# ZAMBIA'S SPECIFIC INTERESTS IN WATER RESOURCES MANAGEMENT & DEVELOPMENT

Daniel CW Nkhuwa
School of Mines, UNZA, Lusaka
dcwnkhuwa@yahoo.com

# Introduction

To attain Middle-income Status by 2030, Zambia has identified, as drivers for its economic growth, **FIVE** sectors, namely:

- agriculture
- mining
- industry
- housing
- energy

# Introduction…..contd.

Close **examination** of these sectors **reveals** that, for their development, **each requires**:

- access to adequate water, and also
- sanitation services

# Introduction…..contd.

In turn, developments in the chosen sectors impact **quality** and **quantity** of available water resources.

Hence, different **NEXI (NEXUS).** Example include:

- Food – Water – Mineral, and
- **Food – Water – Energy** (briely discussed later)

# Introduction…..contd.

Sources of water quality & quantity Impacts include, among others:

- population growth, urbanisation, etc. – have induced pressures on land use.
- Accumulations of fertilizers & pesticides in the environment – from agricultural practices.
- Waste water discharges – from industrial, domestic, & agricultural activities;
- Excessive pumping of groundwater – for **mine** dewatering purposes.

# Specific Needs & Interests for Zambia

In view of requirements of especially two statutes – *WATER RESOURCES MANAGEMENT ACT NO. 21 OF 2011, & NATIONAL WATER SUPPLY AND SANITATION ACT NO. 28 OF 1997* – country's specific NEEDS & INTERESTS will involve addressing the following issues:

a) Water demand vs. supply, and sanitation

b) Impacts of Climate Change/Variability

c) Research and Development

# Specific Activities of the CoE in Zambia

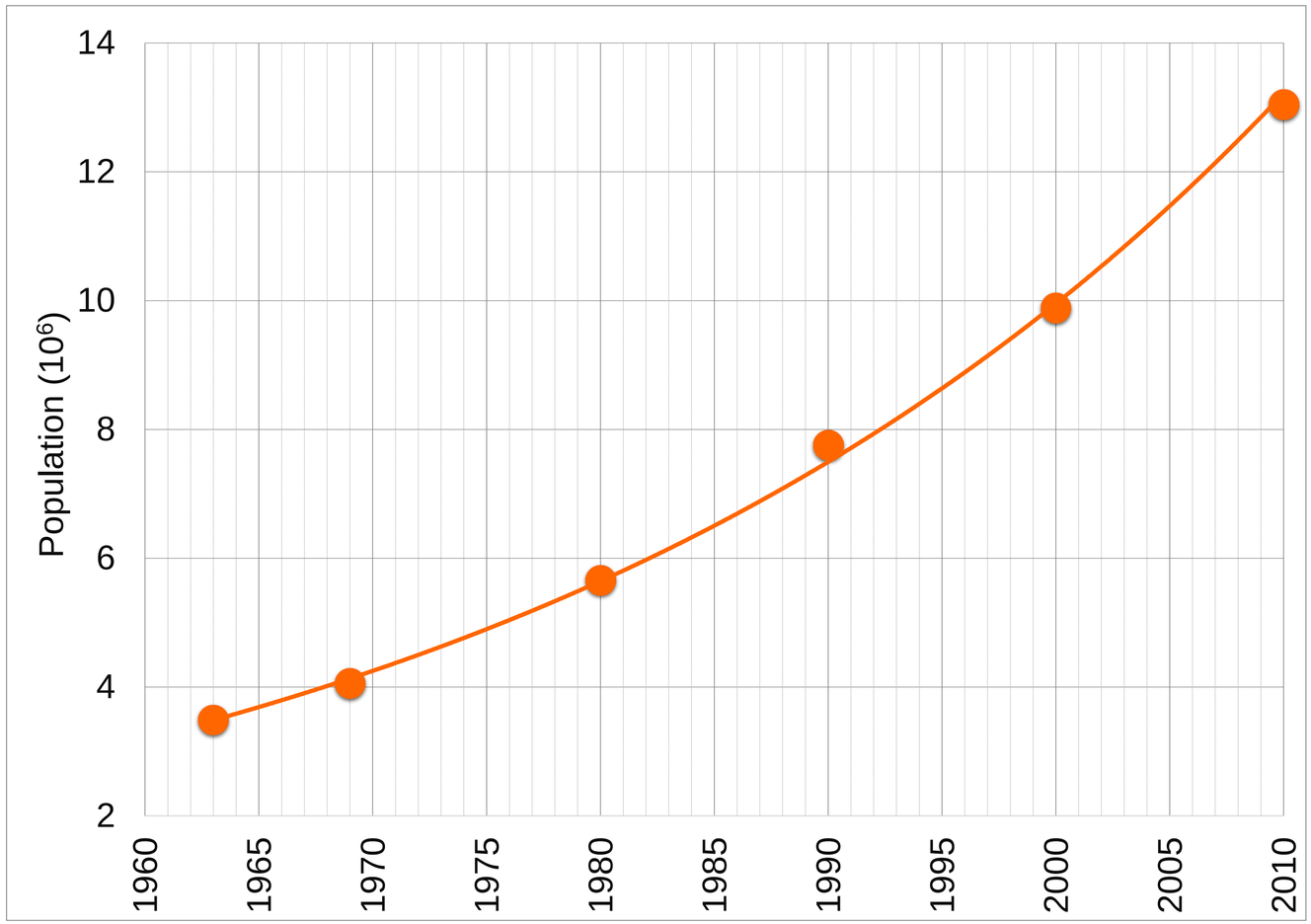
UNZA – country's representative CoE in water sciences – has been involved involved in different repertoires of WRM, among others, in:

