

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

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# Introduction (1)

- Botswana is a water-stressed country
- It is prone to drought - precariousness of rainfall
- Below 250mm per annum in the southwest and approximately 600mm per annum for the northeast
- Since water is scarce it requires astute management to achieve sustainable development

## Definition of water management

- Hydrological management is defined as an activity that embraces planning, developing, distributing and managing the optimum use of water resources

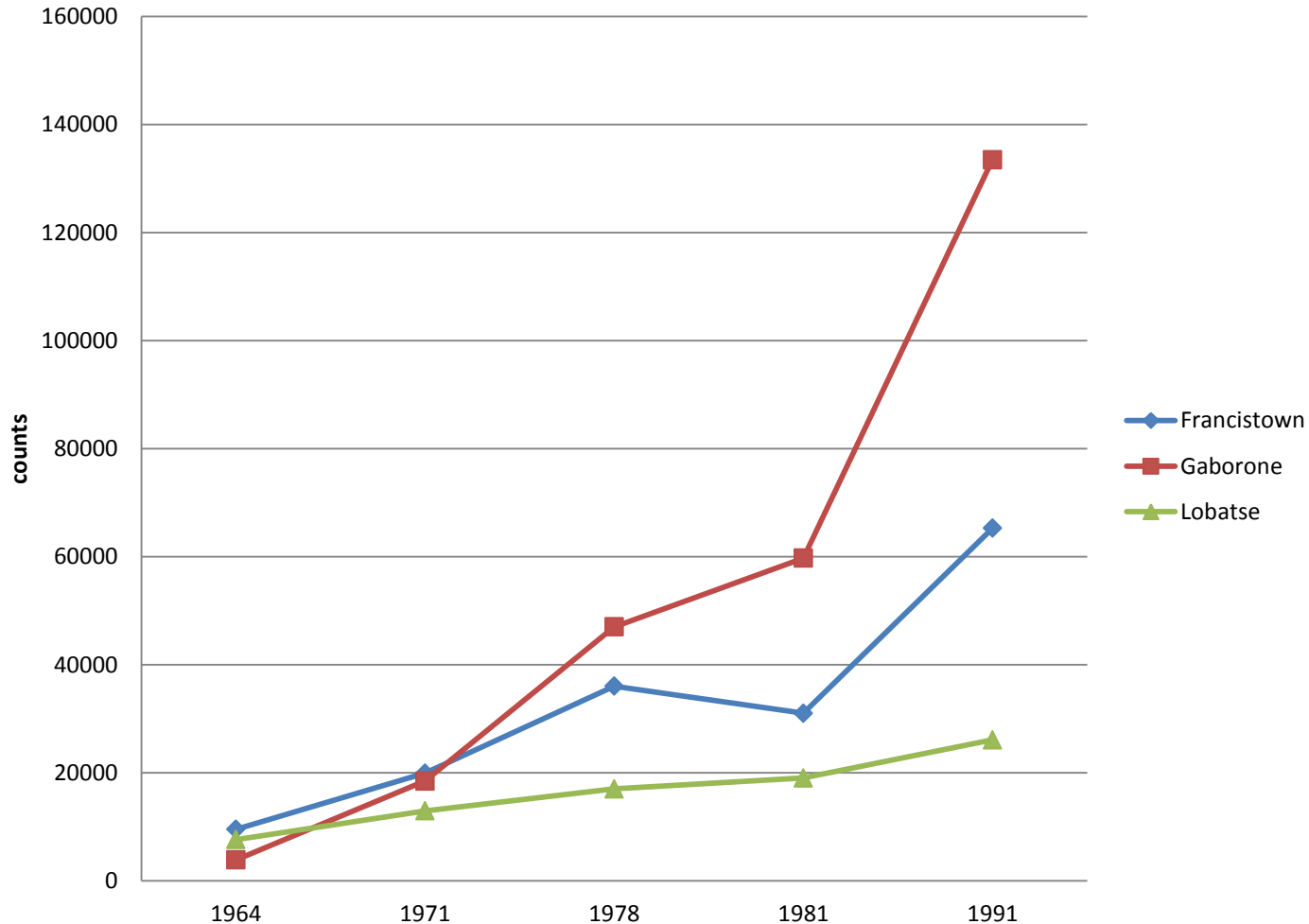
## Introduction (2)

- To achieve good water management, collective participation between state and non-state actors is an important strategy
- Water shortages are exacerbated by the vagaries of the weather and inept management since colonial times
- Fresh surface water is inadequate due to absence of perennially flowing rivers

# Introduction (3)

- Since independence and the discovery of diamond by De Beers at Orapa in 1967 mining has been competing for water with the livestock, irrigation, potable supply sectors, and emerging industries
- At independence (1966) population was 500 000; by 2010 population over 2M and the national herd was over 3M up from 700 000 in 1940
- About 80% of the human and livestock population thrives on groundwater, which like any other source of water, requires impeccable management
- Thus, the buoyant phase brought by mining and the beef industry was challenged by the enormous stress imposed on water resources by the demands of a growing economy

# Urban population and water demand (1964-1991)



- Between 1964 and 1991, 34% of Botswana's population relied on boreholes and wells. \* By 2010, demand for water increased as groundwater was catering for 60% of the national water supply – Government is trying to increase piped water infrastructure
- Clearly, the economy is growing (E.g. In 1966 GDP was P37 M; by 1979 (P650 M); by 1993 (over P7 billion) and in 2010 it was estimated to be US\$ 15.246 billion)
- However, the stress on water resources due to competing claims and a difficult geophysical environment is a paramount challenge to sustained development in Botswana
- **N.B.** Botswana is not only trying to evolve a clear water policy, but it is also grappling with developing an appropriate water management strategy – \* attempts to achieve this dual objective are under way as evidenced by the work being carried out by the state agencies (DWA and WUC)

