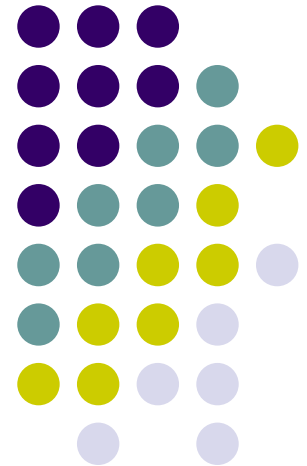
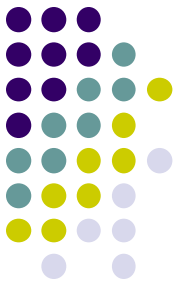


# The Flow Variability of the Phuthi River and its Implications for Water Supply in Maseru

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Department of Water Affairs

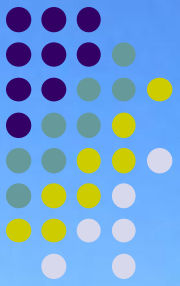




# Introduction

- In Lesotho surface water resources are estimated at 4.73 km<sup>3</sup>/year, far in excess of the country's requirement (Ranthamane, 2003).
- The seemingly abundant availability of water can be misleading as only a fraction of it is used.
- This is due to high runoff and inaccessible mountain terrain and the fact that major capital-intensive engineering that Lesotho cannot afford would be required to harness this water for use by people (Molapo 2005).
- In addition, water is always unevenly distributed over space and time and these results in water being available in abundance where it is not needed and lacking in areas that need it most.
- This has led to unprecedented demand for water supply and sanitation services, which has resulted in about half of Maseru's inhabitants lacking an adequate supply of safe water, and having to rely on water vendors or joining the long queues at public water points (Sekhonyana, *et al.* 2005).
- [Lesotho River Station Map](#)

# Introduction Cont....



- Climate of Lesotho is sub humid to temperate with warm and rainy summers, cool to cold and dry winters
- Average monthly temperatures in the lowlands vary from 6.7° C to 21° C in January
- In the highlands mean monthly temp. vary from -7° Celsius in June to 10.8° C in January
- Mean precipitation varies from 500mm and 1200mm in the highlands
- Approximately 780 mm fall annually over the country from Oct to Apr
- In winter snow cover much of the mountains

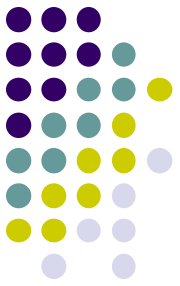


# Introduction Cont...



- The Phuthi River has a total drainage area of 13, 442 km<sup>2</sup>
- The mean annual discharge is estimated at 36m<sup>3</sup>/s
- The river flow, like the rain fall is highly seasonable

# Description of Study Area



- Lesotho is a land-locked mountainous country completely surrounded by the RSA
- It has a total area of 30 350 km<sup>2</sup>,
- Altitude varies from 1 500 m to 3 482 m above sea level.
- It is located between latitudes 28° 35' and 30° 40' South, and longitudes 27° 00' and 29° 30' East (FAO 2005).
- It has four geographic regions,
  - Mountainous 59%
  - Foothills 15%
  - The lowlands 17%
  - Senqu (orange river valley) 9%
- Lesotho has ten administrative districts including Maseru
- [Map of Lesotho.doc](#)



# Description of Study Area

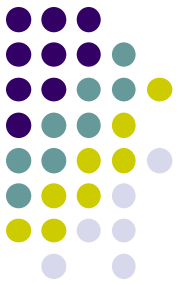
## Cont.....



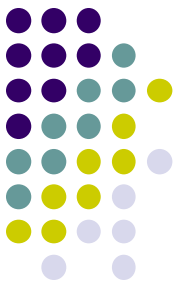
- Maseru is the capital city of Lesotho; it is a fast growing city with the population estimated to be 227,880 in 2006 and its land area at 150 km<sup>2</sup> (Bureau of Statistics 2007).
- In the city, like in other urban areas of the country, water supply and sewer services are provided by Water and Sewerage Authority (WASA), a parastatal body established under the Ministry of Natural Resources in 1992 (Sekhonyana *et al.* 2005).
- The main raw water source for Maseru is an off-channel storage reservoir located to the North Eastern side of the city (Maqalika Dam).
- The reservoir receives water through the natural inflow from the catchment as well as the water from the nearby Phuthi (Caledon) River which is the main source. Phuthi River has an average flow rate of 25 m<sup>3</sup> per second (TAMS, 1996)

# Description of Study Area

## Cont.....



- Water from the river is pumped into the reservoir through a transfer pumping station located at the river bank. The Maqalika reservoir has a total yield of 23.7 MI/day (CEC, MM, and GWC 2003).
- Phuthi River dries up during drought and the Maqalika Dam also dries up if the drought is persistent, then water is released from the 'Muela Dam.

