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Editorial: Setting the Scene—Hydropolitics and the Development of the South African Economy

ANTHONY R. TURTON, MARIAN J. PATRICK & JEANETTE RASCHER
The Council for Scientific and Industrial Research (CSIR), Pretoria, South Africa

South Africa is a complex country with a history that is as rich as it is convoluted (Van Vuuren *et al.*, 2007). Significantly, it has an industrialized economy, and is also one of the most economically diverse, water-scarce countries in the world, its population having adapted well to the largely semi-arid climate. This fact, in addition to the fundamental vulnerabilities that characterize South Africa's aquatic ecosystems, needs to be understood by the new generation of water resource managers if they are to engage successfully in sustainable and effective water management. A defining feature of South Africa is that it is part of a region that has the lowest conversion of mean annual precipitation (MAP) to mean annual runoff (MAR) in the world, a characteristic shared only with Australia (McMahon, 1979; O'Keeffe *et al.*, 1992). The continental average for the conversion of MAP to MAR is 20%, i.e. one-fifth of the water that falls as rain eventually ends up as streamflow, a fact that is skewed because of the tropics at the centre of the continent. Most of the southern African region ranges from 10% to 15% MAP to MAR conversion, while the rest falls considerably below this key-defining ratio. Rivers with such a low conversion ratio are known as ephemeral streams and are episodic in nature with unique ecosystems and management challenges of their own (Jacobsen *et al.*, 1995; Pallet *et al.*, 1997; Seeley *et al.*, 2002). In the case of South Africa, economic growth and development is fundamentally constrained by water resource availability as the country only has an average annual precipitation of 480 mm. This is a startling fact when one takes into account that in 2004 approximately 98% of the national water resource had already been allocated at a high assurance of supply level (NWRS, 2004). This situation leaves little margin for error if sustained economic growth is to be the norm in future.

The southern African region is also characterized by development that is spatially skewed; indeed, it has two distinct features that make it globally unique in this regard. First, all of the development requiring water is found in areas far removed from the rivers that support them. This geographic disconnect between water resources and the economic development that sustains the population has given rise to the need for complex inter-basin

Correspondence Address: Anthony R. Turton, CSIR-Natural Resources and the Environment, P.O. Box 395, Pretoria 0001, South Africa. Email: aturton@csir.co.za

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transfers (Basson, 1995; Snaddon *et al.*, 1999; Basson *et al.*, 1997; Heyns, 2002, 2003; Turton, 2000; Blanchon & Turton, 2005). Second, all of the major cities or centres of development in the region are not located on a river, lake or seafront, but rather on a watershed (Turton *et al.*, 2006). As a result, cities such as Johannesburg, Pretoria, Gaborone, Francistown, Bulawayo, Harare and Windhoek all straddle watersheds or are found just off the edge of a watershed. This raises issues of vulnerability, often not appreciated, because water needs to be pumped at great cost to sustain the populations and economies of these cities. The Gauteng province of South Africa, for example, within which Johannesburg and Pretoria are located, produces 10% of the economic output of the entire African continent, is home to 25% of the South African population and is 100% dependent on inter-basin transfers (Basson *et al.*, 1997; Turton *et al.*, 2006). This staggering fact also means that South Africa's major centres of development lie upstream of the sources of drinking water, which means that the management of return flows becomes a significant challenge in its own right. Again, this point raises key vulnerability-related issues that are often not understood.

South Africa has a history of contestation, violence and hegemonic domination. Indeed, many of the countries that constitute the region were forged during a wave of great political violence that rolled across the Highveld. This event was known as the *Mfecane*, which saw what is today called ethnic cleansing take place on a massive scale during the first quarter of the 19th century and span areas as far afield as Malawi, Zambia, Zimbabwe and Tanzania (van Jaarsveld, 1975; Thompson & Lamar, 1981; Edgecombe, 1986; Davenport & Saunders, 2000; Welsh, 2000; Turton *et al.*, 2004). It was this event that laid waste the vast hinterland of South Africa, leaving it open to the settlers from the Cape who embarked on the Great Trek in the 1830s and 1840s. This expedition gave rise to the first two Westphalian States in the region, the Orange Free State and the South African Republic (also known as the Transvaal), known collectively as the Boer Republics. It was in these two sovereign and independent states that gold was discovered in 1886, sparking off the Anglo Boer-War as the British sought to gain control over these vast mineral resources (Longford, 1982; Evans, 1999; Farwell, 1999; Raath, 1999; Van Reenen, 2000). Thus the die was cast for a century of violence and human rights abuse, which ended in 1994 when South Africa became a democracy by means of a negotiated settlement. Nowhere before in the history of the world has a government voluntarily negotiated itself out of existence, but that is exactly what the apartheid government ended up doing in 1994.