- **Research** activities in diverse water science issues

Sections that follow highlight CoE's specific research interests based on the 3 areas of country's NEEDS & INTERESTS.

# Water Demand vs. Supply

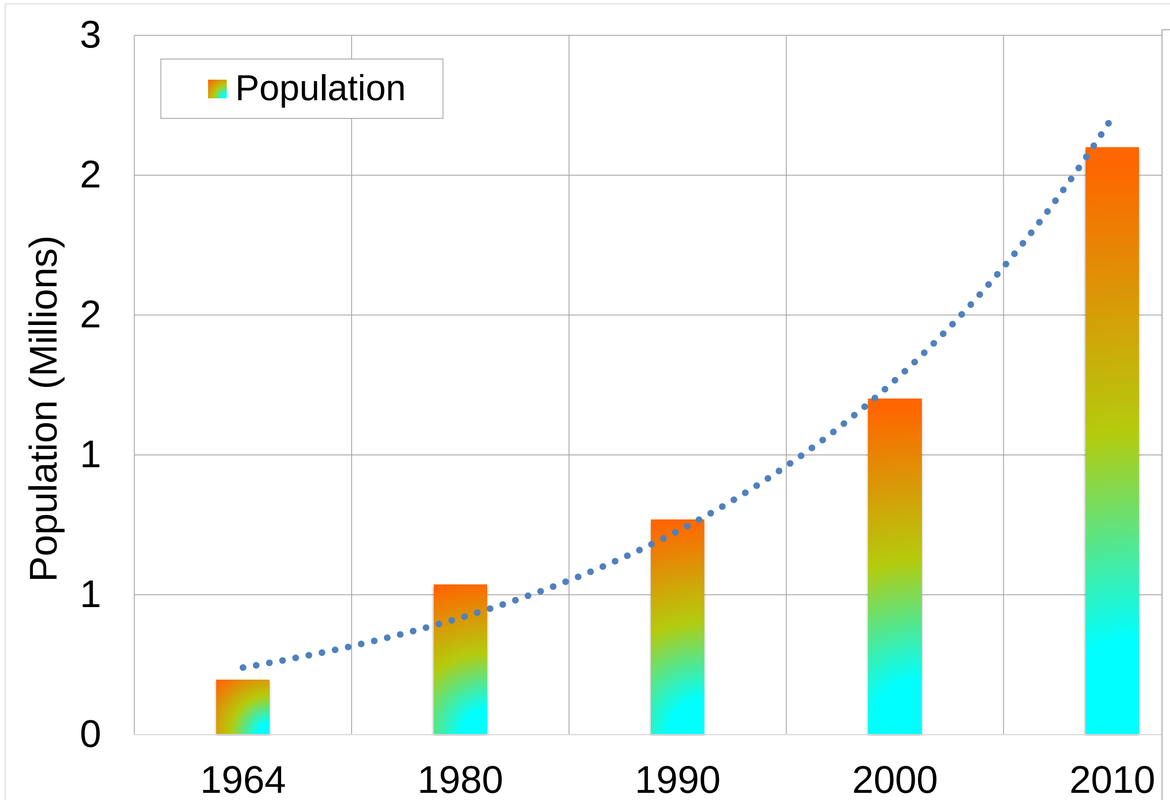
Water demand has been greatly heightened by a *rapidly growing population.*