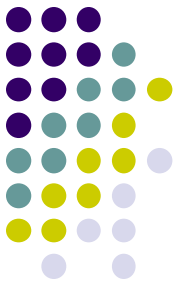


# Home Organization

- Water resources management is the responsibility of Ministry of Natural Resources through, CoW, DWA, DRWS, LWSU, LHDA
- DWA is responsible for monitoring, assessment and management of surface water resources, ground water resources and water quality throughout Lesotho



# Objectives of the Presentation



- **General**

The main aim of this presentation is to give an overview of the potential impacts of water shortages in the economic activities in Maseru

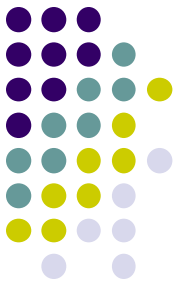
- **Specific**

To assess flow trend of Phuthi River.

To identify factors influencing water shortage.

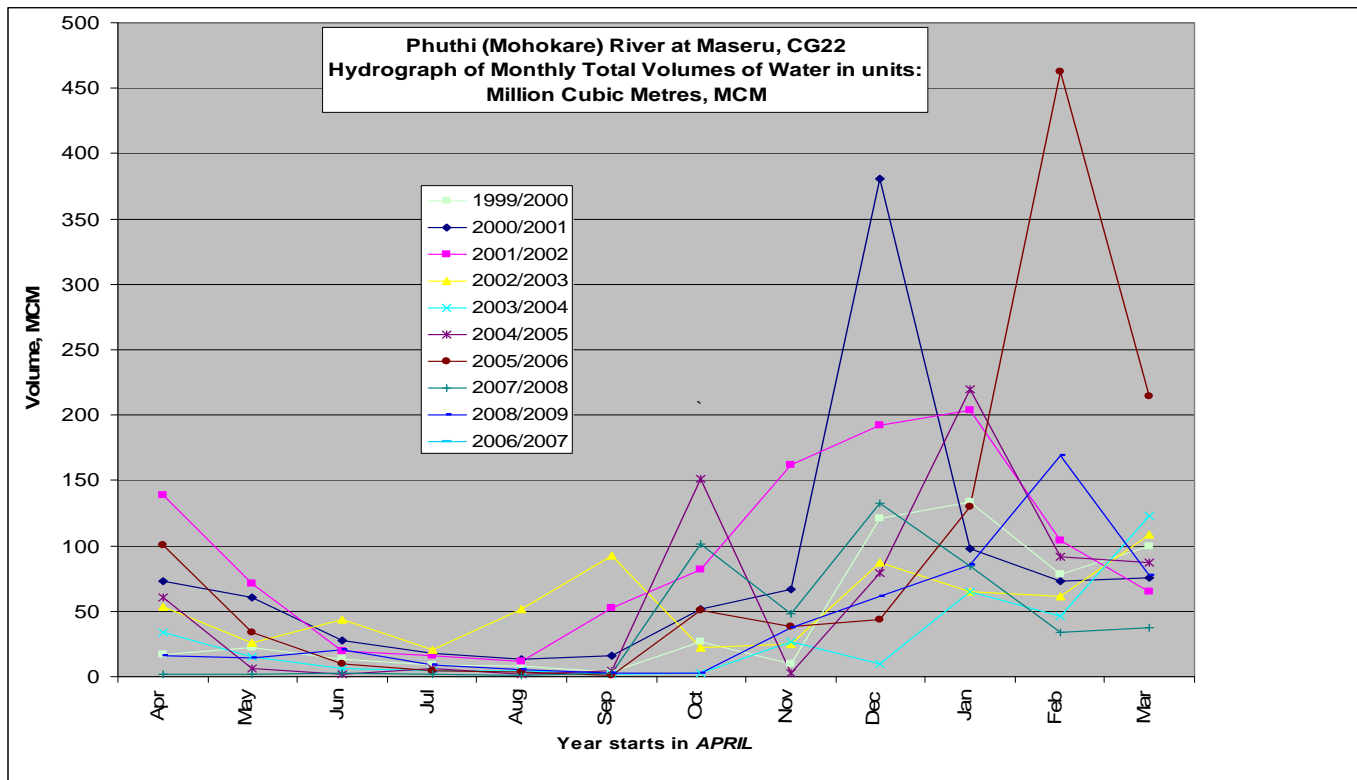
To establish the existing water demand .

