



**South Africa's Hydropolitical History:
Actors, Actions, Roles, and
Responsibilities**

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By Kieran Findlater, Nikki Funke,
Rebecca Adler, and Anthony Turton
CSIR: NRE
PO Box 395
Pretoria, 0001
Tel: 012-841-4475
Fax: 012-842-7687
Email: findlaterk@gmail.com

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Table of Contents

Introduction	1
Methods	6
Defining actors.....	6
Historical development	7
1652 to 1875: Private development.....	7
1875 to 1912: The rise of government consciousness.....	11
1912 to 1930: A single Department of Irrigation (DoI)	15
1930 to 1956: Make-work projects and the rise of the National Party (NP)	17
1956 to 1980: Consolidation of central control	18
1980 to 1994: Rising conscience, rising cooperation.....	20
1994 to present: A new democracy, a new vision.....	21
Changing roles over time	22
Conclusion.....	23
References	25

Acronyms

CMA	Catchment Management Agency
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DoA	Department of Agriculture
DoI	Department of Irrigation
DoPW	Department of Public Works
DPRA	Department of Plural Relations and Administration
DWA	Department of Water Affairs
DWAF	Department of Water Affairs of Forestry
JCI	Johannesburg Consolidated Investment Company
JWEEC	Johannesburg Waterworks, Estate and Exploration Company
LMS	London Missionary Society
NGO	Non-Governmental Organisation
NP	National Party
OFS	Orange Free State
RSA	Republic of South Africa
RWB	Rand Water Board
VOC	Dutch East India Company
WUA	Water User Association

Introduction

Since the arrival of the Dutch in 1652, water resource development in South Africa has been driven by political ideology and rising demand for limited resources, forcing major changes in policy and institutional capacity over time. In turn, these changes shaped the roles and responsibilities of different public, private, and civil society actors. Historical water legislation, management, and resource development created the water-related infrastructure and economic systems to which modern management practices must be adapted. Understanding the historical patterns of development and the evolution of water resource actors, roles, and responsibilities lends context to current challenges facing the implementation of the progressive principles of the 1996 South African Constitution and the 1998 National Water Act.

Prior to 1875, private interests were the major force behind South Africa's hydraulic mission. The Parliament of the Cape of Good Hope entered the fray in that year by establishing the advisory position of hydraulic engineer, and gradually increased the government's role in resource development. Early legislation based on Roman-Dutch and British law was not well-suited to South Africa's climate and performed poorly as demand grew. Rising demand and the political pressure to pursue economic development culminated in the codification of South African water law and establishment of the Department of Irrigation (DoI) in 1912. Following an expansion of the DoI's mandate in the mid 1920s, economic depression and severe drought in the early 1930s drove a monumental shift in resource development, hinted at tentatively in earlier decades by a government interested in economic development, but ultimately driven by the plight of destitute whites in a sinking economy. Nationalist and Afrikaner influence over government policy was solidified by the rise to power of the National Party (NP) in 1948. Coupled with increasing resource demand by agriculture and industry, this accelerated the construction of large-scale water resource projects in the second half of the 20th century.

The Water Act of 1956 strengthened government control over water resource development and allocation, driven by rising multi-sector needs and epitomised in the establishment of Government Water Control Areas. International negotiations, playing little part in the first half of the century, came to the fore in the 1970s, 80s and 90s as skyrocketing demand, especially on the Witwatersrand, drove the need for international cooperation in resource development. The appearance of modern civil society with respect to water resources briefly preceded the

transformation of the Republic of South Africa into a democracy in 1994, and the promulgation of the new National Water Act in 1998.

The new Constitution and National Water Act recognise the need for a shift from command-and-control management to stakeholder-enabled cooperative governance, where users have input into water policy. This is embodied in the drive by the Department of Water Affairs and Forestry (DWAF) to decentralise water resource management, with the establishment of government-controlled Catchment Management Agencies (CMAs) tasked with the oversight of user-controlled Water User Associations (WUAs).

This paper summarises progress in understanding the trends in water resource development and management since the arrival of the Dutch in the Cape of Good Hope in 1652. It identifies actors in South Africa's hydropolitical history and analyses their evolving roles over time. Turton *et al.* (2004) provided a strong foundation of basic knowledge and information by summarising a multitude of primary and secondary sources ranging from parliamentary documentation to newspaper clippings and engineers' reports. In support of this fount of raw information, a variety of other primary and secondary sources was consulted to fill in missing information, further investigate trends, and solidify findings.

Differences in the relative involvement of different actors have defined seven periods of South African water resource development that are herein discussed (Figure 1):

- i. 1652 to 1875 – Water resource development was driven primarily by private interests and regulated by government. Government played very little role in development, and civil society first appeared as church groups concerned with irrigation development.
- ii. 1875 to 1912 – The establishment of the hydraulic engineer in 1875 heralded the first direct involvement of the state in development and ushered in an era of increasing government involvement.
- iii. 1912 to 1930 – The Irrigation Act of 1912 codified South Africa's water law, and created the Department of Irrigation (DoI), Water Courts, and irrigation boards. Irrigation boards were the primary drivers of development during this period, while the powers of the DoI were gradually broadened.

- iv. 1930 to 1956 – The Depression in the late 1920s and early 1930s precipitated a sharp increase in large government-funded projects, and small Acts of Parliament gradually continued to increase the power of the DoI.
- v. 1956 to 1980 – The Water Act of 1956 centralised power over water resources, expanding the mandate of the DoI and changing its name to the Department of Water Affairs (DWA). Government control was solidified and the powers of the Water Courts and irrigation boards were accordingly reduced.
- vi. 1980 to 1994 – The DWA's brief incorporation into the Department of Environmental Affairs (DEA) in the early 1980s and rising international concern prompted consideration of environmental impacts and preceded the appearance of modern civil society with respect to water in the late 1980s.
- vii. 1994 to present – The advent of democracy in 1994 heralded a new era of social and environmental concern, and a shift toward cooperative governance.

