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ARTICLE

Water Provision, Governance and Management in Post-Colonial Botswana: Policy Development and Practice in a Semi-Arid Environment, 1966-2020

Mark Nyandoro *

Abstract

The continuities and policy shifts from the colonial to the post-colonial era inform the evolution of arid Botswana's water sector. This paper examines the major trends in Botswana's water resource governance from independence in 1966 to 2020. It evaluates the continuities and policy changes implemented by the government of Botswana in that period. The country's water sector changed from seemingly no identifiable water policy during the colonial era to, with some exceptions, more tangible policies afterwards. The paper argues that the colonial administration was reluctant to develop the water sector beyond the areas occupied by white people such as Ghanzi and Tati. Therefore, post-colonial Botswana inherited a poorly developed water distribution infrastructure with no clearly stated policies despite water's critical function to the future development of the country. The post-colonial era was thus characterised by significant efforts to change water provision and governance by the independence government. The government consistently sought to reverse and rectify the water management policies of the past for the benefit of present and future needs. In this effort, it was complemented by strategic development partners and other stakeholders, hence this collective effort led to transformative change for Botswana's water sector in the post-1966 period.

Keywords: Water Provision, Water Scarcity, Water Resources Management, Water Policy, Semi-Arid Environments, Botswana

Introduction

The paper, the second and last of a two-part series, focuses on perspectives on water provision, water resource governance and management in post-colonial Botswana,1966-2020. It seeks to assess major developments in the water sector regarding policy shifts, interventions and their impact on the country over time. The continuities and policy changes from the colonial to the post-colonial era inform the evolution of Botswana's water sector. The sector changed from seemingly no identifiable water policy during the colonial era to, with some exceptions, more tangible policies afterwards. Although this has been refuted by Steenkamp (1991), the country's colonial water trajectory shows that the post-colonial government inherited a poorly developed water distribution infrastructure with no clearly stated government policies despite water's critical function to the future development of the nation. Water was and continued to be the most limiting (natural) resource in arid to semi-arid regions. The post-colonial era was thus characterised by diverse views from the people and political organisations as well as commendable effort to change water provision and governance by the independence government through new water development policies and research.

* Mark Nyandoro, Professor of Economic History, University of Zimbabwe; Extraordinary Professor Research, School of Social Sciences, Subject Group - History, Faculty of Humanities, North-West University (Vaal Triangle Campus), South Africa. Email: nyandoromark@gmail.com

Emerging from a background where the colonial state was reluctant to support comprehensive water development, it was inevitable for the post-colonial government to reverse and rectify water provision and management problems of the past. The effort of the government aimed to cater for the needs of Batswana and all development sectors in the country. In the post-colonial period, the new independent government led by President Sir Seretse Khama, notwithstanding some challenges, worked tirelessly to overhaul the dilapidated water distribution infrastructure that the colonial administration had otherwise created. A major concern for Seretse Khama's government was the increasing and intensifying periodic droughts. This seemed like a key factor driving the post-independence government's need to improve water infrastructure. It apparently informed almost all decisions regarding water from that point onwards.

The new government accepted that having to develop both the water resources and the major policies that controlled water access across the country was inevitable. Such resolve came amid escalating demand for water in various sectors including home use, agriculture, as well as industrial development. In highlighting water provision, development and management of water resources in Botswana, the paper draws on a rich collection of published and unpublished material including a selection of archival records from the Botswana National Archives and Records Services (BNARS). New oral interviews and secondary literature are utilized to posit the argument that there were deficiencies and opportunities in planning, management and provision of water across the historical periods. As illustrated in important works by Parsons (1985), Picard (1987), Colclough and McCarthy (1980), Peters (1983), Peters (1984) and Nyandoro (2020), all sectors notably water, health, agriculture and infrastructure such as roads and education were largely neglected during the colonial period although Steenkamp (1991) critiques this view.

For a water stressed country, scarcity affected the nation's development as confirmed by Roe (1980), Makgala (2012), and Nyandoro (2020) who have demonstrated that development in the country was inhibited by water scarcity. The government in the post-colonial period therefore came up with new pathways to rectify water access, accessibility and provision challenges in the country in light of endemic dryness. Water accessibility refers to the proportion of the population with access to reliable improved drinking water supply. Improved drinking water sources include safe drinking water; piped water into dwelling or yard or piped household water connection; public tap or standpipe; bore well; protected spring or dug well; and rainwater collection.