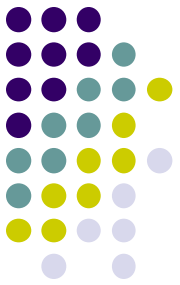
To identify best practices to address the water shortage.



# Flow Trend of Phuthi River

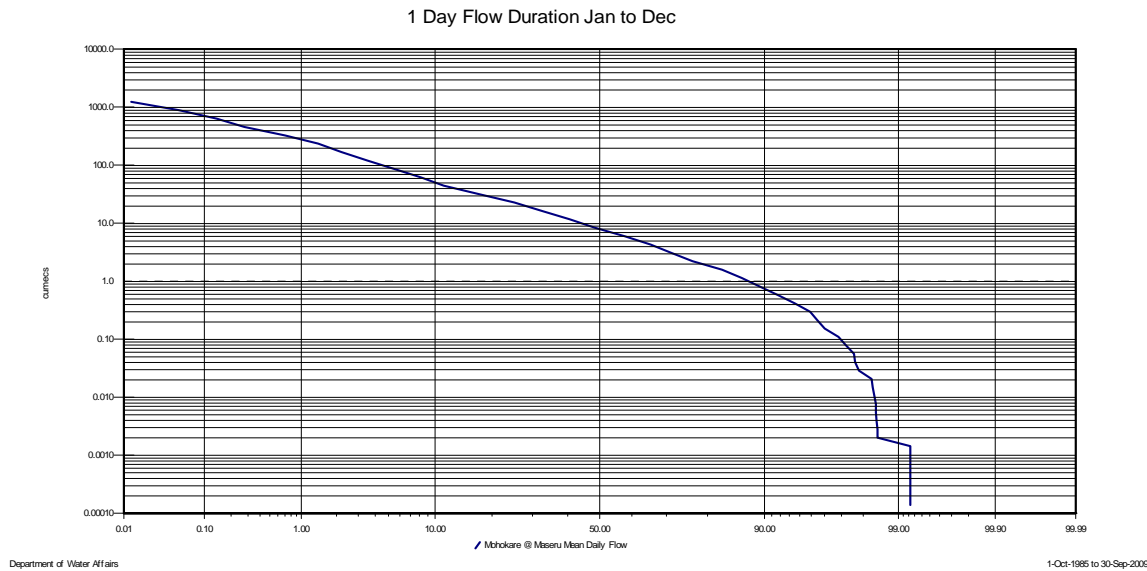
Hydrograph of Monthly Total Volumes of Water for Phuthi River at Maseru



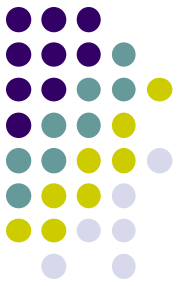


# Flow Duration Curve

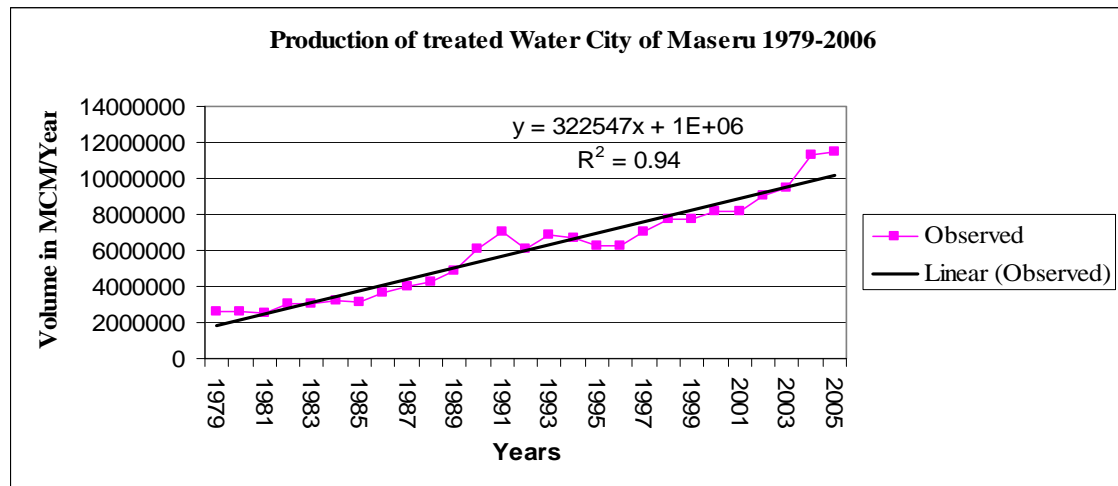
- Flow Duration Curve for CG 22



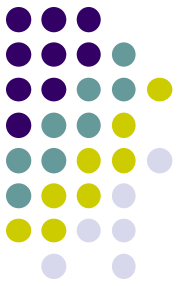
# Analysis and Discussion of Results



- **Water Demand**
- The water demand in the city shows a linear increase ( $R^2 = 0.94$ ), at the rate of 322547 m<sup>3</sup> per annum.