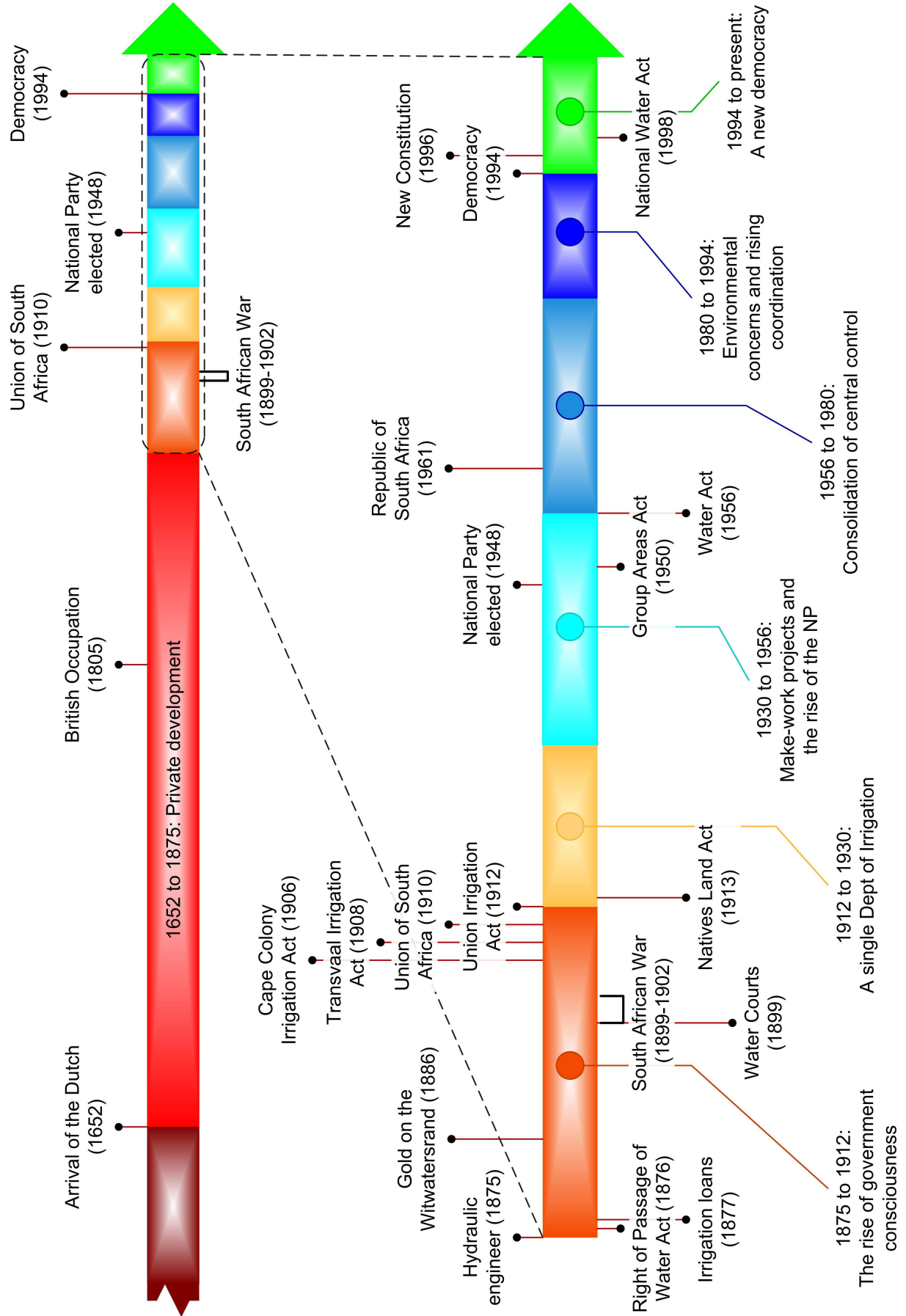


Figure 1: Timeline of seven proposed eras of water resource development in South Africa

Methods

Turton *et al.* (2004), an annotated bibliography, was examined in detail to identify actors and actions in South Africa's hydropolitical history. A database of actions was created to manage the volume of information, and each action was characterised and the actors identified. Seven broad groups of actors were defined and the history of each group was summarised with respect to water resource development, and trends in their roles and responsibilities were identified and described. The interlinked trends were then used to define seven periods of water resource development in South Africa with respect to the major players (Figure 1). The available sources from Turton *et al.* (2004) were collected through the Information Procurement system of the Council for Industrial and Scientific Research (CSIR) and re-examined in detail for clarification and accuracy. A broader and more comprehensive literature review was then conducted to identify documents that may not have been available during the creation of Turton *et al.* (2004), and these were evaluated to increase the level of analytical detail. The evolution of South African water law was further investigated to strengthen our understanding of the context of development.

Defining actors

More than 400 actors were identified during the preliminary research, but most played relatively insignificant roles and can be classified into fewer broad categories. The role of each group of actors has changed over time and is described in the sections to follow.

