beyond 2005 (Karim 2000; Lurie 2000; UNAIDS 2000a). In addition, it is essential to remember that the limited availability of accurate, widespread surveillance in Southern Africa suggests that any estimates made are likely to underestimate the true prevalence of HIV/Aids.

Predictions of mortality rates due to HIV/Aids are based almost exclusively on the realisation that no effective cure for HIV has yet been discovered. At this time, every person recorded as HIV-positive appears certain to die within a period of between seven to ten years from the date of first infection, unless antiretroviral therapy is administered to halt the progression of the disease. In children, the situation is far worse and life expectancy can drop to as low as two years for babies. Informed medical opinion considers that the prevalence of HIV/Aids appears to reach a plateau at between 32 and 35%, when approximately one in every three individuals is infected (Whiteside 1999a). Prevalence survey data demonstrates that somewhat fewer men than women are infected with HIV/Aids (Whiteside 1999a; Karim 2000; UNAIDS 2000a).

Given the range of uncertainty around predictions of the possible numbers of people infected with HIV/Aids and the resultant mortalities, it is clear that estimates of population numbers will also likely be inaccurate (Whiteside & Sunter 2000). Together, these uncertainties will reduce the accuracy and reliability of future water demand estimates for specific geographic areas and countries (Ashton 2000).

If water demand estimates do not take HIV/Aids-related mortality into account, demands for water could be overestimated by between 10 and 30%. This would pose several possible unanticipated consequences for the construction and operation of large-scale water supply schemes. In particular, if anticipated HIV/Aids mortalities do indeed reach the very high levels suggested above, this would delay the demand for water by between 10 and 20 years. In addition, if this scenario were to hold true, the construction of large water supply schemes within current planning timeframes would result in unnecessary expenditure of capital (Ashton 2000). The converse situation is also important: if mortality rates are overestimated, the growth in water demand profiles of an area or country will not be anticipated correctly. Given the relatively long lead-in times for water supply projects (Basson et al 1997), a population would face undue hardship if adequate water supplies cannot be provided in time (Ashton 2000).

The other side of this coin for large-scale water supply schemes is that these projects may inadvertently lead to increased transmission of HIV in an area, thereby changing HIV/Aids projections for that area. Increased transmission is a recognised consequence of introducing a large, predominantly male workforce into an area surrounding the water scheme development.

## *Inability to pay for (water supply) service delivery*

Arising from the projected HIV/Aids mortality rates for different age groups of the population, it is highly likely that the working-age population (20-50 years of age) will experience the greatest reduction in numbers (Karim 2000; UNAIDS 2000a; Whiteside & Sunter 2000; Williams et al 2000a; 2000b). The net result of these high mortality rates will be a somewhat smaller population with proportionately higher numbers of juveniles (<20 years old), who would normally still depend on their parents, and elderly people (>50 years old) who would not normally make up a large proportion of the national work force of economically active people. Given that juveniles (<20 years of age) also demonstrate some of the highest rates of HIV/Aids prevalence (Whiteside 1999a; Crewe 2000; Williams et al 2000a), it can be anticipated that a significant proportion of surviving juveniles would also be infected with HIV/Aids and therefore unlikely to survive into old age (Williams et al 2000a). This will cause a dramatic change in the age structure of the population and similar trends are anticipated for each Southern African country (Whiteside 1999a; Karim 2000; Lurie 2000).



If this scenario holds true, the size of the economically active population will decline or remain static and the surviving juveniles and elderly people will be required to shoulder the burden of providing for their families. In extreme cases, households will be headed by surviving teenagers who have to look after younger siblings, together with elderly relatives who may be unable to work or who have to rely on state support. Such a situation will pose extraordinary social problems for most communities. Teenage-headed households will have great difficulty in securing sufficient funds to pay for normal municipal services such as electricity, water supply and sanitation, while still having to provide for food, education and housing for themselves and their siblings (Whiteside & Sunter 2000; UNAIDS 2000a). This example demonstrates a strong link between the economic status (poverty level) of a household or community and its ability to cope with the ravages of HIV/Aids (UNAIDS 2000a). Even in households with economically active adults, the increased need for healthcare for sick family members will divert funds away from other expenditure such as water and sanitation services.

In such situations, water supply agencies would find it extremely difficult to recover the expenses associated with providing water supplies and sanitation services. It would then become necessary to institute some form of cross-subsidisation from more affluent members of the community to ensure that poorer communities could still receive basic services. If the number of such cases is high, or continues for an indefinite period, national government support would be required to resolve the issue. The resulting additional taxation burden would cause increased public resistance to prolonged support of poorer communities.

## *Loss of skilled employees*

Given the implications of the projected mortality rates described above, it can be anticipated that skilled and semi-skilled employees in most sectors of society would also display similar HIV/Aids infection rates to those predicted for their respective national populations. Typical age profiles of skilled and semi-skilled employees span the range between 20 and 45 years of age; this is also the section of the population most likely to be impacted heavily by HIV/Aids (Whiteside 1999a; UNAIDS 2000a; 2000b; Williams et al 2000a). The construction of a typical large water supply scheme can be used to illustrate some of the implications of the features described above. If the construction work for large-scale water supply projects takes between three and ten years to complete, and up to one in every three persons employed on such a project could be HIV-positive with an expected post-infection lifespan of between seven and ten years, normal employee turnover rates can be expected to increase dramatically. It is therefore possible that 30 to 50% of the total construction staff complement could die during the construction period, or no longer be able to work as a result of HIV/Aids (Ashton 2000).