Independence and Post-Colonial Water Supply Development 1966-2020

The opening phase of independence, 1966-1970s

By independence, there was no major water management instrument in place and no investment in the social sectors of the economy, but livestock ranching, dryland (rainfed) and irrigation agriculture and to some extent mining were beginning to grow beyond the colonial levels. The emphasis on water development in the post-colonial era bears testimony to the lack of water policy and funding for the social services sectors in the pre-independence days. Since independence, the government was determined to solve both the new and inherited water problems.

The opening phase of Botswana's independence was marked by significant expansion of both arable and animal farming. Contrary to views that these sectors relatively lacked progress in the 81 years of colonial rule (1885-1966), Steenkamp (1991) has paid tribute to Charles Rey, the Resident Commissioner at the time, for responding to the needs of the country's economy with a comprehensive water and cattle development strategy. Independence brought major expansion and improvement to water supply and management after the promulgation of the Water Act No. 40 of 1967. As confirmed by the Permanent Secretary in the Ministry of Minerals, Energy and Water Resources (MMEWR) as it was called by 2011 Paya (2011), the respective Directors of the Department of Water Affairs (DWA), Obakeng (2011), and

Khupe (2011), from the 1960s to the 2000s government emphasis was on augmenting water supply. Water supply had to be improved in the wake of a fast-increasing population and the growth of many water-based industrial activities. For instance, the population of Lobatse which was 7,613 in 1964 (two years prior to Botswana's independence) rose to more than 10,000 in 1971 and to about 19,000 in 1978. In the same period, the population of Francistown (the second largest town in Botswana which became a city in the late 1990s) increased from 9,521 to 20,000 then to approximately 38,000, and that of Gaborone from 3,855 in 1970 to 20,000 a year later and to just below 45,000 by 1978 (Nyandoro 2013). These figures do not only demonstrate population growth, but are a reflection of the resultant increase in water demand throughout the country, hence the need for policy change. In these and other towns and villages (which are much bigger than towns and cities in other countries), Botswana experienced 'water stress' which was related to factors such as rapidly increasing population leading to a sharp increase in water demand, low and variable rainfall, high rates of evaporation, and the high cost of exploiting existing water resources (Du Plessis and Rowntree 2003). These population increases in Francistown and the other centres affected people or stressed the water distribution network thus forcing the country to think about policy restructuring.

The advent of new proactive water policy in Botswana

The post-colonial period in Botswana was characterised by significant changes in water governance and it marked an important turning point in water policy development. The country's political leaders stimulated the emergence of new, but proactive water policy. The genesis of post-colonial state water policy is traceable to President Sir Seretse Khama (1966-1980) – the founding head of government. At independence Botswana (with no known mineral wealth) was the second poorest country in the world after Bangladesh (Magang 2015), but following the discovery of its natural resource endowment, namely diamond, after 1966 it became a mineral-rich and politically stable country with beneficial strategic business partnerships with major global economic powers such as the US, Britain and the Nordic countries who were involved by way of aid. In addition, there were trade relations with apartheid South Africa, at a time the Botswana economy was still highly dependent on external aid from its former coloniser, Britain, bolstered by preferential beef export arrangements. With the discovery of diamonds soon after independence, Botswana had a minerals partner in De Beers company from South Africa. However, De Beers as a powerful diamond multinational corporation was a great challenge to Botswana's economic autonomy in the region (Gapa 2016; Magang 2015).

Notwithstanding the pessimism at the beginning of independence that the new government like its predecessor would fail to provide water to the growing population, water policy was promulgated starting with the Water Act of 1967 which was the first post-colonial water statutory instrument in Botswana. The evolution and promulgation of this water legislation was a welcome development. Mining became the largest consumer of groundwater in Botswana as the Act – the primary regulation of water use, which became effective in February 1968 – afforded mining companies virtually unlimited abstraction rights over water in their respective mining areas (Nyandoro 2018).

Since the adoption of the new Water Act, it was clear that the government was ready to end the country's water woes. Water policy continued to evolve through successive presidents, Ketumile Masire (1980-1998), Festus Mogae (1998-2008), Ian Khama (2008-2018), and Mokgweetsi Masisi – the fifth president of Botswana who assumed office in 2018. All the country's presidents were forward looking as they endeavoured to meet the country's current and future water needs. Throughout the reign of these presidents, water development in Botswana did not necessarily follow a different or unique approach/policy. With the exception of some adjustments in the post-colonial period, the approach was largely homogeneous. Water policy was mostly implemented by the government through its water agencies such as

the Department of Water Affairs (DWA) for rural areas and the Water Utilities Corporation (WUC) initially for urban areas only.