Early public actors (up to 1875)

- Dutch East India Company (VOC)
 - o Council of Policy
 - o *Landdrost* and *heemraden*
 - o *Burgherraad*
- Magistrates
- Civil commissioners
- Hydraulic engineer
- Parliament

Modern public actors (after 1875)

- Department of Irrigation / Department of Water Affairs / Department of Water Affairs and Forestry
- Department of Agriculture
- Department of Environmental Affairs
- Department of Labour
- Department of Lands
- Department of Plural Relations and Administration
- Department of Public Works
- Parliament
- Water Courts
- Water Research Commission
- Catchment Management Agencies

- Irrigation boards and Water User Associations
- Local and regional governments

Other actors

- Individuals
- Private companies
- Non-governmental organisations / civil society

Historical development

1652 to 1875: Private development

With the arrival of Jan van Riebeeck and the Dutch East India Company (VOC), and the establishment of a permanent refreshment station on the Cape of Good Hope in 1652, formal water law was established for the first time in South Africa. The VOC governed through the Council of Policy with strict control over water and land in the Cape Colony, leasing land to farmers but rarely granting permanent tenure. The maintenance of the colony and the efficient operation of the VOC's ventures trumped individual water rights. For example, increasing water demand for irrigation in 1661 was countered with the establishment of limited hours for irrigation, in favour of the continued operation of the VOC's corn mill (Hall, 1937:160-162; Hall & Burger,

1957:1; Gildenhuys, 1970:6). There were two periods of government water control under Dutch rule. Between 1652 and the middle of the 18th century, the government controlled water use through a series of orders known as *placcaets*, including that concerning the corn mill's operation. In the second half of the 18th century, the government generally exercised control through the granting of entitlements for water use of shared streams, and the resolution of disputes. Water law in the Cape Colony under Dutch rule was based Roman-Dutch law, whereby water belonged to the state and the government had the right to control its use (Thompson, 2006:34,36). The *Burgherraad* (Burgher Senate) of Cape Town was charged with the town's administration, including the determination of hours of water use for garden owners, but the date of its establishment is unclear. This Burgher Senate continued to operate after the establishment of British control in 1805 (Lewis, 1934:8-11; Hall, 1937:160-167; Hall & Burger, 1957:2).

In 1685 and 1682, respectively, the VOC established the courts of *landdrost* and *heemraden*. The *landdrosten* were positions of judicial authority, mandated to preside over minor disputes in conjunction with the *heemraden*, councils of prominent local citizens charged with the administration of towns and districts (Lewis, 1934:10; Ross, 1983:195). For more than a century, these bodies were tasked with the settlement of water and land disputes that did not directly impact on the Cape Colony's greater interests. Records from the 18th century indicate that the courts presided over a variety of water disputes, including fair apportionment and redress for damaging practices (Lewis, 1934:104). The *landdrosten* were also tasked with the granting and renewal of land leases, and the collection of a standard rent, with custom toward the end of the 18th century dictating automatic lease renewal, even there was outstanding rent to be collected (Duly, 1965:358). The method of appointment of local citizens to the courts was such that rich, white, land-owning citizens of influence were far more likely than others to occupy positions in the *heemraden*, with a propensity to make and maintain policies that furthered their own goals and those of their peers (Ross, 1983:208).

With the end of Dutch rule in 1805, the new British government began an extended process of water, land, and institutional reform. In 1812, the British established a system of permanent land tenure to replace the Dutch leasehold system. The early success of this new policy was limited since, in a practical sense, the new system of perpetual quitrent (an annual rent) was very similar to the automatically renewed leases late under Dutch rule (Hall, 1939:28; Duly, 1965:361). Compounded by a vague system of land valuation to determine the size of the quitrent which

often required higher payments than previously, this created resistance to the conversion of loan farms to quitrents so that by 1821, only a quarter of existing loan farms had been converted (Duly, 1965:365). Under British rule, the riparian principle applied, whereby all the owners of land along rivers had common rights to the water in those rivers. This principle was slowly incorporated into policy and practice over the first few decades of British influence (Thompson 2006:36).

The courts of *landdrost* and *heemraden* continued operating until 1827, when they were replaced by a system of magistrates and civil commissioners with similar functions. Unfortunately, the new bodies were not given the same power as had been vested in the Dutch courts, to apportion water and settle water and land disputes. Between 1828 and 1848, only the Supreme Court of the Cape Colony had the statutory mandate to make such decisions, and with a lack of local representation on the Supreme Court, water and land rights were sometimes poorly defined, especially in outlying areas of the Colony (Ross, 1983:26). The lawyers appointed to the Supreme Court were mostly educated in English and Scottish law, and were therefore more likely to base decisions on the English riparian principle than on the Roman-Dutch law principles that had applied under Dutch rule (Hall, 1939:29; Thompson, 2006:36). An ordinance was passed in 1848 attempted to resolve these issues by giving magistrates powers of adjudication previously held by the courts of *landdrost* and *heemraden* (Thompson, 2006:36).

The first documented private farm dams were built by individuals for domestic use and stock watering, and began appearing in the eastern part of the Cape Colony in 1828 (Brown, 1877:584). This set the tone for water resource projects over the next half-century, with individual enterprise driving the construction of development schemes and government acting almost exclusively as a regulator. The London Missionary Society's (LMS) irrigation settlement in the Kuruman Valley provides the first evidence of civil society with respect to water resources. In the early 19th century, the LMS established an irrigation scheme and settlement in order to attract settlers and convert Africans to Christianity. This scheme pre-dated major racial segregation in South Africa, and the LMS continued to work in the interests of all of its farmers, objecting to increasing segregation of land and labour. Ultimately, the erosion of black water and land rights and the LMS's insistence on protecting the rights of its black farmers lead to the closure of the irrigation settlement and its sale to the local municipality in 1917 (Jacobs, 1996:240,251).

The Supreme Court decision of *Retief v. Louw* in 1856 solidified the riparian principle in the Cape Colony and laid the foundation for South African water law. This decision affirmed that only riparian owners were entitled to the use of public water, and uses were categorised in order of decreasing importance as: required for animal and human life; for increased vegetation (irrigation); and for mechanical purposes (Thompson, 2006:43). No owner was allowed to make use of water in a way that would inhibit the use of water for more important purposes by any other riparian owner. Public water was identified as any water that flowed in a known and defined channel, with the exception of trickles of water that tended to dry up at the source during the dry season (Thompson, 2006:38). In accordance with the riparian principle, control over water resided mostly with landowners rather than with the government, with fair apportionment among the owners determining water rights. In 1874, uses were divided into the categories of ordinary and extraordinary. Ordinary uses, for which an upstream owner was entitled to use all of the water in a stream, were those necessary for stock watering and domestic use. All other uses were classified as extraordinary uses, and were only allowed if the ordinary uses of all downstream owners had been satisfied. With regard to irrigation, every riparian owner was entitled to a reasonable share of the water in the event that every owner's ordinary uses were satisfied (Thompson, 2006:43).