The primary implication of increased employee turnover is that there needs to be a corresponding increase in the recruitment of new staff (Whiteside 1999a). This has important ramifications in terms of additional training needs, as outlined below. Similarly, there are also important implications for a likely decline in productivity, as described later.

Based on the anticipated decline in numbers of skilled and semi-skilled employees due to HIV/Aids, there will be a corresponding need to recruit increased numbers of replacements (Morris & Cheevers 2000). This is likely to place a heavy demand on the available (unemployed and presumably untrained or partially trained) population in a country (Williams et al 2000a). If new staff members are recruited from neighbouring countries, this is unlikely to reduce the prevalence of HIV/Aids, since most Southern African countries display comparable HIV/Aids prevalence statistics (Whiteside 1999a; Lurie 2000; Malan 2001; UNAIDS 2000a; 2000b; 2000c). In an attempt to avoid this situation, a few organisations in Botswana have recently started to hire skilled and semi-skilled employees from overseas countries where HIV/Aids prevalence rates are lower, to replace Botswana citizens who have already died as a result of Aids (Elias 2001 – personal communication). However, this can also be problematic as increased mobility of people can promote the transmission of HIV/Aids to overseas countries.

In order to deal with the anticipated high rates of employee turnover, companies and organisations will have to focus considerable attention on employment of suitable new staff (Morris & Cheevers 2000). Importantly, the HIV/Aids prevalence of these new recruits is also likely to match regional and national averages. The typical employment equity legislation in most Southern African countries contains specific references to the need to eliminate discrimination based on race, gender, religion and HIVstatus (Whiteside 1999a). It would be illegal for employers to screen potential recruits for their HIV status prior to employment, in an attempt to employ new staff members that are not HIV-positive (Ashton 2000).

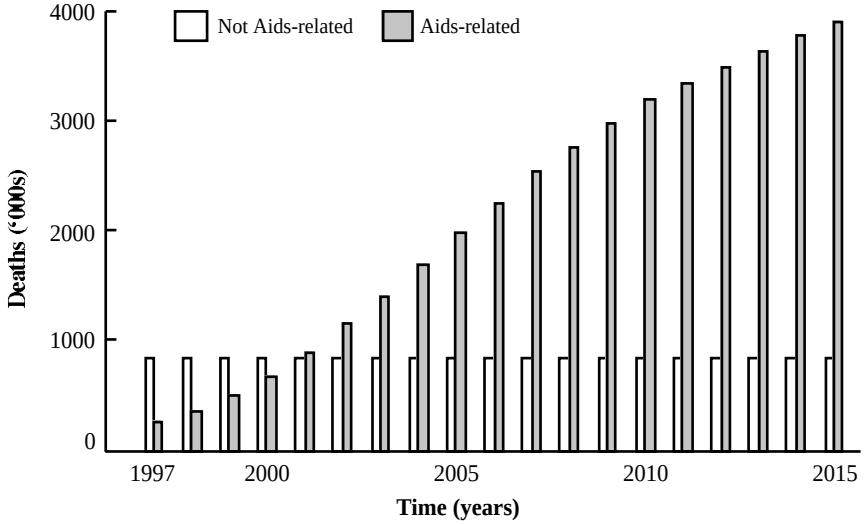
The projected increase in employee turnover at all levels that can be attributed to HIV/Aids mortalities of between 30 and 50% will be accompanied by an increased demand for training to ensure that vacant posts are filled in a timely manner with appropriately trained individuals. Failure to provide adequate training will result in decreased productivity and, in extreme cases, could lead to unsafe work practices or costly delays. Clearly, this need for increased training should be anticipated in good time so that sufficient numbers of trainers and adequate training materials are available when needed (Ashton 2000). With a poor understanding of the HIV/Aids prevalence in the workforce, employers are hindered in anticipating changes and managing the situation by not knowing the extent of the problem.

The projected Aids deaths in a South African workforce (1997-2015) are expected to increase so that, by 2015, almost four times as many deaths will occur than normal (figure 6; LoveLife, 2001). While some companies may be able to operate with a lower staff complement, most companies will need to replace HIV-infected staff, leading to a high annual turnover rate. The exact numbers of staff who will be affected annually will be dependent on the HIV prevalence in the workforce and the disease progression in the individuals concerned. Recent estimates suggest that staff will leave the workforce six to seven years after infection (Rosen et al 2000). In addition, risk modification attempts by the company and the degree to which work processes have been planned to take HIV infection into account will alter the turnover rates and associated costs of the epidemic.

Although data on infection levels in the workforce is scarce, and workforce profiles may change in time, the number of employees lost to Aids over the next decade could be equivalent to 40 to 50% of the current workforce in some companies. By 2010, it is estimated that approximately 15% of all highly skilled employees will have contracted HIV.



*Figure 6: Estimates of Aids-related and non-Aids deaths in the South African workforce between 1997 and 2015*




Source: Redrawn from figure 5, LoveLife (2001).

The projected need for increased training can be extended further, for example, to those who are employed at water treatment works and sewage treatment works (Ashton 2000). These individuals also occupy vulnerable socio-economic strata in society and would presumably also reflect similar statistics for HIV/Aids prevalence and mortality rates. In other words, if similar patterns of HIV/Aids prevalence and mortality also apply to the operators of water treatment works, it can be expected that some 30 to 50% of these individuals will also to be affected by HIV/Aids.