DWA and WUC development: A result of inadequacy of colonial water infrastructure

The colonial water distribution infrastructure was inadequate. During the colonial era, the government implemented a project to construct a sequence of boreholes with the purpose of providing water for cattle as documented in Charles Rey's diaries titled *Monarch of All I Survey*. Considering the prevailing issue of water scarcity across the nation, some villages mushroomed around such boreholes, notably in the Kgalagadi and Ghanzi areas. However, water sources and provision of water fell under tribal administrations with a grant from the colonial authorities. The lack of a clear water policy in the colonial period, therefore, revealed an ever-present demand for water provision by various categories of urban and rural industries and users after independence, hence the establishment of the Department of Water Affairs (DWA) in 1968 and the Water Utilities Corporation (WUC) in 1970 (Roe 1980; Peters 1984; Nyandoro 2018). Following the promulgation of the Water Act in 1967 and in response to the inadequacy of water, new state-controlled water institutions – the DWA and the WUC – were thus formulated. Of the two, the WUC was established by an Act of Parliament – the WUC Act. The DWA was founded in the wake of the passing of the Water Act. DWA was one of three key technical departments within the Ministry of Mineral Resources and Water Affairs. The other two departments were the Department of Geological Surveys (DGS) – now known as the Department of Geosciences – and the Department of Mines (DOM). DWA was further given the mandate to formulate water policy while the Water Affairs was assisted in the implementation of policy by the DWA, DGS and the WUC (Republic of Botswana 1991).

DWA was one of the formal water supplying institutions together with the WUC and district councils. The latter complemented government to meet major urban, village and subsidiary water supplies and provide institutional stability. The emergence of all these key institutions prevented the country from relying on self-water providers. DWA and the district councils performed the management and operational control of all groundwater sources that delivered water to the WUC for public supply. The WUC was established to manage a single project for the supply and distribution of water in what was then called the Shashe Project focusing on copper/nickel mining in the new town of Selebi Phikwe. Among the core functions of the WUC were planning, constructing, operating, treating, maintaining and distributing water resources in the areas mandated by the government countrywide (Nyandoro 2018). However, starting with the adoption of the Water Act, concerted effort was made to broaden the WUC mandate to address the existing and imminent water shortages in the country. Whilst all water resources nationwide, including their control, were vested in the state, legislation in 1967 and subsequent legislative amendments allowed the issuance of water rights to integral parts of the state such as DWA and the Water Apportionment Board (WAB) formed in 1968. Due to water scarcity and the imperative for astute water development and management systems the Water Act, therefore, was supported by state agencies such as the DWA, the WAB and the WUC, with overarching water responsibilities.

In the late 1960s and early 1970s, these agencies (DWA – a state controlled entity and the parastatal WUC) performed largely similar or a mixture of different, and overlapping water supply functions which hindered efforts to address perennial water scarcity challenges. Their work was applauded in some instances and criticised at other times (Nyandoro 2020). Although these bodies had a relatively turbulent efficacy and history punctuated by some successes and failures, they were more efficient than the 'tribal' committees of the colonial era – already discussed in Nyandoro (2020) – because they were modern and more organised than the yesteryear committees. However, contrary to their colonial counterparts these new parastatal organs resembled a top-down management system which was premised on state centralisation

of water control with little devolution of water powers to the people and district councils. The bodies were also constrained by inadequate funding and lack of technical expertise in certain areas. In spite of their limitations, the motive for setting up such post-independence institutions after 1966 was to boost water supply to rectify the water paucity challenges of the colonial era in line with the government's new focus.

The challenges of undeveloped water resources forced and influenced the government to commit its energies and resources to overcoming water provision and management problems of the past and to facilitate modern water resource development projects. The projects included the DWA to meet the demand for water provision, building of dams and a public water enterprise, the WUC, to boost water supply because of water's political, socioeconomic, and strategic significance for growth in the post-colonial era. The projects, which were incepted as contemporary water schemes to respond to new water and economic development demands especially after the discovery of diamonds in 1967 and growth in population, were fairly successful. Dams and boreholes were built by the mid-1970s. However, most of these failed due to funding challenges. For example, notwithstanding the national value of the construction of small dams and the drilling of boreholes as part of a 1974 policy aimed at providing water resources for livestock watering and to offset the deleterious effects of perennial droughts, the policy was reported (in the mid-1980s) to have failed (Fortmann and Roe 1986). This verdict was echoed by some state policy evaluations in the 1970s and1980s (Republic of Botswana 1998 and 2004). However, although there were 'limited funds' in the colonial era for the development of water infrastructure (Parsons and Crowder 1988; Peters 1994:223) water development on a national scale failed because available funds were often deployed for the advancement and supply of water to the few mines like the Debswana's diamond mines and Tati nickel mines (that wielded so much power that they expended most of the available water resources because they had unlimited access to water) as well as ranches in Ghanzi and Tati farming districts. Limited financial resources thus did not permit large-scale investment in sectors of the economy such as water, energy (electricity), transport (roads), health and education (Nyandoro 2020).