Farmer cooperatives formed in the second half of the century to undertake projects that were either too large or too expensive for individual farmers. The Parliament of the Cape Colony held extensive debates with respect to the provision of aid for irrigation, and took evidence from civil commissioners and the Agriculture Department about the current state of development and potential for economic growth and settlement. Various reasons were given for the lack of decisive action in support of irrigation development, from population densities that were too low to make irrigation schemes profitable, to a lack of transportation infrastructure to take goods to market, and the unsuitable soil and topography of South Africa (Brown, 1877:580-581; Legislative Council Debates, 1875: Page Unknown).

Initial resource development was primarily in the Orange River Basin, which limited the available documentation and the significance of actors in the other major basins prior to Union. The risk of malaria hampered development in the Maputo basin, with the first irrigation project proposed in the mid 1920s. The only significant irrigation in the Transvaal prior to Union in 1910 appears to have been in Pretoria (Hurley, 1909:98-99).

1875 to 1912: The rise of government consciousness

In 1875, Parliament established the position of hydraulic engineer, tasked with the provision of surveying and planning support to private water resource enterprises, as well as the assessment of the hydrological and irrigation potential of the colony and the viability of government-funded projects. Although private entities had to pay for the engineer's services, this signalled the government's first foray into water resources beyond regulation, and was quickly followed by legislation in 1877 to create a mechanism for the provision of government loans to private enterprises to foster irrigation projects. Unfortunately, this system of loans proved too complicated and the interest rates were too high, driving farmers back to private lenders until the 1912 Irrigation Act (Bell, 1891:18; Lewis, 1934:35-36; Hall, 1939:62-63). Although the bill also provided for the establishment of irrigation districts and boards, they did not feature prominently until their clarification in the 1912 Irrigation Act. Although subsequent Acts in 1879, 1882, and 1893 modified the regulations to try to promote adoption, by 1894, only one irrigation board had been established, and a Select Committee created to evaluate the loan system concluded that it was dysfunctional (Lewis, 1934:35-38). The Irrigation Bill nonetheless provided a framework for later government involvement. Expanding on riparian water rights, the Right of Passage of Water Act in 1876 allowed for any person to pass water to which they were entitled, over the land of another where necessary, so that non-riparian owners could more easily access water to which they had rights (Thompson, 2006:51).

The first hydraulic engineer of the Cape Colony, John G. Gamble, surveyed, planned, recommended, and constructed the first government-funded water project at Van Wyk's Vlei in 1883 (Lewis, 1934:35). Although considered an engineering success, the reservoir was a commercial disaster and provided evidence for those forces in government that resisted direct aid to water resource development (Cape of Good Hope, 1891:166; Wallace, 1896:427). On the other hand, some proponents of government-aided development had a large personal stake in successful aid. For example, the Commissioner of Public Works in 1900 (later Commissioner of Irrigation), Smartt, led a privately owned irrigation company, the Smartt Syndicate, that would later profit from government aid (Morrell, 1986:530). Similarly, Cecil John Rhodes, a member of parliament in the Cape Colony, embarked on numerous private enterprises, including an attempt to finance irrigation in the district of Griqualand West. Rhodes argued that destitute whites in the area had

been devastated by the Rinderpest epidemic of 1896 and needed government support (Cape of Good Hope, 1898:471-474).

In 1883, the Dutch Reformed Church built its first irrigation settlement at Kakamas to help destitute whites, and continued to advocate for irrigation development for several decades (Green, 1948:87; Hopkins, 1978:13). Their spokesman in this regard, Reverend Christian Schröder, constructed an irrigation furrow for the Church's gardens at Kakamas with private financing. Following the success of that project, the Church established an irrigation colony at Kakamas to help improve the economic situation of destitute whites (Green, 1948:87; Hopkins, 1978:13). To this end, the government gave the Church two farms along the banks of the Orange River in 1897. For nearly three decades the Church played a prominent role in auditing government actions with respect to irrigation development. Rev. Schröder raised concerns about soil salinisation and the efficacy of various projects prior to the formation of the Union (Cape of Good Hope, 1899a:198-199; Marchand, 1909:44). Evidence of the Church's active involvement in the audit of irrigation development ends in 1908, and the Church withdrew completely from irrigation when it sold the Kakamas works to the Union government sometime prior to 1948 (RSA, 1965a:2).

The discovery of diamonds in 1867 and gold in 1886 prompted the creation and enormous growth of Kimberley and Johannesburg, respectively. To satisfy demand for water in these mining towns, the local councils entered into agreements with private companies to provide water and sanitation services. The Kimberley Waterworks Company Ltd. began providing water services to the town of Kimberley in 1881, while the Johannesburg Waterworks, Estate and Exploration Company (JWEEC) began providing services to the municipality of Johannesburg in 1888, soon accompanied by the Braamfontein Estate Company and the Vierfontein Syndicate. JWEEC was purchased by the Johannesburg Consolidated Investment Company (JCI) in 1895, but the municipality of Johannesburg took over the operations of all of the town's water services in 1902, amidst rising concerns for the volume and quality of the water supplied. The municipality of Kimberley eventually took over the assets and operations of the Kimberley Waterworks Company in 1921 for similar reasons (Olivier, 1997:122; Shorten, 1970:168; Turton *et al.*, 2006:319-321).