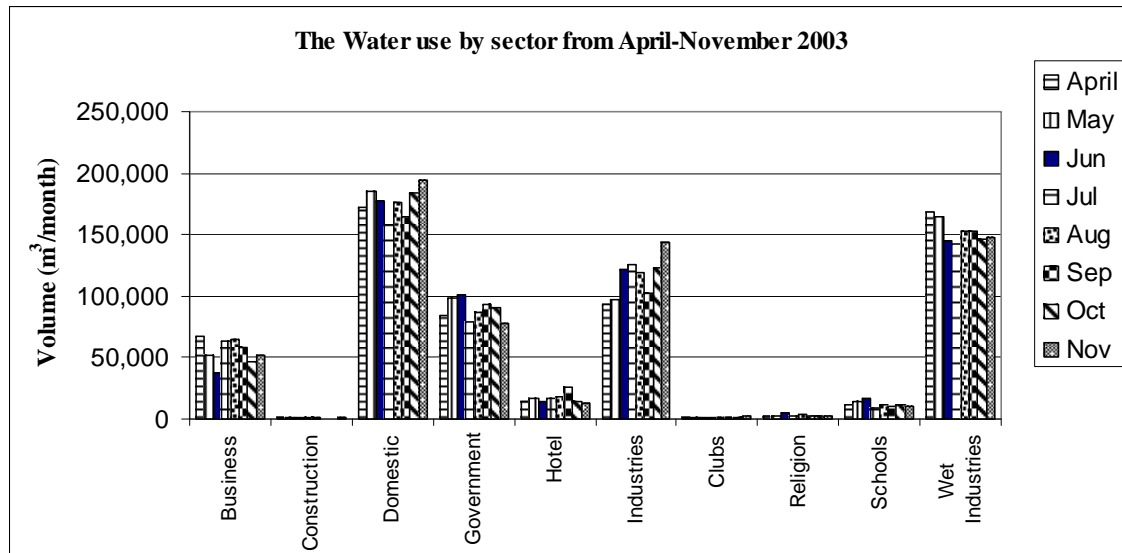


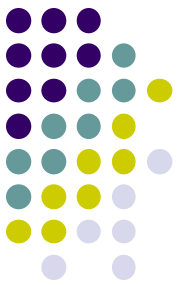




# Water Users

- Water Use by Sector





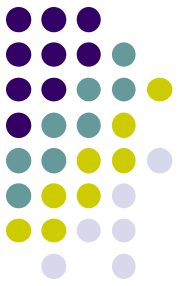
# Water Users Cont...

- It is worth mentioning that agricultural water use in Maseru (Lesotho in general) is insignificant due to the fact that irrigation development has not been very successful in Lesotho and many schemes have been converted into dryland farming systems.

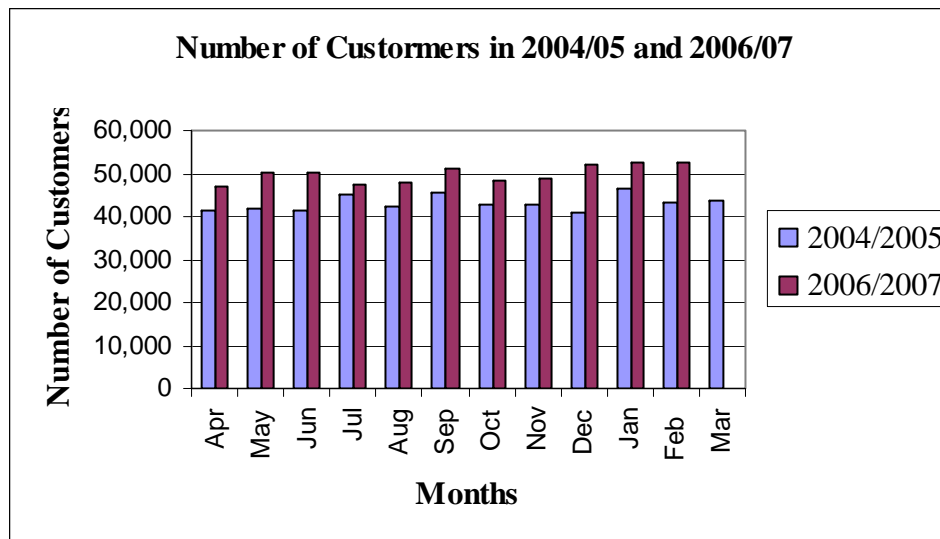
Sector	Volume Billed in Mm <sup>3</sup>	%
Business	1,381,252	13
Domestic	3,452,216	32
Industries	4,082,393	37
Government	1,500,266	14
Other	482,266	4
<b>Total</b>	<b>10,898,308</b>	<b>100</b>