The effort to establish water provision projects had culminated in the construction of two of Botswana's six large storage dams within the Limpopo basin in the north-eastern part of the country; initially the Gaborone Dam in 1965/1966 and secondly the Shashe Dam in 1972 which was part of the Shashe Project for the Selebi Phikwe copper/nickel mine. The projects included many small dams built in the 1980s as a major government strategy to boost water supply. Important water sector initiatives were also implemented in the 1990s, illustrating the value of water.

New Water Sector Initiatives, 1990s and Beyond

Several water sector initiatives and the reform of the two key water institutions were implemented after the 1990s. Prior to the 1990s, DWA and WUC performed largely similar but intersecting water supply functions. After 2008 under Ian Khama's presidency, however, the government implemented new measures that created a clear separation in both their roles. The reforms entailed the WUC taking over all local water authorities and some of the water supply functions of DWA (Paya 2012), and enabled the WUC to concentrate on its core water business (WUC Annual Report 2010/11). Since its inception in 1970, the WUC's mandate expanded in the 2000s to supplying all the urban centres and villages in the country with water and providing wastewater management nationally as authorised by the Minister of Mineral Resources and Water Affairs (WUC Annual Report 2010/11). It was, however, planned that by 2013 the WUC, under a new policy framework, would take over all local water authorities thereby leaving the DWA to perform its core mandate and functions of water management and policy formulation but this had not happened by 2020.

From the 1990s DWA was to operate at a higher level than the WUC with limited or no major focus

on water supply. Its new mandates involved the creation of new water resource management policies as well as dam research development. The DWA also performed a monitoring role and acted as an advisor to the Water Resource Council (responsible for the pricing and allocation of water for different uses) on water rights and other aspects (Paya 2012). Additionally, DWA looked after the Okavango, the transboundary waters of the Zambezi, Limpopo and Chobe rivers, and groundwater aquifers (Paya 2012). This was in line with Botswana's best practice model which sought to look after all the water resources of the country and prevent pollution to ensure that 'future generations will come and pass with water' (Paya 2012).

In an attempt to achieve water management efficiency, the WUC did not only assume overall responsibility over urban and rural (village) water supply, but it also introduced water levies/charges which were comparatively higher than the rates previously charged by DWA. The idea of high-water tariffs determined how WUC ran and how the community received these new changes. The result was the general outcry against high water tariffs especially since the takeover of water responsibilities from DWA by WUC (Department of Environmental Affairs 2006; *Botswana Daily News* 2013, 2019) and also since there was no contrast with the structure of water tariffs in the colonial period because that structure did not exist.

There was general concern that independence era initiatives failed to cover some sectors of the national economy. In spite of the wide-ranging water sector initiatives, from 1966 to 2020 (the time of the devastating COVID-19 pandemic) Botswana's agricultural sector for instance continued to be severely affected as water and agriculture development for the peasant sector was hampered by incessant droughts, perennial water scarcity and exorbitant water tariffs (Jerven 2010; Nyandoro 2018). The contribution of the agricultural sector to the gross domestic product (GDP) actually shrank from 1965 to the new millennium due mostly to drought conditions although the decline in agriculture was also relative to growth in other sectors, like mining and construction and not necessarily in absolute terms (Nyandoro 2018). Drought conditions, the worst of which occurred in the 1978/1979 season (Jerven 2010; Nyandoro 2018), nonetheless, had serious consequences on the nation's agriculture because it caused 'an absolute failure of crop output, while cattle owners wanted to slaughter their animals because of the lack of water' (Jerven 2010:82). Key sectors such as the cattle industry and the rapidly expanding urban and rural population required large volumes of water.

At the highest level, the state with the aid of a government department like the DWA and a parastatal, WUC, adopted modern hydrological management against the backdrop of droughts to facilitate water supply. In an arid zone beset by relentless droughts, the provision of water for various purposes was paramount in stimulating growth in a country with a few wealth-creating natural endowments apart from diamonds, wildlife and the Okavango Delta for tourism. The construction of more groundwater supplies in African or tribal reserves (created by the colonial power) which dates back to the mid-1950s and mid-1960s continued to be vigorously pursued in the new millennium in realisation of the synergies that existed in the beef/livestock, agricultural and water supply sectors in the post-colonial era (Nyandoro 2018). However, the exploitation of groundwater resources was not a case of success all the time as water shortages persisted. Therefore, the shortage of water stimulated the post-colonial government to augment water supplies through further water sector initiatives.