On the Witwatersrand, the Rand Water Board (RWB) was established by the Transvaal government in 1903 to better manage the scarce water resources of the Johannesburg area in the face of fast-paced development. The RWB's limits of supply were originally restricted to the

districts of Johannesburg, Boksburg, Germiston, Krugersdorp, Benoni and Springs, but were later expanded to cover the Witwatersrand, including mines and other industries (Turton *et al.* 2006:320). Given the importance of mining in the Transvaal, the government passed legislation to allow for the granting of water rights to mining operations with priority over other uses (Lewis, 1934:82).

Private companies were also involved in irrigation development at this time, managing irrigated property, leasing land to individuals, and constructing and maintaining irrigation works. In 1893, a farmer named Odendaal built a weir across the Orange River and a furrow to supply water to plots of irrigable land which he surveyed and sold with the promise of water delivery; a scheme that eventually failed (Cape of Good Hope, 1899c:2-3). The Smartt Syndicate built a dam in 1908 to develop irrigated land for the production of lucerne, other fodder crops, and wheat. The Syndicate continued to operate until 1954 when it went into voluntary liquidation (RSA, 1961a:3).

The Departments of Agriculture, Public Works, and Irrigation began to play a significant role in the Cape Colony towards the end of the 19th century. Prior to the formation of the Union, the Department of Agriculture (DoA) advised Parliament by conducting feasibility studies, soil and climate analyses, and advocating for government aid to individuals in the development of the hydraulic mission (Agricultural Journal, 1895a:365; Agricultural Journal, 1895b:585; Agricultural Journal, 1895c: 479). Along with the Department of Public Works (DoPW), the DoA also played a small role in the construction of irrigation works (Cape of Good Hope, 1899b:2; Cape of Good Hope, 1903:iv-v; Cape of Good Hope, 1904:613; Cape of Good Hope, 1909:15; RSA, 1962a:3).

Throughout the 19th century, rules pertaining to water and its use were not always clear, and variable court interpretations changed those rules every few years. With increasing intensity of irrigation in the late 19th century, and especially after the South African War (1899 to 1902), the rising incidence of dispute about shared streams required the codification of water law. The Right of Passage of Water Act in 1876 and the Irrigation Act in 1877 were the first steps in the Cape Colony. The Water Act of 1899 established water courts for the first time, specifically created to adjudicate over disputes and claims for and between private entities. In 1906, the first attempt was made in the Cape Colony to embody all water law in one Irrigation Act, and this would form the basis for the Union Irrigation and Conservation of Waters Act in 1912 (commonly referred to as the 1912 Irrigation Act) (Thompson, 2006:51,52).

Elsewhere in South Africa, the legislature of the Zuid Afrikaanse Republiek (ZAR), which became the Transvaal under British control, passed an Irrigation Act in 1894 to create ordered rules for water use and to define public water. Both the Transvaal and Orange Free State (OFS) governments developed Departments of Irrigation towards the end of the 19th century, but there is not much evidence of their involvement in the promotion of water resource development (Thompson, 2006:52).

The Transvaal Irrigation Act of 1908 created measures for the administration of water, and methods for its conservation and use. The Natal Colony passed two Irrigation Acts towards the end of the 19th century to promote irrigation, while the OFS retained common water law until the formation of the Union of South Africa (Thompson, 2006:54). Signalling an increasing need for cooperation and regional planning, negotiations between the Cape Colony and the OFS over the use of water from the Orange River began in the years preceding the South African War (Cape of Good Hope, 1899c:2-19), but did not conclude until after British occupation. An 1854 agreement between the two political entities had defined the border as the mid-point of the stream, and any project that spanned the stream had to be agreed upon by both parties (Cape of Good Hope, 1899c:15).

Following the South African War and the expansion of British control over the Orange Free State (OFS) and the Transvaal, the rise of the ostrich industry became the primary driver of irrigation development in South Africa. Lucerne under irrigation was considered the best pasture on which to raise ostriches, and prior to 1915, many small irrigation works were built to this end (Forde, 1925:347).

With the intensification of the agricultural industry in the first years of the 20th century, driven in large part by the ostrich industry, it became necessary for a more authoritative agent to play a role in coordinating water resource development. An Irrigation Congress met in 1909 to bring together representatives from all four governments with those from agricultural unions, irrigation boards and other interested parties, including irrigation professionals (Cape of Good Hope, 1909:1-2). The chair of the Congress, Prime Minister Malan, emphasised the importance of irrigation as an impetus for the creation of the Union of South Africa. The formation of the Union in 1910 then precipitated the passage of the Union Irrigation Act of 1912. This represented a major shift from a

locally driven hydraulic mission, to major government involvement and the start of centralised control.

1912 to 1930: A single Department of Irrigation (DoI)

In the early 20th century, irrigation was the primary use of water, and the formation of the Union of South Africa in 1910 prompted the creation of a unified South African water law. The Irrigation and Conservation of Waters Act 8 of 1912 was a compromise between the hydrological realities of the four colonies. Primarily based on the 1906 Irrigation Act of the Cape Colony, the 1912 Act established the Department of Irrigation (DoI) to promote and govern irrigation in South Africa and to provide oversight to the re-created irrigation districts and boards (Lewis, 1934:72; Hall & Burger, 1957:6). The 1912 Act created the South African Water Courts to apportion resources and adjudicate over disputes. The Water Courts also had the power to grant permits to riparian owners for power generation or use in industrial or mining activities (Lewis, 1934:81). They played a key legal role in apportionment, and Water Court decisions from the early part of the 20th century continue to have ramifications for modern day disputes.

The DoI institutionalised water resource development in South Africa, employing a staff of administrators and engineers, led by the Director of Irrigation and overseen by the Minister of Irrigation (Union of South Africa, 1917:377; 1918: 409; Gildenhuys, 1970:7; DWA, 1988:1). Although Parliament was still responsible for approving expenditures for large projects, the Act delegated the bulk of responsibility for irrigation management and development to the new DoI, and provided for loans to private persons and irrigation boards to advance irrigation in the Union (Union of South Africa, 1919:5,6,53).