Clearly, operators of water treatment works and sewage treatment works are not the only sector of a national workforce who would be affected. Nevertheless, this group has been singled out as it fulfils a critical role in the management of water resources and the provision of wholesome water supplies for domestic and industrial use. An increased turnover of operators at water treatment works and sewage treatment works of between 30 and 50% will also need to be matched by a corresponding increase in the training of replacement operators (Ashton 2000). If this specific need for increased training is not met in time, the performance of these treatment plants will suffer. In turn, this will lead to periodic, or perhaps more frequent declines in potable water quality and a concomitant increase in health-related problems for water users (Ashton 2000).

## Decline in productivity

Workers who are infected with HIV/Aids provide the most obvious cause for a decline in productivity. HIV-positive workers with impaired immune systems are more susceptible to common illnesses such as tuberculosis, influenza, common colds and gastro-enteritis

(Whiteside 1999a; World Bank 1999; Crewe 2000; UNAIDS 2000a; 2000b), as well as other more serious diseases such as malaria and bilharzia (Ashton 2000). Increased levels of illness will naturally result in increased requests for sick leave or, if these workers remain in the workplace, they will not be able to perform their duties to their full ability (UNAIDS 2000a). The net result is a decline in worker productivity.

It is almost impossible to provide any accurate predictions of the degree of lowered productivity in this type of situation (Whiteside 1999a). However, a crude estimate can be based on the prevalence of HIV/Aids among workers: if some 30% of a workforce are HIV-positive, their productivity will decline progressively during their illness, from being fully productive at the onset of HIV/Aids until they are simply unable to continue working. Given the provisions of typical employment equity statutes, employers will not be allowed to discriminate against such workers (Heywood 1999; Smart & Strode 1999). Instead, additional replacement workers will need to be employed to fulfil the functions of the sick workers during the tenure of their illness or during treatment sessions (Heywood 1999; Ashton 2000; Whiteside & Sunter 2000).

A second possible cause for a decline in productivity relates to workers who need to care for relatives and family members who may be infected with HIV/Aids, or to attend the funerals of those who have died as a result of HIV/Aids (Ashton 2000; UNAIDS 2000a; 2000b; Whiteside & Sunter 2000). Virtually every African society firmly embraces the concept of the 'extended family', where family-type relationships exist, for example, between men of the same circumcision group, or men and women of the same tribal clan. In each of these examples, all the members of a group consider themselves to be related to one another and are able to call on the other for support and help in time of need. This is also clearly applicable to blood relatives and relatives by marriage.

Given the anticipated high levels of HIV/Aids mortality within a typical construction workforce, frequent attendance of burial services would lead to a marked decline in the number of workdays per year that an employee would be present on any particular job. This would result in a corresponding decline in productivity and, in turn, could lead to serious delays in construction programmes (Heywood 1999; Ashton 2000; Morris & Cheevers 2000). Importantly, the general uncertainty caused by inaccurate estimates of HIV/Aids prevalence has resulted in widely different estimates of possible productivity losses in the business sector. In turn, these inaccurate or 'unbelievable' estimates have often prompted inappropriate or inadequate responses (Michael 2000).

In addition to lost productivity and increased recruitment costs, employers may also have to carry the additional costs of treatment for opportunistic diseases, funeral expenses and benefit payments. Indeed, the move by companies such as Anglo American to provide antiretroviral treatment may set a precedent that forces other employers to provide similar services for their employees. The greater costs to employers may be passed on to the consumer via increased costs of services, or to the employee via lower wage income and shorter term contracts.

### *Increased vulnerability to water-borne diseases/susceptibility to water quality problems*

A decline in the numbers of trained operators at water treatment works and sewage treatment works is likely to be accompanied by periodic deterioration in the quality of potable water supplies in urban and rural centres. The basis for this assertion lies in two interlinked issues:

- First, an increased incidence of HIV/Aids among the operators of water treatment works will increase the likelihood that water treatment processes may periodically be incomplete or ineffective.
- Second, there is a probability that inefficient or ineffective water treatment will increase the risk of adverse health effects in water users.

Clearly, this scenario does not have be restricted to urban and peri-urban areas that are served by extensive water reticulation systems. The scenario could also apply in rural areas where communities or households receive treated water, or where residents draw water directly from rivers and streams that may be contaminated by incorrectly treated effluent that is discharged from upstream sources. The health risks to these communities would be compounded if any community members were HIV-positive and their immune systems already compromised. Indeed, the immune systems of HIV-positive people are susceptible to a wider range of common illnesses and diseases than individuals whose immune systems are not compromised by HIV/Aids. HIV-positive individuals are therefore likely to have a greater requirement for 'clean'water than their uninfected (HIV-negative) neighbours (Ashton 2000). Families caring for sick members may have less time to collect 'clean' water or treat 'unclean' water, thereby exposing themselves to greater risks. As the population becomes more vulnerable because of HIV/Aids, people will become aware of the value of clean water and suppliers of water and sanitation services may be pressured to increase rates of delivery.

This situation could worsen if the incidence of water-borne diseases increases. For example, discharges of incompletely treated sewage effluent could lead to increased outbreaks of disease attributable to the organisms *Giardia* and *Cryptosporidium*. Both organisms cause extremely debilitating diseases in humans and their adverse effects would be far worse in HIV-positive individuals. While both HIV-positive and HIV-negative individuals would experience increased health risks that would cause a general decline in productivity, the impact significance is likely to be the greatest in HIV-positive individuals (Ashton 2000). A similar increase in the incidence of other (bacterial) water-borne diseases such as cholera can also be expected in these circumstances (UNAIDS 2000a).