Shortage of water: The drive to develop and augment supplies by the post-colonial state

More concerted water resource provision, governance and management in post-colonial Botswana dates back to the 1960s, 1970s, 1980s and even the 1990s. Water treatment plants were built under the WUC. For instance, between 1985 and 2000, wastewater treatment plants were introduced in urban and peri-urban areas such as Gaborone, Lobatse and Ramostwa (Natacha 2017; Department of Environmental Affairs 2006). The new policies or mandates after the 1970s led to the establishment of plants across the country,

with the Botswana parliament and the ministry responsible for water playing an important role in all of this. It was not until the 1990s that the National Water Master Plan (NWMP) was implemented under the Ministry of Mineral Resources and Water Affairs whose role was clearer especially after 1990 when there was a visible drive towards policy creation. This was so given the huge demand for the 'precious liquid' by the diamond mining and livestock industries. Overall, there was a farsighted expansion of infrastructure and public goods in the 1960s, 1970s, and 1980s. Hence, the economic development programmes that began in the mid-1960s were successful, with the cattle economy (one of the major consumers of water) expanding rapidly (Nyandoro 2018). It quickly became apparent that Botswana was moving down a different path than its regional neighbours.

Although it has been argued that it was not until the revenues from the newly discovered diamond deposits started flowing in the early 1970s that the 'African economic miracle' truly took off, a significant source of revenue for the government in the early 1970s was renegotiated receipts from the Southern African Customs Union (SACU) (Hjort 2010). Botswana prospered as an annual growth rate of 12 to 13 per cent was sustained for decades through extraordinarily successful economic policies (such as heavy investment in infrastructure, water, health, and human capital; free trade policies; and a notable circumvention of the Dutch Disease – a cattle disease (Hjort 2010).

The mining sector grew rapidly as it had unrestricted access to water. With assured water supply and developed transportation infrastructure, Botswana emerged as a major mining country, albeit having coal, uranium and base metal resources not quite developed to the same level as diamonds – the major contributor of government revenue (Swatuk and Rahm 2004).

Indeed, after 2000 it was important to consider reviewing water policy and water tariffs especially for large extractors like mines and ranches who by 2012 only paid P60.00 to secure a water permit, and were charged P22.00 per cubic metre of water. Even at this low water rate per cubic metre some large consumers within the cattle and mining industries still felt this was exorbitant (Grynberg 2012). In their view it was expensive to pay P22.00 per cubic meter for water when they could extract it from boreholes for free. The government could make approximately P100 million from the mining industry alone if policy was aligned to achieve new profitable levels (Grynberg 2012). Without a review of water policy and water tariffs Botswana had trouble getting a loan for the planned massive pipeline project to connect to the Zambezi River given a low local revenue base and a turbulent international economic situation. The proposed system would transfer 495 million cubic metres a year of water from the Chobe-Zambezi River through 1,500km of pipeline, running from the collection point in the town of Kazungula on the Botswana-Zambia border to Mmamashia near Gaborone in Botswana, with two spur lines towards Maun in the North West District and Orapa in the Central District.

Certainly, commodification (the attempt to turn water into a product from which 'owners' can reap maximum profits at public expense) of water was achieved under the auspices of the WUC and other state institutions, and despite the outcry on water tariffs since 1970 water was still very cheap compared to its price in the region (Morton 2014). For example, the price per cubic metre of water was R1.38 in South Africa. With water shortage being a matter of world security and water experts worried by Botswana running dry, water conservation initiatives in the water sector were a step in the right direction. However, water woes were not completely eradicated in spite of the people and government of Botswana knowing that water was scarce. Despite the government's stated policy in favour of full cost recovery in the water sector, it tended to avoid controlling demand through punitive measures. Government willingness to continue delivery of water below cost was a major limitation in demand policy (Grynberg 2012). However, it was the public's attitudes about water, rather than government policy that stood as the greatest obstacle to the future of water in Botswana. For instance, there was a general belief in the country, given this De Beers

marketing slogan, that water would not run out; like diamonds, water supposedly would be forever (Nyandoro 2012a; Paya 2012). Diamonds themselves of course were not inexhaustible. It was thus a matter of national urgency to put in place an intensive education campaign targeting the public and government officials to conserve water and create climate change awareness because climate shocks such as drought were threatening water availability.