# Justification

- The main justification for this country case study of Botswana is not only aridity, but the study is also impelled by the desire to understand how different water authorities coped with the difficulties they faced.
- In addition, it is also realized that important lessons can be drawn from countries like Botswana that are emerging from a colonial structure with no major investment in water

# Major colonial benchmarks in the water sector (1)

- 1885-1895 marked a quiescent phase in erecting hydrological infrastructure such as dams and piped facilities
- Communal/corporate management of water wells dated back to the pre-colonial period (**Bottom-up management structure**)
- “Tribal” committees up to 1920s (Poor management)
- NAC/AAD (1920) and agency
- Borehole syndicates (1920s-1930s) - Efficient management
- **Pim Report (1933)** – improved water supply
- Irrigation schemes were initiated in the late 1940s



## Major colonial benchmarks in the water sector ( 2)

- Small, medium and large dam construction projects were adopted and implemented as a major strategy by 1965. \*The construction of groundwater supplies was also vigorously pursued
- Colonial Welfare and Development grants were utilised for the installation of Surface Water Development Schemes, but not enough \* (£500 in 1927; **None** in 1935-1946; £140 000 in 1956; £750 000 in 1961; £6 M in 1965 & £3 378 000 in 1966). By 1966 still no Water Department, no major water management instrument in place and no investment in most social sectors
- Therefore, the pre-independence period has been perceived in some circles as developmentally static and the period after that year as one of substantially greater development activity in the three major sectors of the economy

# Post-independence water management (1)

- On the contrary, independence witnessed more significant expansion of the water supply and management sectors starting with the promulgation of the Water Act (1967)
- This culminated in the formation of state agencies DWA (1967), the Water Apportionment Board (1968) and the WUC (1970) with overarching water responsibilities

## Post-independence water management (2)

- Efficacy of these bodies – More efficient than the “tribal” committees, but state centralization of water control (**Top-down management system**) with little devolution of water powers to the people and District Councils. These bodies are mainly constrained by inadequate funding and lack of technical expertise in certain areas

## Water supply and demand (1)

- In the post-independence period, Government emphasis is on augmenting water supply
- Considerable government investment in technical capacity and human capital in a continuous effort to optimally exploit both surface and groundwater resources
- E.g. The completion of Phase I and Phase II of the North South Carrier Water Project (NSCWP) at a cost of US\$1.5 billion and US\$2.5 billion respectively – the hydro-project involved the construction of Dams and pipelines to convey water to villages and urban centres
- Effort plausible, but not taking the major rural water developmental burden off the DWA

## Water supply and demand (2)

- Supply is complicated by system water losses through old pipes. E.g. The average total water loss per year for 450 villages is estimated to be 3.5 M m<sup>3</sup> of water which is equivalent to P10.5 million. **N.B.** 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
- On the other hand, controlling demand is perceived by policy makers as an important way of increasing supply
- Possible Water Demand Management (WDM) measures being considered in Botswana consist of rainwater collection; storm water run-off diversion and collection; re-use especially for irrigation of fodder; progressive pricing policy; water-efficient appliances in households, industries and agriculture; development of non-water-borne sanitation systems (eco-sanitation), and consumer education

# Challenges to sustainable water management

- The main challenges to the sustainable management of diminishing water resources in Botswana are multiplex
- These can be understood by considering, *inter alia*, the character and pace of development, institutional overlap, human resource capacity, cultural impediments and power relations

# Preliminary Conclusion

- Similarities and differences in the manner water was supplied and managed in the colonial and post-colonial periods
- Thus, water supply and management have faced several challenges in these two periods
- There is need for sustainable water resources management in Botswana - one of the driest countries in Sub-Saharan Africa
- Botswana needs to embrace integrated water resources management to sustain mining, cropping, livestock ranching, tourism, industrial and domestic needs

## Preliminary Conclusion (2)

- Currently, the government is aggressively pursuing multiple alternative and innovative technologies such as rainwater harvesting; storm water capture and diversion; solar-power desalination; and wastewater recycling in order to increase water supply and to improve water use efficiency
- My study demonstrates that development in Botswana is inhibited not only by water scarcity, but also inept management of a finite resource and the lack of coordination between institutions at the policy level
- The limitations of the colonial water infrastructure are clear, but parastatal bodies such as DWA and WUC need to be reformed and strengthened
- There should be a clear separation of powers between the two and greater financial investment to enhance their operations



# Preliminary Recommendations (1)

- There is a need to improve the weak managerial aspects of the colonial period, the consolidation of the strong management strategies of the post-colonial state as well as a rethink of water management (based on historical experience) to implement newer and more sustainable water management methods
- The alternative and innovative technologies such as rainwater harvesting and wastewater reuse should be more intensively pursued
- Other technologies that are commensurate with an arid terrain and based on other countries' experience can be tried

## Preliminary Recommendations (2)

- To fully implement newer technologies, the injection of substantial amounts of funds by the government in the water sector is inevitable
- Water bodies (DWA and WUC) need to be fully capacitated. **N.B.** They don't need to be replaced, but they need to be strengthened

# THANK YOU



# Announcement:

Next Seminar : Friday September 2, 2011

Topic: **Modeling agronomic and economic flows in a watershed across the Niger river: a case of the irrigated perimeter of Gaya**

Speaker: **Dr. Mamadou Adam**

Time: **10 am prompt**

Venue: **UNU-INRA Conference room**