With increasing pressure on water resources, and newly improved measures for the establishment and operation of irrigation boards, their number grew dramatically following the 1912 Act, quickly becoming a major force in irrigation development in the Cape and more slowly in the rest of the Union (Turton *et al.*, 2004). Upon petition from three or more riparian owners in a proposed irrigation district, Parliament established the district by proclamation, and an irrigation board was elected from land-owning farmers within the district. The board was given the power to levy fees for water use to repay government and private loans used to pay for new works. The board

inherited control of all existing waterworks within the district and was tasked with the planning, construction and management of new works. To best direct the district's water resource development, the board was able to enact by-laws to better manage water use (Pirow *et al.*, 1914:179).

Although irrigation boards were fairly independent of government while acting in the interests of their members, the DoI played a supervisory role over board activities and had the power to disestablish irrigation boards that no longer proved useful (Union of South Africa, 1961c:3; RSA, 1963b:4). The Union government regularly aided irrigation boards by providing loans and taking control of poorly performing projects. The DoI also began developing small to medium scale government-funded projects (Union of South Africa, 1961a:4; Union of South Africa, 1961b:4).

The role of the DoI was expanded in the 1920s to include hydrographic surveys and advice to other departments and public bodies, including provincial and local governments, on a broader spectrum of water issues including supply, irrigation, drainage, and sewage (Union of South Africa, 1929:359-360). After the First World War briefly delayed water resource development, a struggling economy and labour strife in the 1920s heralded the start of the Depression (Union of South Africa, 1930a:368; RSA, 1963b:4; RSA, 1973a:3; RSA, 1977b:3). The plight of destitute whites had been an issue for the South African and colonial governments since the middle of the 19th century; an issue that was aggravated by the drought and Rinderpest epidemic of 1896, and the scorched earth military policies of the British during the South African War (Cape of Good Hope, 1898:472; Davenport & Saunders, 2000:225-228). This concern resurfaced at the end of the 1920s as the Depression set in. Despite declarations by the Director of Irrigation in 1929 against the implementation of large water schemes, the government responded by fast-tracking a number of large-scale waterworks in order to provide employment to destitute whites (Union of South Africa, 1930b:24-25).

Other government departments had supporting roles under the 1912 Irrigation Act. The DoA had an advisory role, providing soil assessments and economic analyses in recommending irrigation projects (Union of South Africa, 1926:11-12; RSA, 1985:5; RSA, 1980:4, 5). The Department of Lands coordinated the purchase of land for projects both large and small, and organised labour and irrigation colonies, where land was leased to individuals (RSA, 1964a:2; RSA, 1965b:3). The Department of Labour organised the labour necessary for large projects and implemented

restrictions on the racial and marital status of workers hired by the DoI (Union of South Africa, 1937a:28-29).

1930 to 1956: Make-work projects and the rise of the National Party (NP)

The plight of destitute whites – previously driven by drought, Rinderpest, and war at the end of the 19th century – was of great concern to Parliamentarians in the early 1930s as the Depression wrought havoc on the South African economy. Coupled with a severe drought, the Depression drove a flurry of fast-tracked water resource projects. In 1930, the Director of Irrigation received instructions with respect to the Buchberg irrigation scheme to start “construction as soon as possible to provide employment for white people who were suffering from the effects of drought” (Union of South Africa, 1931:19).

A number of projects that had been considered for many years, with no action, were suddenly authorised, some without the usual depth of planning. Most notable was the Vaal River Development Scheme, South Africa's first multi-objective water resource project, to which the Rand Water Board made a major financial contribution. Director of Irrigation, A.D. Lewis, had cautioned against its implementation in 1929 when he made broader statements against large water resource projects (Union of South Africa, 1930b:24-25). Ultimately, the early 1930s saw a sharp increase in the implementation of large projects, including the Vaal River Development Scheme and Vaal Dam, the Vioolsdrift and Beenbreek irrigation projects on the Orange River, the Kalkfontein and Egmont Dams in the Orange River Basin, and the Loskop Dam in the Limpopo Basin (Union of South Africa, 1935:23; Union of South Africa, 1936:38; Union of South Africa, 1937b:29; Union of South Africa, 1940a:29).

The Department of Labour managed the workforce, ensuring that the objective of employment for destitute whites, especially single white men, met with as much success as possible (Union of South Africa, 1937a:28). Ultimately, the sharp increase in large, labour-intensive projects ran aground in the late 1930s. South Africa's economic resurgence preceding the Second World War created an acute labour shortage, sharply increasing project costs. The Department of Labour was forced to hire a great number of coloured and black labourers, contrary to the original intent of the fast-tracked projects (Union of South Africa, 1937a:29; Union of South Africa, 1940b:29); a

situation that was greatly exacerbated by a diminished white workforce and drastically reduced funding during the Second World War (RSA, 1977a:3).

Following the election of the National Party (NP) to power in 1948, solidifying the government's perceived Apartheid mandate, consecutive Prime Ministers drove an increasing number of large water resource projects to help stimulate South African economic development (Turton *et al.*, 2004). The DoI's role slowly expanded from 1912 to 1956, driven by increasing pressure on water resources and the need for more centralised control in their allocation and development, and evidenced by the new mandate in the 1920s and the implementation of the multi-objective Vaal River Development Scheme.

1956 to 1980: Consolidation of central control

The 1956 Water Act created the Department of Water Affairs (DWA), replacing the DoI and expanding its mandate to include management of all water resources in South Africa. While maintaining most of the principles of the 1912 Irrigation Act, the 1956 Water Act placed increased emphasis on industrial use and required better control of water quality as a result. In keeping with the 20th century trend of increasing government control over water, the DWA was tasked with maximising the water-based benefits to South Africa. Accordingly, the DWA was given the power to create Government Water Control Areas in areas important to economic development or those facing pressing water scarcity and high demand (Thompson, 2006:62,63). Power of apportionment was transferred from the Water Courts to the DWA so that the department could better manage South Africa's resources for the greatest public benefit (Vos, 1967:45-46). Any withdrawal of water from a public stream thereafter required the approval of the Minister of Water Affairs. The role of the Water Courts was reduced to the determination of redress for riparian owners impacted by government decisions (RSA, 1976b:586).