Sustainable water policy was hindered too by inadequate scientific data and ineffective monitoring or limited human resource capacity. The expertise needed for government decision making was in some cases lacking and also policies that helped monitor water use and the purpose for use did not exist. Most of Botswana's water policy was supply-oriented. What was hindering the implementation of demand side policy measures was that, although efforts were underway with the onset of independence, there was no accurate measure of demand for water use, or ways to determine need within segments of the population during the colonial period to inform the new policy (Nyandoro 2012a). The unlocking of 495 million m^3 from the Zambezi River by the Zambezi Watercourse Commission (ZAMCOM) was a vital intervention to secure adequate supply. ZAMCOM is an intergovernmental organisation set up by eight (8) riparian states that share the Zambezi Watercourse through the ZAMCOM Agreement of 2004. The conservation of a vital and scarce resource such as water was, of course, a matter of national security but also potentially a cause of conflicts. Given the relationship between water scarcity and national security, commentators on the country and Okavango water have suggested that if there was a potential conflict that could arise between Botswana and its neighbouring countries, it would likely be centred around the issue of water scarcity (Motlhoka 2020). In addition to allaying regional water conflicts in Southern Africa, conservation of water from the Zambezi and Okavango supply line was crucial if depletion of a scarce resource in Botswana was to be avoided in a time demand was rising every day.

The emergence of formal and informal car washes in Botswana has further increased demand for water beyond agriculture, livestock and mining. Curbing the plethora of informal car washes that have sprouted in major urban centres in the country was a vital water conservationist measure. The increase in the number of cars and the resultant mushrooming of car washes (the car washing 'industry') in Gaborone and Francistown was escalating demand on water, and also gave rise to increased competition for water by various sectors (Morton 2014).

A clear water management system was necessary to avert possibilities of Botswana running dry. Major regional issues, though, should be addressed to make ZAMCOM workable as Southern African Development Community (SADC) countries stood to benefit from exchanging ideas on water conservation and community irrigation projects. The mineral and energy sectors, in the three decades from 1990 to 2020, consumed most of the water used in the country (Grynberg 2012). The environmental consequences of the water used and recycled for mining purposes were countless. Available groundwater was threatened with depletion through pollution of aquifers by improperly discharged wastewater from major mining operations at Orapa, Jwaneng and Selibe-Phikwe and the coal driven power station at Morupule (Nyandoro 2012a). For the Botswana Institute for Development Policy Analysis (BIDPA) the Zambezi project could sustain Botswana until the end of the century, but mining companies were not charged for groundwater and this water needed to be priced accordingly. At a water forum or meeting (*pitso* in Setswana) in 2012, it was anticipated that mining industries would pay about P22.00 per cubic meter from Zambezi, but the BIDPA Senior research fellow and water conservationist, Roman Grynberg (2012), questioned why the mining industry did not use underground water and be charged appropriately. Over P150 million could be generated from groundwater if the mining industry was charged for the water they used. Another conservationist and hydrogeologist, Tiro Molebatsi (2012), argued that urban centres had lost the spirit of conserving water, but only those communities in rural areas were still keen on managing water, adding that more

conservation education was, therefore, necessary. He also said there should be a way to minimise the level of water evaporation from dams, hence it was imperative for the government to come up with policies that embraced the suggestions proffered at the 2012 Water Forum (also attended by the Permanent Secretary, Boikobo Paya). Given the finite nature of the resource (water), price reforms alongside the 2009 and 2013 water sector initiatives appeared absolutely necessary, but these could be lenient towards the ordinary urban and village or rural consumer.

For Botswana and many Southern African economies, the importance of water not only as a distinctive life saver and the significance of management of finite surface freshwater and groundwater was a major security concern (Nyandoro 2018). This was so because in the country as in other parts of the region like Namibia water shortages caused by climatic change were endemic (Nyandoro 2018). The resort to sinking wells and drilling boreholes to tap groundwater was, therefore, not only frequent but still a priority in some of Botswana's villages. Many stakeholders and researchers argued in favour of improving and enhancing water supply management and the development of sustainable hydrological systems to alleviate shortages (Ganesan 2001; Nyandoro 2020). Along with augmenting supplies, the government endeavoured for high levels of water management as enunciated at the 1992 Dublin International Conference on Water and the Environment (ICWE).

Importance of water management to Botswana's development

Water was fundamental for sustainable development (UNDP 2007) and its scarcity hindered development. Frequent droughts exacerbated water scarcity and had informed Seretse Khama's water improvement policy after 1966. In fact, Botswana attained independence in 1966 amidst one of the severest droughts in living memory. Clearly, for a long time, the most troubling fact staring Botswana in the face was the pattern of intensifying drought. Of the 33 years between 1980 and 2013/14, more than half (that is, 18 years) were drought years, and on three occasions (1981-1984; 1991-1992/1993-1994; and 2002-2006) drought was 'episodic' (Nyandoro 2018). It extended over four or five successive years of varying intensity. There were also intermittent spates of drought in the six years from 2014 to 2020. Water and climate experts expected the situation to deteriorate further (Hoegh-Guldberg *et al*. 2018) as drought was projected to be a major threat to water security not only in Botswana but in the whole southern Africa region from 2018 to 2020.