The ecological consequences of impaired water quality are closely allied to the human aspects of this scenario and discharges of incompletely treated effluent will have a range of adverse effects on aquatic ecosystems. The adverse effects will be worse in those aquatic ecosystems that receive proportionately larger quantities of incompletely treated effluent. In consequence, the aquatic ecosystems will provide fewer 'ecosystem goods and services' (such as food, building materials and medicinal plants) to the users of such services (Falkenmark 1999; FAO 2000b). Ultimately, these ecosystem services would become stressed by the demands made upon them and may then collapse (Ashton 2000).

### *Possible contamination of ground water resources*

To date, there remains a pervasive and widespread sense of 'shame' associated with HIV/Aids sufferers. In many cases, family members are very reluctant to admit to relatives, friends and colleagues that one or more members of the family are HIV-positive. In the past, this situation has been aggravated by the violent reactions of friends and

neighbours to the news that one of their friends or colleagues has HIV/Aids or has died as a direct or indirect result of HIV/Aids. In some cases, reactions have escalated to the point where surviving family members may be driven out of the community or, in extreme cases, erstwhile friends and relatives have even killed HIV/Aids sufferers who admitted their illness (Jackson 1999). To avoid confrontation, family members often attribute the death of a relative to a cause other than HIV/Aids. In many cases, this is supported by the fact that the individual concerned may well have been infected with other opportunistic illnesses such as tuberculosis or cholera. Unfortunately, this situation also contributes to reducing the accuracy of HIV/Aids prevalence and mortality estimates (Ashton 2000).

One of the unintended consequences of the so-called 'legacy of shame' that attaches to HIV/Aids victims is that family members also feel a deep sense of personal shame and sometimes do not announce the death of their relative publicly. Where this happens, the feeling of shame has sometimes driven families to bury their dead relatives in so-called 'unofficial' graveyards with few of the normal rituals and ceremonies. While this situation can disrupt the social fabric of communities and can also aggravate or prolong the feeling of shame in affected families, there may also be further unanticipated side-effects. An example of this is the possibility that inappropriately sited unofficial graveyards could lead to contamination of local ground water that is used as a community water supply. Clearly, the health risk in this situation is not one of possible transmission of HIV to ground water; that is impossible. Instead, it is linked to increased nutrient levels and bacterial contamination from graves entering nearby ground water systems (Engelbrecht 1998). If nearby communities rely on boreholes or wells to supply potable water from shallow aquifers, this could also lead to potential health risks for these communities (Ashton 2000).

While there are a few anecdotal records of instances where unofficial graveyards have been located on or near to shallow aquifers, it is not possible to provide a quantitative estimate of the extent to which this situation has occurred. Nevertheless, given the prevailing public abhorrence of HIV/Aids and the high-profile media reports of instances where HIV/Aids sufferers have been rejected by their families and communities, an increase can be anticipated in such instances in future (Ashton 2000).

A further, unanticipated effect of unofficial graveyards is that other development options (roads, houses, cultivation) for these sites are very often precluded by the presence of a grave. Whatever their legal status, graveyards take on a special, sanctified significance in society that very often prevents the land in question from being used for alternative purposes. Nevertheless, even if the stigma of HIV/Aids is removed, cultural practices of burial will still lead to an increased demand for gravesites. With limited land resources, it is likely that unsuitable ground will be used in some instances.

## Current responses to the implications of HIV/Aids in the water resource management arena

Every Southern African country faces the truly daunting prospect of dealing with the devastating effects of HIV/Aids on every sector of its society. However, individual countries have responded to the pandemic in widely different ways to date. These responses cover a range from relatively small-scale reactions by individuals and communities, but with little formal government support (in Zimbabwe; see Kerkhoven & Sendah 1999), to concerted, organised and integrated programmes involving international, national and local authorities and organisations, as well as communities and concerned individuals (Swaziland and Zambia; see Whiteside 1999b; Jackson 1999). Countries such as Angola and the Democratic Republic of Congo appear to be preoccupied with resolving their respective civil wars and seem unable to deal with the threats posed by HIV/Aids at this time.



While the scale and variety of the responses reflect the wide array of concerns expressed by governments, communities and individuals, the primary focus in each country appears to be one of dealing with the specific problem areas within such a country. Indeed, regardless of the level of response that the pandemic has elicited in individual countries, there is little evidence of concerted, region-wide programmes of action. The absence of cohesive, region-wide programmes of action also reflects the widespread differences of opinion that exist regarding the responsibilities and roles of individuals, communities, governments, aid organisations and the private sector. While individual businesses, companies, organisations and sections of government departments have started to implement programmes of action to remedy impacts that have already affected their spheres of business, others seem to be waiting for their respective governments to initiate formal (national) programmes of action.

In the water resource management arena in Southern Africa, there is very little in the way of a concerted response to the array of threats posed by HIV/Aids. A few key government departments that deal with water-related issues have initiated calls for national and regional assessments of the implications of HIV/Aids for their activities. Similarly, certain of the larger water utilities have realised that they face decreased worker productivity and therefore an array of associated cost increases, as well as increased staff turnover and hence an acute need for additional training programmes. At a more general level, industry, business and governments are increasing their educational efforts to enhance worker awareness of HIV/Aids and its main modes of transmission, as well as providing counselling services for infected victims and their families. In addition, national government departments in most Southern African countries have embarked on intensive educational campaigns to promote public awareness of HIV/Aids and its dangers for individuals, communities and society.

