

## WATER MANAGEMENT FOR WATER SECURITY (Water resource management in Botswana: a corporate undertaking)

By Mark Nyandoro

### Introduction

Water scarcity is arguably the biggest limiting factor to national development in Botswana. Shortage of water is due to insufficient rainfall (ranging from 250 mm to 600 mm per annum) and very high rates of evaporation (2 000 mm per annum from dams alone) that affect surface water reservoirs such as wells, dams and open tanks, with average daily maximum temperatures in the summer of about 32°C sometimes reaching extremes of almost 42°C. This is aggravating the situation in a country with inadequate fresh surface water due to the absence of perennially flowing rivers, except for the international or transboundary waters of the Zambezi, Limpopo and Shashe rivers.

Botswana's water situation is exacerbated not only by low precipitation and excessive evaporation rates, but also limited groundwater recharge from surface water resources. On one hand, erratic precipitation and Botswana's proneness to drought due to the precariousness of rainfall require the adoption of appropriate water management strategies such as integrated water resources management (IWRM) to help counteract the

**Figure 1: Extent of aridity and poor vegetation cover in Kgalagadi South, Botswana**



**Source:** Botswana Government, "Monthly Vegetation condition," Department of Forestry and Range Resources, Vol. 1, Issue 1, January-April 2008 at [http://www.mewt.ov.bw/uploads/files/dfrr%20vegetation\\_condition.pdf](http://www.mewt.ov.bw/uploads/files/dfrr%20vegetation_condition.pdf), accessed on 2011-08-18

damaging effects of desertification. On the other hand, since water is scarce, astute management is required to achieve sustainable development.

Climatic change is expected to increase rainfall variability and the stress on livelihood activities, and worsen Botswana's water situation. The imperative to ensure water security should therefore be very high.

This policy brief evaluates the challenges and opportunities in Botswana's water management

sector and the measures that can be implemented.

### ABOUT THE AUTHOR

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## Pre-colonial and post-independence approaches

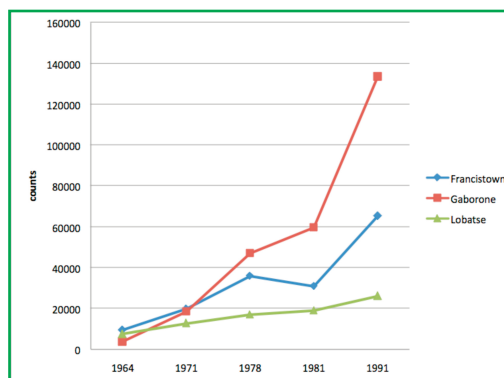
Historically, the pre-colonial economy relied on cattle husbandry, for which water was vital. From the 1880s to the 1920s, the British Protectorate Administration largely relied on a policy of indirect rule, using decentralised structures such as local tribal committees, borehole syndicates and traditional chiefs for water management. These exercised control over water points, and were often characterised by rudimentary, inefficient and poor management.

From the mid-1950s to the mid-1960s construction of ground-water supplies was vigorously pursued. However, up till 1955 there was no major investment in water infrastructural development because of limited financial resources prior to the discovery of minerals in the early 1960s. At independence (1966) Botswana's population was 500,000. Its economic growth was driven in the 1970s and 1980s by agriculture and mining. By 2010 the population was over 2 million and the national herd was over 3 million, up from 700,000 in 1940.

There was a phenomenal increase in demand for water, largely due to industrial development and the rise in population. From 1990 to 2010 most of the water used in the country was consumed by the mining and energy sectors. Botswana faced the problem of how to equitably distribute water among its rapidly growing population, given the enormous stress imposed on water resources by the demands of a growing economy.

Figure 2 illustrates that the population of Botswana's major urban

**Figure 2: Evolution of Urban population (1964-1991)**



areas was growing at a rate that dictated the need for more water as shown in Table 1 below.