Due to the prevalence of drought the government made several efforts to ensure a steady supply of water while, at the same time, focusing on how best to conserve the little that was available. However, between the 1990s and the 2000s attempts to satisfy humans' drinking water requirements and conservation were frustrated by a combination of funding challenges and management inefficiencies which included not enough attention to pipe bursts and water leakages (Nyandoro 2018). Efforts to meet agricultural and other competing water requirements were made but decentralisation of management still had to be pursued with greater vigour to move away from state centralised control and management of the water sector (Nyandoro 2018). Decentralisation, however, was not an advocacy for removal of the state. Whilst the state had a role to play in water delivery and management, (notwithstanding the arguments against this), efficient management and governance would be achieved through decentralising the functions of state agencies and giving autonomous power to non-governmental organisations (NGOs), water user associations and private institutions. This was a push for water privatisation (when private corporations buy or operate public water utilities) despite arguments against privatisation. Such an approach however strengthened the government of Botswana's central theme of good governance for water preservation and utilisation. One of the merits of privatisation was that it enhanced policy formulation, legislation and the creation of democratic space which the country continued to enjoy (Nyandoro 2018).

Additional options for the improvement of water provision included advancing and consolidat-

ing efforts on integrated water resources management (IWRM) and water demand management (WDM) initiatives such as rainwater harvesting, storm water capture and diversion, re-use for irrigation of fodder, farm gardens using minimum tillage and grey water irrigation, water efficient appliances in households, industries and agriculture, reduction of leaks from distribution systems, use of lower pressures, progressive pricing policy, eco-sanitation and consumer education (Arntzen *et al*. 1999; Rahm, Swatuk and Matheny 2006). The use of green plastic jojo water tanks was important in areas where dams and other water storage reservoirs were still absent. The government of Botswana had to aggressively pursue more multiple alternative water storage technologies. However, by 2020 the government's approach to the actual implementation of these measures was haphazard at best, tending to surface only in the face of severe drought as in the case of 1982, 1984 (Holm and Morgan 1985), 2002-2006 and 2011-2014 (Nyandoro 2018). Eventually, though, there was a movement away from supply augmentation towards WDM.

Notwithstanding the scarcity factor, by 2020 Botswana had made enormous efforts to cater for all actual and latent water users in both the urban and rural settlements using the WDM approach. For instance, when Festus Mogae assumed the presidency of Botswana in 1998 there were 460 rural village water supply schemes operated and maintained by the various district councils situated throughout the country (Nyandoro 2018). Mogae, like his predecessor (Sir Ketumile Masire) realised that institutional stability depended on the strength and inclusiveness of village institutions in maintaining water supply to the 16 large villages where DWA provided production, consumption and loss figures for the period 2000-2010. These villages were Tsabong, Ghanzi, Kanye, Ramotswa, Mogoditshane, Tlokweng, Molepolole, Mochudi, Thamaga, Mahalapye, Palapye, Serowe, Letlhakane, Tonota, Maun and Kasane. Successive presidents, Ian Khama and Mokgweetsi Masisi, preoccupied themselves with facilitating water supply at a cheaper cost to ordinary consumers. On the whole, the ruling Botswana Democratic Party (in power since 1966) spearheaded the national discourse concerning the construction of dams on rivers in the northern region, the distribution of water to the southern region, and the utilisation of water resources for agricultural irrigation **(**Kedikilwe 2008). Indeed, government efforts were continually made to allay water shortages in a water stressed country (Nyandoro 2018).

Continued government efforts to end water shortages in Botswana, 2000-2020

In the 2000s, the government continued to be committed to end water shortages. At the highest state level, in 2011 President Ian Khama acknowledged the legacy of an inadequate water-infrastructure inherited from the colonial government and the importance of water to 21st century Botswana when he stated that 'there are state initiated projects such as water and electricity that are running that will not be allowed to suffer as they are central to the development of the country' (Khama 2011). As drought conditions intensified in the face of increased global warming, water demand which was low in 1990 increased considerably by 2020 and even beyond (Nyandoro 2018). Projections during the 2012 water *pitso* in Gaborone confirmed that in the face of escalating demand, water-shortage in the future was a likely prospect if sufficient measures were not taken to avoid it (Nyandoro 2012a; Nyandoro 2012b; Morton 2014). As indicated in a media report on Nyandoro's Botswana Society water forum presentation, contemporary water sector policies needed to be adjusted in line with increasing demand and changing climatic conditions to save this finite national resource from running dry in a few years (*Botswana Gazette* 2012). Confirming the media observation, on 21 September 2015, Bloombeg (2015) reported that the Botswana capital's water supply options could dry up amid drought and as South Africa threatened to cut off supplies to Gaborone in October 2015. Parts of the city were already without water for up to three weeks at times (Bloombeg 2015). Given Botswana's water loss through leakage per year and other factors, the country could not afford any inefficiencies in the distribution of a scarce commodity envisaged by the UN to be under threat of depletion.