A variety of associated activities launched by government departments in some Southern African countries have a direct bearing on the linkages between HIV/Aids and the water sector, and the vulnerability of poor people to HIV/Aids. Examples are the efforts to provide poor rural and urban communities with safe supplies of drinking water and sanitation services in Mozambique, Namibia and South Africa. Originally, these programmes sought to alleviate historical disadvantages experienced by these communities as a result of previous political dispensations and to reduce the risks of water-borne diseases such as cholera. Fortunately, these programmes also help to reduce the risk that people infected with HIV/Aids will be exposed to poor quality water. As a result, there are likely to be considerable indirect benefits in terms of reduced worker absenteeism due to illness, reduced infant, child and adult mortality due to disease, and a reduction in potential losses in national productivity. In summary, while most of the current Southern African responses to the HIV/Aids pandemic appear, individually, to hold great promise, they seem to lose much of their impact because they are fragmented

and seldom enjoy the benefits and advantages of integration within national or regional programmes.

## The road ahead

It is now widely accepted that HIV/Aids is a true development crisis that threatens the social and economic fabric, as well as the political stability, of entire nations (UNAIDS 2000a). Nowhere does this statement appear to be truer than in the countries of Southern Africa. However, there is good evidence that the pandemic is not out of control everywhere. Some African countries have managed to stabilise or reduce their HIV infection rates, while others have maintained low HIV/Aids prevalence rates. In yet other countries, significant progress has been made in community and individual programmes for the care and support of victims and their families (UNAIDS 2000a; Whiteside & Sunter 2000). Changes in the behaviour of individuals and communities, together with the improved accessibility of commodities and services, as well as reduced discrimination based on gender and improved human rights, have all been critically important factors that contributed to these successes. Importantly, the social and economic roots to people's vulnerability to HIV/Aids have been recognised and are being acted upon (UNAIDS 2000a; Williams et al 2000b).

Successes achieved elsewhere in Africa (Uganda; see UNAIDS 2000a) have provided extremely useful insights into possible approaches to combat HIV/Aids in Southern Africa. Clearly, no single 'ideal response'or 'universal blueprint'is likely to emerge as the preferred option for controlling or reducing the prevalence of HIV/Aids and its impacts on society. Instead, a number of basic common principles of effective responses can be identified (UNAIDS 2000a). These should form a basis for the design and implementation of locally relevant strategies in each country. Importantly, these strategies should be integrated into a single cohesive unit within each country and, ideally, within the Southern African region. Each sector of society will need to be closely involved in and committed to the execution of its own (national) programme, as well as its share of the overall (regional) programme.

The urgency and severity of the current situation in Southern Africa make it imperative that immediate, concerted actions are undertaken to provide reliable estimates of the prevalence of HIV/Aids, as well as the numbers of people who succumb to the disease or die from illnesses associated with an impaired immune system. This should be coupled with concerted actions aimed at supporting and strengthening national initiatives designed to reduce the spread of HIV/Aids, and inducing the widespread and sustained behavioural changes that will be required to achieve this.

Water resource managers will need to develop accurate forecasts of the demographic spread of water demand across the sub-continent and work closely with their counterparts in neighbouring states to improve regional water resource management approaches. Simultaneously, water supply utilities in each country will need to continue expanding and extending their water supply networks to meet national demands for water. Particular attention will need to be paid to ensure that poorer communities, who experience difficulty in paying for service delivery, receive assured water supplies.

Within the water sector, there is a clear need to develop, test and implement robust and reliable water treatment processes that do not require constant supervision or management



interventions. These would help to reduce the potential health risks associated with ineffective water treatment that can be expected as a result of increased mortality of operators of water treatment works. In addition, the water sector can help national efforts to expand public awareness of the dangers associated with untreated water and inadequate personal hygiene practices. Further, the sector can actively promote and adopt training schemes designed to increase the numbers of skilled and semi-skilled workers required to manage the region's water resources.

The regional situation will only start to improve when every society and national population comes to terms with the scale and severity of the HIV/Aids problem in Southern Africa and this increased awareness results in appropriate social, cultural, behavioural and institutional changes. The tragic consequences of a failure to act, or of acting either inappropriately or too late, are already visible in many parts of Southern Africa and elsewhere on the African continent. Speedy and concerted implementation of appropriate responses is the only way in which the ravages of HIV/Aids can be checked and contained, and its potential impacts reduced. Success in this endeavour depends on the full co-operation and collaboration of every individual, community, organisation and national government in Southern Africa.

## Note

Sincere thanks are due to Dr Barbara Heinzen and Professor Alan Whiteside for providing several constructive suggestions that improved an earlier draft of this chapter.

# PART V: CONCLUSION

# Chapter 17
# The expanded concept of hydropolitics: Towards a new research agenda for Southern Africa

**Anthony Turton**

## Introduction

In the introduction to this book, it was said that the study of hydropolitics as it is currently practiced – with its main emphasis on conflict between states in a shared river basin – is in fact too narrow to reflect Southern African situations accurately. For this reason, a case was made for widening the concept. A definition was offered in which hydropolitics is seen as the study of the authoritative allocation of values in society with respect to water. The introduction also suggested that two new elements are essential in extending the definition of the term. The first is the element of *scale*, ranging from the individual to the international level. The second is that of *range*, with a wide spectrum of potential issue-areas having been identified. The rest of the book has dealt with some of these issues in more detail. What remains is the generation of a research framework that can be used to develop these ideas further in an attempt to create a knowledge base that can serve the needs of the decision-making élite and other water sector roleplayers in Southern Africa.