**Table 1: Water demand from 1980-2004 ( $\times 10^6$  m<sup>3</sup>/Year) (excluding villages not connected)**

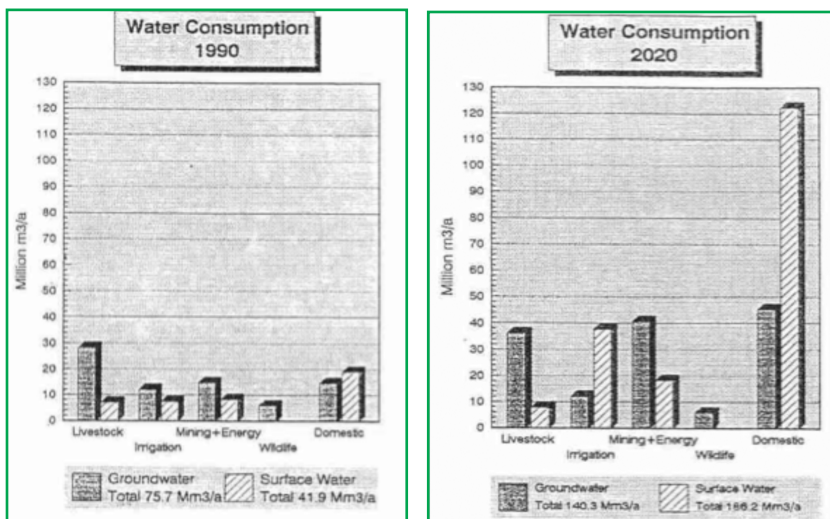
1980	1982	1984	1986	1988	1990	1992	1994	1996	1998	2000	2002	2004
Less than 10	Less than 10	Less than 10	11	15	20	23	27	32	37	45	Over 45	Over 45

The post independence government was keen to address inherited water sector problems towards achieving the industrial transformation of Botswana, and securing adequate water supply. Figure 3 below illustrates water consumption figures for 1990 and projections for 2020.

The Water Act, which was passed in 1967, centralised management strategy by placing major water institutions such as the Department of Water Affairs (DWA) and the Water Utilities Corporation (WUC) under direct state control. DWA and WUCs are often called upon to assist with the rehabilitation and maintenance of small dams, boreholes and wells to ensure water security.

The current water policy, initiated in May 2009 under the new water sector reforms, following the adoption of the National Water Master Plan (NWMP) of the early 1990s, is a post-colonial attempt to introduce a clear water policy for Botswana. It focuses on supply-side interventions in response to increasing demand.

**Figure 3: 1990 water consumption / projections for 2020**



## Water resources: challenges to sustainable management

The shortage of water in Botswana is real and continues to present the government with challenges in restoring social and economic justice. In spite of a relatively effective supply strategy, the government of Botswana does not have a comprehensive demand policy and overlooks the value of decentralisation to hydrological management. This policy brief is not advocating for the removal of the state, but evaluating the need for a new policy orientation and direction in Botswana.

Attempts to satisfy competing claims, notably potable water requirements, agriculture and livestock, wildlife, irrigation, industry, mining and energy generation needs, from the Protectorate era to the present have been frustrated by a combination of funding problems and management inefficiencies.

Supply is complicated by system water losses through old pipes that need replacement. The average total water loss through leakage per year for 450 villages is estimated to be 3.5 million cubic metres (Mm<sup>3</sup>) of water which is equivalent to P10.5 million (USD1,348,000). Clearly, the country cannot afford these inefficiencies in the distribution of a scarce commodity envisaged by the UN to be under threat of depletion by 2025.

Available groundwater has been contaminated through pollution of aquifers by improper wastewater discharge, for example from major mining operations at Orapa, Jwaneng and Selebi-Phikwe and by the coal-driven power station at Moropule. The environmental consequences of water used and recycled for

mining purposes are countless, particularly since such water is unsuitable for the irrigation of edible crops or fruits.

The pollution caused and its allied effects pose daunting environmental and developmental challenges that threaten sustainability. The time to adopt appropriate legislation to curb water pollution, wastewater or effluent discharge which are contaminating valuable underground water resources, as well as to implement cost-effectiveness and efficiency in consumption patterns, is now.

### Water resources: Opportunities and Options

Whilst the state has a role to play in water delivery and its management, more efficient management and governance can 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 facilitates good governance for water preservation and utilisation and enhances policy formulation.