Agreeing with these sentiments, Kabelo Seitshiro of the *Sunday Standard* (2020) reported that the permanent secretary in the Ministry of Land Management, Water and Sanitation Services (MLWS), Bonolo Khumotaka, said Botswana's total annual water-demand at 245 million cubic meters was expected to increase to 340 million cubic meters per year by 2035. Khumotaka stated that her ministry was working diligently on the Botswana Water Security Strategy to address short, medium to long-term solutions to water demand deficits countrywide (*Sunday Standard* 2020). If predictions by scholars, the media and other agencies were correct, Botswana was likely to be 'very thirsty' and among the first nations to feel the water crunch, hence the time the country had to secure delivery, eliminate wastage and curtail/restrict use especially under drought conditions was running out. All the projections, accurate or not, therefore, pointed in the direction of the necessity for harnessing efficient water demand measures as controlling demand, for policy makers, was an important way of increasing supply and water use efficiency. Despite water deficiency projections, however, the permanent secretary in the MMEWR, Paya (2012), defended government water policy when he said that 'everything [that was observed by researchers during the 2012 *pitso* to be] lacking [in the water sector] was [actually] covered in the new policy [being planned for implementation in 2013]'. He was correct, but only if the 2013 new water policy in the country was effectively and efficiently implemented to address the challenges faced by the water sector including endemic dryness. Ten years on, Botswana is still pursuing the three overarching principles of equity, efficiency and sustainability.

Thus, in the face of droughts water continued to be a scarce commodity. In the post-colonial era the government of Botswana, through state water agencies such as the DWA and WUC which provided the essential link between policy development and practice, thus concentrated on augmenting water resource provision and management in a semi-arid environment. Planners for all the urban (including Gaborone, the capital) and rural villages of Botswana, therefore, took drought and water scarcity challenges in their stride and planned to have more water delivery and adaptation strategies to reduce water shortages and augment supply. While drought and water problems existed, the state can, however, be commended for coming up with structures to address water supply and management challenges in the post-colonial period although more still needed to be done. In fact, devising coping mechanisms at both the individual, city, village and state or country levels was essential in the new millennium, and education, research, innovation and knowledge generation guided the country's efforts to ensure lasting and long-term water-security beyond 2020.

Conclusion

In conclusion, this paper is on a very important subject – water – a resource that is so essential to the livelihoods of people, animals (both domesticated and wild), and even for industrial use. It offers some valuable insights on the historical trajectory of water development in post-colonial Botswana. It is important and insightful as it is potentially useful to policy makers in government because water is a scarce resource in the country, with a history spanning the colonial to the post-colonial period. Using a wide array of relevant sources, it covers the history of water management and water provision over time, showing the deficiencies and strengths in planning, management and provision across the historical periods. The paper has illustrated that in the post-colonial period (particularly, from the end of colonial rule to the first two decades of the twenty first century) water provision and the management of bulk water supply to the relatively sparsely populated African areas in Botswana significantly improved through state and other actors' efforts despite some critical water shortages and water policy challenges.

Overall, the post-colonial period was not developmentally static as the colonial era. It showed development progress in ranching, agriculture and mining partly because there was a major commitment in erecting water infrastructure throughout the country by astute state institutions such as DWA and the

WUC. Since independence in 1966, the state created modern hydrological management institutions and water projects against the backdrop of droughts to facilitate water supply in order to meet the insatiable demand for water by an ever-growing population and industry. Respective Presidents correctly viewed hydrological projects as central to the development of the country and its industrialisation. As a result, numerous efforts were put under way in the new millennium to enable the post-independence government, more than its predecessor, to rectify the challenge of water paucity wrought by desert conditions to achieve sustainable growth and development.

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Dedication

This water paper is dedicated to my colleague and mentor, Professor Fred Morton, who retired from the University of Botswana (UB) in August 2020 following an impeccable career at this institution stretching from February 1976. Fred was a Professor of History, a leader in the Botswana Society and Livingstone Kolobeng College Water Forum Series in the capital, Gaborone, and now Professor Emeritus of the Loras College.

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