Source: WASA Annual Report 2005/2006

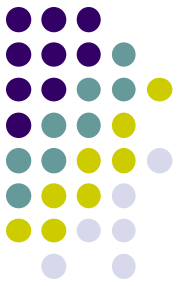
# Factors Leading to Water Shortage in Maseru



- According to the 2001 demographic survey of all districts carried by the BoS, Maseru District experienced the largest in-migration rate and the smallest out-migration rate. Maseru District's population had grown by nearly 7 % from lifetime migration (BoS, 2003). This influx has resulted to a steady increase in numbers of customers supplied by WASA between 2004 and 2007.

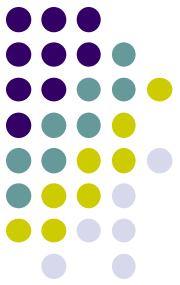


# Factors Leading to Water Shortage in Maseru



- Apart from the demographic factors, the rising standard of living and sustainable industrialization have been identified as the factors which are putting pressure on the water resources (LSSOER 2002).
- The industrial structure which is biased towards the manufacturing of textiles puts a lot of pressure on the water resources as it is a known fact that textile industries are water 'greedy'.
- The industries contribute 45 % to the GDP through AGOA
- Recurrent drought and pollution.
- The causes of pollution are the overflowing sewage pump stations, pit latrines and land fill sites and industrial effluent

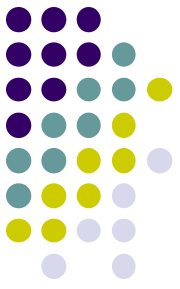




# Conclusions

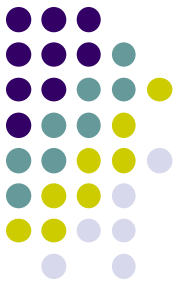
- **The factors which influence the water demand in the city and lead to water shortage are: the ever-increasing population due to urbanization, the rising standard of living, the sustainable industrialization biased to water greedy textile industries, recurrent drought and pollution.**
- **DWA already has intensively monitor the Phuthi River water**
- **There are recurrent droughts which often lead to the river drying up especially in winter**

# Analysis and Discussion of Results Cont.....



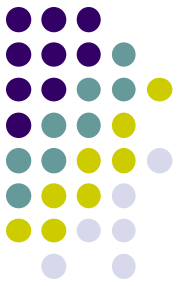
- **Awareness Raising and Public Education**
- From an interview with WASA officials it was established that there are public awareness initiatives on reducing water use and on water conservation.
- Newsletter produced quarterly, brochures, flyers, videos and electronic and print media are used as a mode of awareness campaigns. The radio programmes are meant to educate, inform, communicate and make people aware of the value of water resources and the importance of its conservation.
- The radio programme on the national radio station, Radio Lesotho is run weekly, and the utility has secured 15 minutes permanent slot every Tuesday from 6:45 p.m to 7:00 p.m. (WASA, 2007).
- The utility has also opened a Customer Care Centre, to ensure effective communication with customers and stakeholders.

# Conclusions Cont.....



- **The factors which influence the water demand in the city and lead to water shortage are: the ever-increasing population due to urbanization, the rising standard of living, the sustainable industrialization biased to water greedy textile industries, recurrent drought and pollution.**
- **The DWA already does extensive monitoring of the Phuthi River**
- **There is a potential of WDM in Maseru if integrated and intensive WDM management strategies can be put in place.**

# Way forward

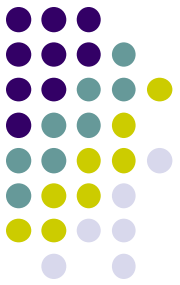


## Capacity Building

- There DWA should be capacitated to develop flood forecasting
- There has to a river catchment model for Phuthi
- Drought management plan has to be in place which consider type of user, allocation among user and source of water and potential for storage
- Monitoring of the meteorological events and knowledge of the normal or average hydrological conditions are essential for decision making



**THANK YOU FOR LISTENING**



**KEA LEBOHA!**