Some options for Botswana include advancing and consolidating current efforts on integrated water resources management (IWRM) and water demand management (WDM) initiatives such as rainwater harvesting, storm water capture and diversion, progressive pricing policies, eco-sanitation and consumer education. Tanks could also be considered, as has been done in Burkina Faso. The government should more aggressively pursue these multiple alternatives and innovative technologies, including solar-

power desalination plants and wastewater recycling to improve water use efficiency.

Transboundary or international water agreements targeting the use of the Zambezi, Limpopo and Shashe have to be forged to give Botswana the hope of uninterrupted and abundant water supply in the absence of perennially flowing internal rivers. Nevertheless, vital economic sectors require regulation of their daily, weekly, monthly and annual consumption in the face of water scarcity.

There is therefore the urgency to harness appropriate technologies to mitigate water shortage vulnerabilities. To achieve this, large capital outlays are needed, which makes this not only a government responsibility, but the collective responsibility of all stakeholders from state institutions such as the Department of Water Affairs and the Water Utilities Corporation to international institutions such as the UNDP, civic society, industry, including mining and academic researchers.

Government needs long-standing partnerships that can fund water development as well as proffer new ideas. The absence of such partnerships hinders efforts at creating synergies in the water sector. Instead of the state bestowing the mandate to formulate water policy on the Ministry of Minerals, Energy and Water Resources (MMEWR), assisted in policy implementation by the DWA, the Department of Geological Surveys (DGS) and the WUC, it should embrace consultative dialogue with all major stakeholders in policy formulation.

# Policy Recommendations and Conclusion

## This policy brief recommends:

1. Water scarcity due to aridity demands a corporate water management strategy to correct past and present errors towards ensuring water security and achieving sustainable development.
2. Botswana needs to harness astute management approaches and strengthen institutional capacity and institutions responsible for efficient water development and supply.
3. In a post-colonial state there is a need to improve on weak managerial practices and consolidate strong management strategies that rethink water management based on newer and more sustainable water management methods.
4. Existing alternative technologies to improve water use efficiency should be more intensively pursued and newer technologies tried.
5. Water institutions (DWA and WUC) should have a national outlook and be strengthened through merging them with the MMEWR under a strong water resources commission, like in Ghana.
6. The government of Botswana should design a national water policy to provide a framework for the sustainable development of the country's water resources:
  - (a) governance - oriented approach comprising all stakeholders (participatory democratic approach) in developing hydrological resources and institutions;
  - (b) strategically repositioning Botswana to harness newer, home-grown and user - friendly technologies to alleviate water paucity and achieve optimum growth; and
  - (c) the establishment of a research institute/centre funded from local, bilateral and multilateral sources that emphasises long term research partnerships with the government, to generate a water and other natural resources databank.
7. Staging of annual symposia or conventions on water to learn new practices, and analyse and review alternative policy responses, in order to understand how other countries faced with similar challenges to Botswana's have overcome their problems.
8. Promoting the history of water development and management, particularly with regard to the historical investigation of trends over a long period.
9. Building capacity and new partnerships through water research and sharing science and technology solutions as a

topmost priority, because water is at the core of the global development debate.

As drought conditions intensify in the face of increased global warming, the MMEWR, DWA, WUC and the National Water Master Plan (NWMP) of Botswana admit that water demand which was low in 1990 will increase considerably by 2020. The effective management and conservation of water therefore has implications for current and future water availability, accessibility, agricultural production, food security and poverty reduction as stipulated under the Millennium Development Goals (MDGs).

To ensure water security, both surface water resources and underground aquifers, which represent accessible freshwater, have to be protected for long-term sustainability. Botswana, as it develops an appropriate, clear and sustainable water management strategy, must, in line with the 1991 Dublin Conference on Water Management, take "actions which promote more desirable levels and patterns of water use".

Finally as an integral part of its hydrological planning, it must consider other alternative measures, as well as explore internal and external funding opportunities. ■

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### **Water Resource Management Perspectives in Botswana: A Contrast between the Colonial and Post-Colonial Periods up to 2010**

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