The DWA was also given the mandate to subsidise water resource projects that would provide "direct and indirect benefits" to South Africa as a whole (RSA, 1962b:3,4). The Department could therefore provide largely subsidised loans to irrigation boards. For example, in 1962 the Schoonspruit Irrigation Board was only asked to repay R220 000 out of a total loan of R810 000 (72.8% subsidised) for the implementation of an irrigation scheme in that district (RSA, 1962b:3,

4). Similarly the Letaba North Canal Irrigation District Board received a subsidy of 33.3% on R600 000 in 1960 (RSA, 1961b:5, 6), and the Roodeheuwel Irrigation Board received a 33.3% subsidy on R175 000 in 1973 (RSA, 1973b:4).

The creation of the Republic of South Africa in 1961 and the passage of Apartheid legislation (e.g., the Group Areas Act, Act No 41 of 1950; the Bantu Education Act, Act No 47 of 1953) solidified the perceived mandate of the NP to pursue economic development for the benefit of white South Africans (Thornton & Ramphele, 1988:29,33-35). Foreshadowed by the slow demise of the LMS settlement scheme in the early 20th century, water became a tool of Apartheid, providing privileged access to white, land-owning South Africans. During this period, the Department of Bantu Administration and Development, later renamed the Department of Plural Relations and Administration (DPRA), was tasked with water provision to the homelands. DPRA played a part in service provision and construction, but its most important role with respect to water was as an advocate for resource development (RSA, 1961c:3; RSA, 1978:4; RSA, 1979:3). Although DPRA was the nominal manager of the water resources of the homelands, the DWA seems to have maintained virtually complete control over apportionment and development, and the homelands had to negotiate for water rights and use permits (RSA, 1975:4).

The construction of large government-funded projects reached a peak during this period, driven by the aggressive economic development agenda of a series of NP Prime Ministers. At the same time, the DWA increasingly included private contractors and consultants in project development and implementation (Union of South Africa, 1961a:4; RSA, 1963a:4; RSA, 1964b:3; Van Robbroeck, 1986:1-4). Beginning in the late 1960s, the negotiation of international freshwater agreements became increasingly important, including consideration of a transfer agreement with Lesotho. In 1966, a drought in the economically important Witwatersrand prompted the South African government to create a commission to study the possibility of drawing water and hydroelectric power from Lesotho. Although the commission recommended the idea, political considerations, including concern that South Africa would become dependent on a foreign country, delayed signing of an agreement until 1986 (Eksteen, 1972:122). Private consultants played an important role in this process, conducting feasibility studies and drafting plans (Van Robbroeck, 1986:1-4).

During this period, increasing pressure on water resources forced heightened multi-sector coordination of resource development and water use. For example, a public-private agreement was reached in the 1970s between the Municipality of Springbok and the Okiep Copper Co. Ltd, whereby the municipality was allowed to draw water from the Okiep Copper Co. water source in the sand-bed of the Buffalo River during times of water scarcity (RSA, 1970:2).

In the 1970s, decades of intensive irrigation and several years of high rainfall created the need to implement drainage works at great cost in response to water-logging (e.g., the Vaal-Hartz drainage scheme in 1976 (RSA, 1976a:3) and the Riet River Government Water Scheme drainage works in 1977 (RSA, 1977a:2)).

1980 to 1994: Environmental concerns and rising coordination

In 1980, the Department of Water Affairs (DWA) was incorporated into the pre-existing Department of Environmental Affairs (DEA) as part of a government reorganisation, but was reinstated as an independent department in 1984 (DWA, 1988:1). Although brief, this marriage with Environmental Affairs prompted the inclusion of environmental assessments in feasibility studies and project planning (RSA, 1981:13; RSA, 1983b:3,12; RSA, 1986:3,11,25; RSA, 1988:15,16). This foreshadowed mounting environmental concern towards the end of the century and reflected international environmental movements.

The Lesotho Highlands Water Project treaty was signed in 1986, driven by demand in Rand Water's service area. The DWA played an important role in negotiating the treaty and was appointed as one of two organisations providing oversight to the South African side of the project (Meissner, 2000:26).

Coupled with drought, increasing demand in the 1980s and early 1990s forced the implementation of a number of emergency schemes. Emergency relief was required to provide water for urban use as well as for the operation of power stations and industry (e.g., the 1983 scheme by the DWA to provide water to the ESCOM power stations and SASOL I and II installations in the Eastern Transvaal Highlands (RSA, 1983a:3; RSA, 1983b:3)). In 1990, the DWA was expanded to

include forestry, becoming the Department of Water Affairs and Forestry (DWAF) (DWA, 1991:13).

Modern water-related NGOs first appeared in 1987, with the formation of water committees below the Pongolapoort Dam. User groups affected by unannounced water releases from the dam formed fourteen water committees from the dam to the Mozambique border, to negotiate the release of water and investigate the impacts of water on health and agriculture. The Phongolo River Floodplain Committee Programme was created to coordinate the activities of the water committees and negotiate with the DWA, but the programme ran into trouble with cotton farmers who protested the new water release schedule since it did not coincide with their agricultural needs (Stott *et al.*, 2000).

1994 to present: A new democracy, a new vision

In 1994, the new South African democracy heralded a revolution in governance, including inter- and intra-government relations, as well as non-government actors. Implementation of water resource development immediately incorporated a new concern for environmental and social implications, and the inclusion of a variety of stakeholders in planning and decision-making processes.