## Towards a new research agenda

The different chapters in this book have dealt in some detail with a variety of issues in a way that has expanded the concept of hydropolitics both in terms of scale and range. However, the examples that were used by no means reflect the final word on the matter. Instead, they should be seen as representative samples of a wide variety of issue-areas that are becoming relevant to SADC, national governments within the Southern African region, and roleplayers such as communities, river basin authorities, interest groups and others. In other words, the reader should feel free to develop and identify other examples of both scale and range. What has been offered is merely the starting point of a long journey, rather than the final destination.

In order to keep this study systematic and scientifically valid, it is necessary to dwell for a few moments on the development of a viable research agenda. By taking the issues that have been raised in this book and analysing them systematically, particularly by means of the scale and range dimensions, three main clusters can be isolated. While there may well be more, these three clusters can serve as a starting point as they currently represent the more important hydropolitical research concerns in Southern Africa. It is also important to note that the intention with this analysis is to show the scale and range within each cluster, as there are distinct variations. This is obviously not a clear-cut issue and different scholars may have different opinions about the allocation. What is significant, however, is that the research methodology and epistemology will differ from issue to issue, as well as in terms of scale.

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## Economic cluster

The economic cluster consists of a conglomeration of issue-areas that primarily have an economic impact. The focus of research needs within this cluster is mainly at the strategic level of analysis, but given the element of scale, the impact of these issue-areas ranges from the individual right through to the international level. Six key areas can be represented in terms of the range dimension:

- *Food security* is a strategic issue of great importance in Southern Africa. In fact, it could easily be argued that some countries in Southern Africa such as South Africa, Botswana, Namibia and Zimbabwe, are only water scarce if each chooses a strategy of national self-sufficiency in food. This would mean a massive mobilisation of water for agriculture. If food security is practiced instead, water stress can be managed and political stability and economic growth can be ensured. This is one of the key issues that will be debated at the 3rd World Water Forum in Japan in 2003, and will probably also become an issue that is discussed at the World Summit on Sustainable Development (WSSD) in 2002 in South Africa. Attention is already being given to this in the World Water Vision (Cosgrove & Rijsberman 2000; Van Hofwegen & Svendsen 2000). This issue therefore forms a natural starting point for research. Figure 1 shows that the main emphasis of research is on the national scale, but the issue impacts all the way from the regional to the individual level.
- *Water for the economy* is also a strategic issue. Central to this issue is the use of water for the generation of economic activity within a given political economy. This links closely to other issue-areas such as food security, interbasin transfers (IBTs) of water, poverty, sustainable development and others. Figure 1 shows that the main emphasis of research is at the national scale, but the issue impacts all the way from the international competitiveness of any given state to the individual level.
- *Interbasin transfers* are also a strategic level issue. Given the maldistribution of precipitation when expressed in terms of human population and development needs, IBTs are a reality in Southern Africa. They are also linked with large dams, which are currently a contentious issue (WCD 2000). IBTs can be seen in abstract terms as the linkage between spatial and temporal variations in precipitation and the spatial variation in population distribution and economic activities (Turton 2000b). As such, IBTs are set to become strategically more important in Southern Africa in future, probably extending across international borders and therefore linking river basins, states and political economies. IBTs impact on a variety of other issue-areas such as the environment, sovereignty, international law and sustainable development. Figure 1 shows that the main emphasis of research is on the basin scale, but the issue impacts all the way from the regional to the community level.
- *Sectoral allocation of water* becomes increasingly important as river basins reach closure. In this regard, closure occurs when all the available water has been allocated to some productive activity or other and there is no more water left to be allocated (Svendsen et al 2000). When this occurs, robust institutions must be in place to manage the conflict potential that can occur. This in turn places pressure on the second-order resources that are available (Ohlsson 1999; Ohlsson & Turton 1999f; Turton 2000b; Turton & Ohlsson 1999). Sectoral allocation also impacts IBTs, food security, economic activity and other issue-areas such as the environment and sustainable development. Figure 1 shows that the main emphasis of research is on the national scale, but the issue impacts all the way from the national competitiveness of a given state to the community level.
- *Virtual water* (Allan 2000a) is a strategic issue that is becoming increasingly important for Southern Africa. Water scarcities exist at the level of the river basin, whereas the remedy can be found in the international trade of water-rich cereals. This touches on other issue-areas such as food security, economic growth, sectoral allocation, IBTs and sustainable development. There is a strong economic research element to this issue, and economists have to be mobilised to address the problem and develop the necessary knowledge. Figure 1 shows that the main emphasis of research is on the national scale, but the issue impacts the international to the basin level of analysis
- *Sustainable development* is a hotly debated issue that lies at the very heart of the north/south divide. Water is central to this debate, which is linked to a host of other issue-areas such as poverty, food security and ecological conditions. This will be the focal point of the WSSD, as well as a component of the 3rd World Water Forum. Figure 1 shows that the main emphasis of research is on the national scale, but the issue impacts all the way from the international to the individual level.

Other issue-areas also exist in this category, but have not been addressed in this book.

If this range of issues are plotted on a matrix, the scale at which they are mostly relevant becomes visible (see figure 1).