Water has flowed through all of these events, like an invisible, but potent symbol of power and progress. Thus we find ourselves today, some 14 years into our new democracy, reflecting back over the past decade and a half. We find ourselves doing now what was done in the first decade after the independence of South Africa from Britain in 1961, for it was in the 1960s that monumental decisions were made about water that are still relevant today and that the South African Hydraulic Mission was born (Turton *et al.*, 2004). It was also in that decade that a decision was made to seek to understand the strategic significance of water in a water-constrained region in order to overcome the limitations inherent in this potentially debilitating situation. A Commission of Inquiry into Water Matters was appointed in July 1966 by the then State President C.R. Swart (Turton *et al.*, 2004) and its objective was to inquire, report and submit recommendations on all aspects of water provision and utilization within the Republic. Its aim was therefore to inform the broad planning of policy "with due regard to the arrangements with neighbouring States relating to common water resources" (RSA, 1970, p. xii; Turton *et al.*, 2004, p. 72). The Commission also reported that:

> Neither on economic nor on strategic grounds is there any urgent need for the large-scale provision of additional water for irrigation within the foreseeable future. Emphasis should far rather be placed on raising the productivity of agriculture and animal husbandry on the already available dry land and irrigation soils and particularly on the achievement of higher yields per unit of water applied. (RSA, 1970, p. 2; Turton *et al.*, 2004, p. 73)

Thus, the idea of 'more crop per drop' is more than 40 years old in South Africa. The Commission also found that:

> ... unless the essential steps are taken to plan the exploitation and augmentation of our water resources, to conserve and re-use our available supplies, and to manage and control our resources in the most efficient manner, serious shortages will be suffered somewhere before the close of the century. (RSA, 1970, p. 3; Turton *et al.*, 2004, p. 74)

Thus, saving the country's water resources was already an issue in the late 1960s. Water savings were also to be implemented, especially regarding power generation, by making more use of hydroelectricity, by establishing nuclear power stations at the coast, and by adopting water-saving measures at coal-fired power stations. Nonetheless, the Commission did stipulate that appreciable quantities of water should be reserved for power generation purposes (RSA, 1970, p. 7; Turton *et al.*, 2004, p. 74). One of the proposed solutions to the country's water problems was a complex strategic-level inter-basin transfer scheme designed to create water balances at the national rather than the river basin-level. This was to provide water for South Africa's large metropolitan areas, new industrial nodes and irrigation projects. The Commission noted that:

> This demands the thorough planning of our water resources to ensure that optimum benefits will accrue to the whole country. In applying this policy, socio-economic principles that embrace the interests of the country as a whole rather than mere sentimental or geographical considerations must be decisive. (RSA, 1970, p. 9; Turton *et al.*, 2004, p. 74)

The Commission also looked into South Africa's relations with its neighbours with regard to water resources of mutual benefit. In this respect the Commission mentioned plans to draw water from outside the country's border, e.g. the Okavango Delta. The Commission found that although such schemes were technically viable, "they can be undertaken only in consultation with the relevant foreign interests". The unit cost of the water was one of the limiting factors for the implementation of such international inter-basin transfer schemes. With regard to international law principles, contained within the 1966 Helsinki Rules for example, the Commission stated that these rules were very loose and that the use of international water resources was generally fixed by agreement. During the 1970s, South Africa was negotiating with Swaziland, Portugal, Botswana, Lesotho and Rhodesia on matters concerning the joint utilization of common water resources. In this regard, the Commission recommended that:

> ... whenever the opportunity arises, all feasible steps [should] be taken to ensure that the Republic's shares of the relevant waters be defined and ratified, so that

> appropriate account may be taken of them in planning. In this context it is appreciated that often other factors must be considered and that the development of the relevant rivers to optimum mutual benefit necessarily depends also on a *good neighbour policy*. (emphasis added) (RSA, 1970, p. 13; Turton *et al.*, 2004, p. 75)

Today South Africa has a complex range of negotiated water regimes (Ashton *et al.*, 2005), arising from this Commission of Enquiry into Water Matters, which was a pivotal point in the hydropolitical history of the country.

So, while South Africa has a turbulent history, water has always played a key role in stabilizing these perturbations. Significantly, while there is a history of violence in the country, there is also a unique history of peaceful negotiations. The world watched anxiously as parties at war negotiated a peaceful transition to democracy through the Convention for a Democratic South Africa (CODESA) that started in December 1991 (Spitz & Chaskalson, 2000; Turton *et al.*, 2004). The world was amazed as South Africa became the first and only nuclear power to voluntarily relinquish all of its tactical nuclear weapons. It is this unique juxtaposition of the power of the negotiated settlement over the anarchy of violence that sets the scene for the Special Edition of the *International Journal of Water Resources Development*, aptly entitled Reflections on Water Management in South Africa. The editors have sought to bring together some of the leading authors, consultants, development specialists, scholars and scientists who are active in the water sector and have tasked them with the responsibility of applying their minds in an assessment of some of the challenges we have faced and overcome, and are currently facing as a country. This is done in the belief that lessons emerging from the crucible of the South African water sector have relevance far beyond the geographic constraints of that relatively isolated country at the southern tip of the African continent.

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