The National Water Act, promulgated in 1998, required a shift from centralised control of water resources toward decentralised management, and an overhaul of the responsibilities and systems of management. The National Water Act also replaced the Water Courts with a Water Tribunal through which affected parties can appeal decisions made by regulatory bodies (RSA, 1998:63-65). With the adoption of the National Water Act, irrigation boards were required to transform into WUAs, but the transition has been slow. By the end of the extended six-month transition period following the implementation of the National Water Act, only 3 of 35 irrigation boards in KwaZulu Natal had transformed into WUAs (Faysse & Gumbo, 2004:16). Across the country, 300 irrigation boards are to be transformed into WUAs (Thompson, 2006:653). Irrigation boards were elected by member farmers, but WUAs are supposed to consist of a broader spectrum of stakeholders and are tasked with a broader mandate. They are to encompass the major actors within their boundaries in order to foster dialogue and agreement on water resource management,

allocation, and development (Pegram & Mazibuko, 2003:6-9). The intent is that they bring more balanced and just apportionment and development of water resources within their jurisdictions. DWAF has to create CMAs to oversee the actions of the WUAs and coordinate regional activities, but according to DWAF documentation, only one out of the 19 planned CMAs has begun operating, with a handful more established but not operational (DWAF, 2006a:30). A lack of detailed direction by government in this process may be slowing implementation, as may the resistance of irrigation board members to change. Guidelines continue to emerge to better structure the development of CMAs and WUAs (e.g., DWAF's *Guidelines for Catchment Management Strategies* is currently out for draft comment (DWAF 2006b)).

In 1997, labour groups protested against the tender process for contracts governing the management of water resources in Mpumalanga (Mail & Guardian, 9 May 1997). The South African Constitution and the National Water Act necessitated the inclusion of stakeholders and interest groups in review processes and cooperative government, and NGOs have therefore played a greater role in public audit and decision-making processes in recent years (RSA, 1996:25; RSA, 1998:12,39,40). NGOs played a significant role in the World Commission on Dams investigation into large dams in 1999, conducting investigations and analyses of the planning and impacts of large dam projects on local communities and the environment (Stott *et al.*, 2000).

Changing roles over time

Private sector: The early hydraulic mission was driven primarily by private interests, while public bodies played a regulatory role. Private companies were directly involved in development in the late 19th and early 20th century, while the recent trend has been for consultants to provide support to government-funded projects. Both private companies and individuals have been involved in construction and water services.

Public sector: From 1875 to 1956, public involvement in construction and water services slowly increased, after which it remained fairly steady until 1994. Irrigation boards played a major part in resource development after 1912, and WUAs should continue this trend under the National Water Act. The public sector was initially focussed on regulation, but became the dominant force in construction, water service provision, advising and financing in the 20th century.

Civil society: With regard to water resources, civil society first appeared in the early 19th century, gradually disappearing in the early 20th century as government control became more centralised. Modern civil society re-entered the water resource domain in the late 1980s and is firmly entrenched in the new democracy. Civil society actors have been involved primarily in public audit, but early actors also dabbled in construction and water services.

Conclusion

Little more than a decade after democracy in South Africa, organisations and institutions are now struggling with the challenges of implementation. Throughout South Africa's hydropolitical history, there has been a significant delay in implementation following major political change. It takes time to reorganise institutional capacity, develop new business plans, learn new roles, and develop or import new expertise. Following the arrival of the Dutch, takeover by the British, the formation of the Union, the rise to power of the National Party, the creation of the Republic, and the advent of democracy, substantial delay has been evident in the effective implementation of new policies.

Actors, roles, and responsibilities have changed dramatically during South Africa's hydropolitical history. Development dominated by the Dutch East India Company's interests gave way to privately-driven development, grew into collective development by syndicates and irrigation boards, was super-ceded by strong central government control, and has now evolved into user-driven management with a focus on equity. Over time, water resource scarcity has driven increasing coordination both geographically and between sectors. Individuals gave way to cooperatives, local control gave way to regional and national control, single sector projects gave way to bigger, broader, multi-sector projects.

The seven phases of water resource development were shaped by a combination of forces: increasing demand and development pressures, and the changing political context and related changes in the regulatory framework. Until 1875, development was undertaken by individuals for personal benefit, with little government involvement. The need to spur economic development in some regions and the increasing demand due to rapid economic development in other regions prompted the government of the Cape Colony to start supporting irrigation development. The hydraulic engineer's post was the first step, but was quickly followed by loan provisions and later by irrigation acts in the Cape Colony and Transvaal. Following the Union Irrigation Act of 1912, the increasing pressure on resources made irrigation boards far more attractive for access and

development than individual efforts, becoming the primary implementing organisations. Drought and economic recession prompted a surge in government involvement in the 1930s. The convergence of growing demand, the rise of National Party and the political goal of accelerated economic development drove the construction of large dam projects and created the need for Government Water Control Areas and international agreements to ensure continued supply. International pressure and government reorganisation introduced environmental assessments in the early 1980s and scarcity and emerging concern for equity drove the emergence of modern civil society with respect to water resources in the late 1980s. The introduction of democracy generated the Constitution and National Water Act, which dramatically re-shaped the legislative landscape and introduced equity and sustainability as the primary goals of development.

Despite the dramatic shift in political ideology and legislation following the advent of democracy, historical patterns and events continue to have a profound, lasting effect on development. During the democratic transition, economic stability required continuity, which in turn prevented the immediate reform of the systems that gave inequitable privileges to certain water sectors. Infrastructure and economic systems created through centuries of development must now be used to implement new policies. The delay in transforming irrigation boards to water user associations is only one of many challenges in the evolving system. To effectively adapt institutions and legislation to new political, social, economic, and environmental circumstances, we must first understand the historical drivers that shaped those institutions and legislation. The actors, actions, roles, and responsibilities of South Africa's hydropolitical history continue to influence its hydropolitical future.

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