## Legal/institutional cluster

The legal/institutional cluster consists of a conglomeration of issue-areas with a primarily institutional focus. As institutions are based on rules and agreements, they also have a legal dimension. For this reason, the two components of the cluster are law and institutions. Central to this is the role of second-order resources (Ohlsson 1999; Ohlsson & Turton 1999; Turton 1999f; Turton & Ohlsson 1999) or what Homer-Dixon (1995; 2000) refers to as social and technical ingenuity. Linked to this is the capacity for political agreement versus the capacity for political discord (Heinzen 2002). Six key issue-areas can be identified in terms of the range dimension:

*Figure 1: Economic cluster showing scale and range of issues*

| **Scale** | **Range** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Food security** | **Water for the economy** | **Interbasin transfers** | **Sectoral allocation of water** | **Virtual water** | **Sustainable development** | **OTHER** |
| International | | Yes | | Yes | Yes | Yes | ? |
| Regional | Yes | Yes | Yes | Yes | Yes | Yes | ? |
| National | **Main** | **Main** | Yes | **Main** | **Main** | **Main** | ? |
| Basin | Yes | Yes | **Main** | Yes | Yes | Yes | ? |
| Provincial | Yes | Yes | Yes | Yes | | Yes | ? |
| City | Yes | Yes | Yes | Yes | | Yes | ? |
| Community | Yes | Yes | Yes | Yes | | Yes | ? |
| Family | Yes | Yes | | | | Yes | ? |
| Individual | Yes | Yes | | | | Yes | ? |

- *International law* is important because it determines the technical dimension and normative basis on which agreements are reached between states. Figure 2 shows that the main emphasis is at the international scale, but it does have impact on the basin level if such a river basin is shared between two or more riparian states. There is no real impact below this scale.
- The *SADC Protocol* is also important because it is the basis of regional co-operation in the Southern African water sector. If coal and atomic co-operation was the basis of European integration, then water can also become the basis for Southern African regional integration. As such, the SADC Protocol can be seen as the foundation for functional integration and not simply a water-sharing agreement. Figure 2 shows that the main emphasis is at the regional scale, but the impact is felt down to the national and river basin level if such a basin is shared between two or more riparian states. There is no real impact below this scale.
- *Institutions* are a crosscutting issue, impacting on a wide scale, particularly if technical co-operation in the water sector leads to other functional integration within SADC. Figure 2 shows that there is no real main scale of impact, but clearly the type of institutions that are suited to manage water at the international level are fundamentally different from the type of institutions that are suited to manage community-level resources. In this regard the work by Ostrom (1990) is illuminating. Research into integrated water resource management (IWRM) will best fit into this category.
- *River basin organisations* (RBOs) are fundamental components of the World Water Vision (Cosgrove & Rijsberman 2000). One of the key elements that is becoming increasingly important is that of financing such organisations (Nicol et al 2001), with this issue likely to be centrally discussed at the WSSD and 3rd World Water Forum. Figure 2 shows that the main focus is at the basin scale, but the impact ranges from the regional to the community level.
- *Catchment management agencies* (CMAs) are a component of RBOs. They represent a new set of institutions designed to reinforce democracy that have been created in South African water law. They encompass the central issue of subsidiarity that is part of the World Water Vision (Cosgrove & Rijsberman 2000; Nicol et al 2001), making them relevant to the whole of SADC and not just to South Africa. As this is embodied in the Dublin Principles (ICWE 1992), which in turn are a component of Agenda 21, this issue is likely to emerge again at the WSSD and 3rd World Water Forum. Figure 2 shows that the main focus is at the sub-basin scale but the impact ranges from the national to the community scale.
- *Water demand management* is an important issue that is related to sustainability. It becomes increasingly important as basin closure is reached, which is the case in many Southern African river basins, particularly in the more developed countries of the region. The knowledge base of water demand management is relatively weak in a Southern African context, and substantial research is needed on this issue. It is also linked with other issues such as virtual water, IBTs and institutions. Figure 2 shows that the main focus is at the basin level, but it impacts at various scales ranging from the national to the individual level. National research priorities would focus on issues that would differ from community research priorities, and methodologies and epistemologies would consequently also be widely variable.



*Figure 2: Legal/institutional cluster showing scale and range of issues*

| **Scale** | **Range** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **International law** | **SADC Protocol** | **Institutions** | **River basin organisations** | **Catchment management agencies** | **Water demand management** | **OTHER** |
| International | **Main** | | Yes | | | | ? |
| Regional | Yes | **Main** | Yes | Yes | | | ? |
| National | Yes | Yes | Yes | Yes | Yes | Yes | ? |
| Basin | Yes | Yes | Yes | **Main** | **Main** | **Main** | ? |
| Provincial | | | Yes | Yes | Yes | Yes | ? |
| City | | | Yes | Yes | Yes | Yes | ? |
| Community | | | Yes | Yes | Yes | Yes | ? |
| Family | | | | | | Yes | ? |
| Individual | | | | | | Yes | ? |

Other issue-areas also exist in this category, but that have not been addressed in this book.

If this range of issues are plotted on a matrix, the scale at which they are mostly relevant becomes visible (see figure 2).

## Social cluster

The social cluster consists of a conglomeration of issue-areas with a primarily social focus. Linked to this cluster are ecological issues, which form another important cluster. Given that this book is about hydropolitics (or the authoritative allocation of values in society with respect to water), ecological issues are included in the social cluster. One of the main manifestations of ecological issues within a study of hydropolitics is the interaction between water for people versus water for ecosystems. For this reason, the two components of the cluster are seen as social and ecological. Four key issue-areas can be identified in the range dimension:

- *Poverty* is a complex issue that clearly has significant ramifications for Southern Africa. It ranges from the individual to the international scale in the sense that poverty impacts on the international competitiveness of a state, while also providing pull and push factors for migration, often across international borders. For this reason, it is difficult to define a main focus for research. It is also obvious that research methodologies would differ according to the scale that has been selected by the researcher. Poverty also has strong linkages with other issues such as HIV/Aids and sustainable development, which in turn has ecological implications. Figure 3 shows the spread of focus with no discernable main level.
- *HIV/Aids* is also a complex issue with a limited knowledge base in the water sector. As with poverty, it is difficult to determine one main focal area, which is evident from figure 3. It could be argued that it is primarily at the level of the individual that behaviour is going to change, making this the main focus, but this is only possible if a national strategy is in place to deal with the pandemic. This is an extremely important research area with virtually no research having been executed that focuses on hydropolitics so far.

*Figure 3: Social cluster showing scale and range of issues*

| Scale | Range | | | | |
|---|---|---|---|---|---|
| | **Poverty** | **HIV/Aids** | **Gender** | **Ecology** | **OTHER** |
| International | Yes | Yes | Yes | Yes | ? |
| Regional | Yes | Yes | Yes | Yes | ? |
| National | Yes | Yes | Yes | Yes | ? |
| Basin | Yes | Yes | Yes | Yes | ? |
| Provincial | Yes | Yes | Yes | Yes | ? |
| City | Yes | Yes | Yes | Yes | ? |
| Community | Yes | Yes | Yes | Yes | ? |
| Family | Yes | Yes | Yes | Yes | ? |
| Individual | Yes | Yes | Yes | Yes | ? |

- *Gender* is closely linked to the water sector via the Dublin Principles (Turton et al 2000b). As such, it forms a vertical link from the international scale that impacts right the way down to the level of the individual. It has a central role in institutional development and river basin management, and will also be relevant at the level of CMAs. In keeping with the other elements of range in the social cluster, it is difficult to determine a primary focal point, as shown in figure 3.
- *Ecological issues* have become socially relevant, particularly in the context of developing countries, as a result of the debate on sustainable development. As this is central to the WSSD process, it will receive substantive attention during the WSSD and 3rd World Water Forum. The issue of water for people (social and economic) versus water for the environment will be a central debating point. At the hydropolitical level, it embraces contentious issues such as the north/south divide, but is also manifest at the subnational level as the focal point of resource capture and the ecological marginalisation of communities (Homer-Dixon 1991; 1994a; 1994b; Homer-Dixon & Percival 1996; Percival & Homer-Dixon 1995; 1998; Ohlsson 1999; Turton 2000b). Due to the wide range of focal areas and impacts, it is difficult to determine one main focal area, as shown in figure 3. This is a rich area for aspirant researchers as it covers many crosscutting issues.

Other issue-areas also exist in this category, but have not been addressed in this book.

If this range of issues are plotted on a matrix, the scale at which they are mostly relevant becomes visible (see figure 3).

## Quo vadis?

Having isolated these three main clusters, a course can be plotted for hydropolitical research in the context of Southern Africa. In this regard, a few points need to be highlighted:

- This is not an exhaustive list. More issues exist that are not mentioned, but that are identified by some scholars as important. For this reason, the 'other' category has been left open in all three clusters. The issues that have been selected, are regarded as important in Southern Africa at this moment in time.
- It is also clear that a researcher could select an issue, as well as the level of scale on which to focus. The main thrust of this book attempted to focus on this possibility. Research methodologies and epistemologies will therefore vary from issue to issue in terms of range, and from level to level in terms of scale. There is no universal methodology to apply and multidisciplinarity is often the best approach.
- Special attention is drawn to the apparent absence of a specific focus on integrated water resource management (IWRM) as an issue on its own. While IWRM is a current buzzword in the water management discourse, the notion implies integration and therefore cross-linkage within an institutional setting. As a result, IWRM touches upon so many of the specific issue-areas both in terms of range and scale that it is difficult to locate it at any one specific portion of the matrix. It seems to be best suited to an institutional form of analysis. However, its absence does not mean that IWRM is unimportant.
- The issue of conflict is important within the field of hydropolitics, but a closer examination of the three clusters will show that it is not the main focus in Southern Africa. The extended concept of hydropolitics as the authoritative allocation of values in society regarding water is therefore useful. It is hoped that it will be taken up by other scholars and researchers, and developed further though rigorous testing in different research venues and on a variety of issues and scales.

The development of a second book to form a series is therefore envisaged. This book can be seen as a first volume containing a critique of the existing focal point of mainstream hydropolitical writing (conflict in international river basins). It has developed an alternative definition and has made a case for extending and deepening the concept of hydropolitics. Central to this process are the two key elements of range and scale. Examples have been offered by the contributors to this book, illustrating these two aspects of hydropolitics. Consequently, the second volume will be dedicated to a set of case studies to develop these central themes further in a systematic way.

## Conclusion

The first region in the world to run into water deficit is the Middle East North Africa (MENA) region (Allan 2000a). This has a significant impact on the political stability of the region, and is becoming a limitation to the economic growth potential of each state. The second region in the world where this seems to be happening is Southern Africa, but at least a quarter of a century later than in the MENA region. Valuable lessons can be learned to ensure that the Southern African experience becomes a peaceful transition with a smooth landing. Unfortunately, it takes about 25 years to change behaviour, as the MENA case has shown (Allan 2000a). Researchers have a major role to play in this process and possibly in accelerating the outcome. This book is an attempt to show that hydropolitics is a growing discipline in its own right. The prevailing definition is seen as too narrow, and a widening of the concept has been proposed. Linked to the widening of the concept are the two essential elements of scale and range. Using this approach, a research agenda has been developed that is based on priorities relevant to contemporary Southern Africa. It is sincerely hoped that this will add some value to the efforts of the SADC Water Sector.

This book is offered as an example of the African Renaissance, a contribution to the efforts to solve African problems by means of African solutions.

# PART VI:
# BIBLIOGRAPHY

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