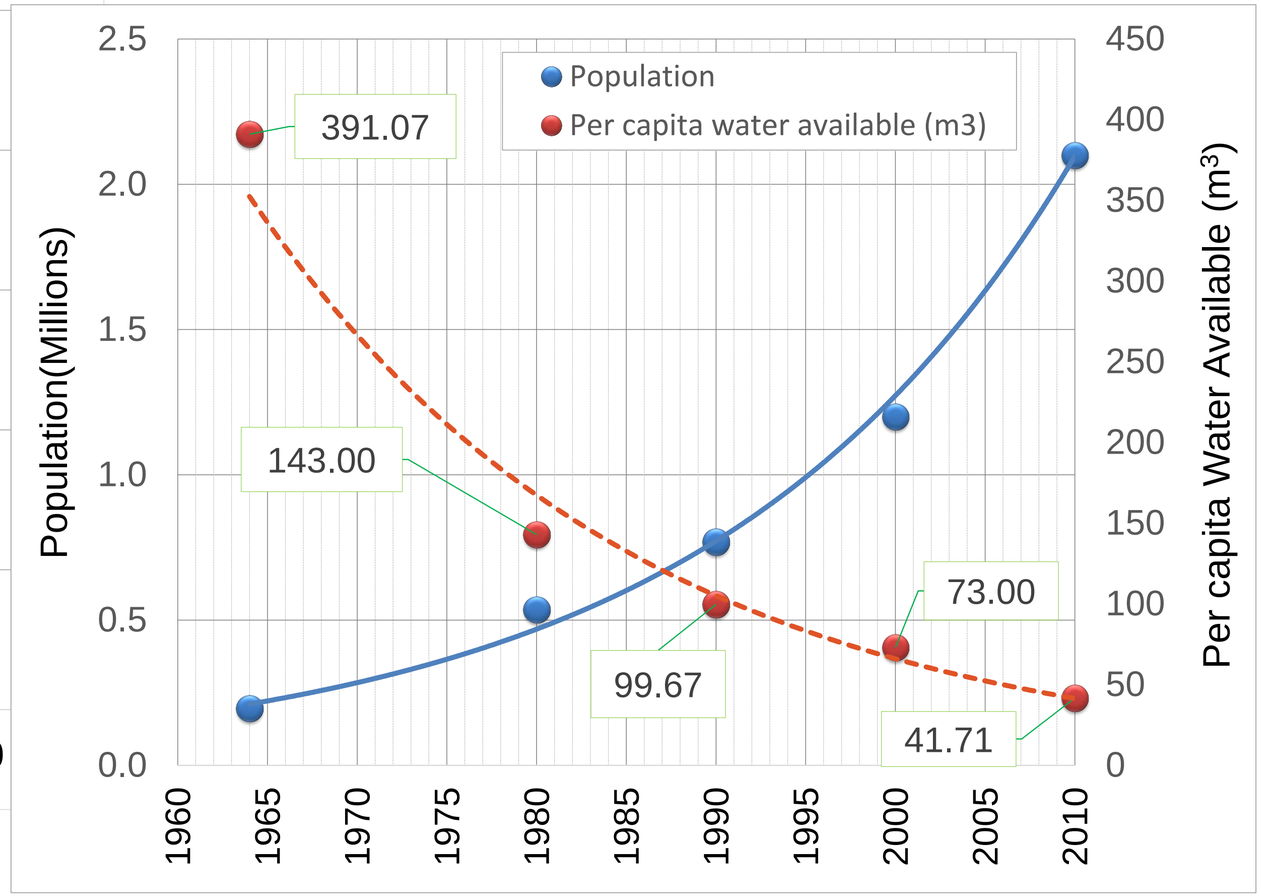



Growth of Population in Lusaka (1963 – 2010)

# Water Demand vs. Supply…..contd.

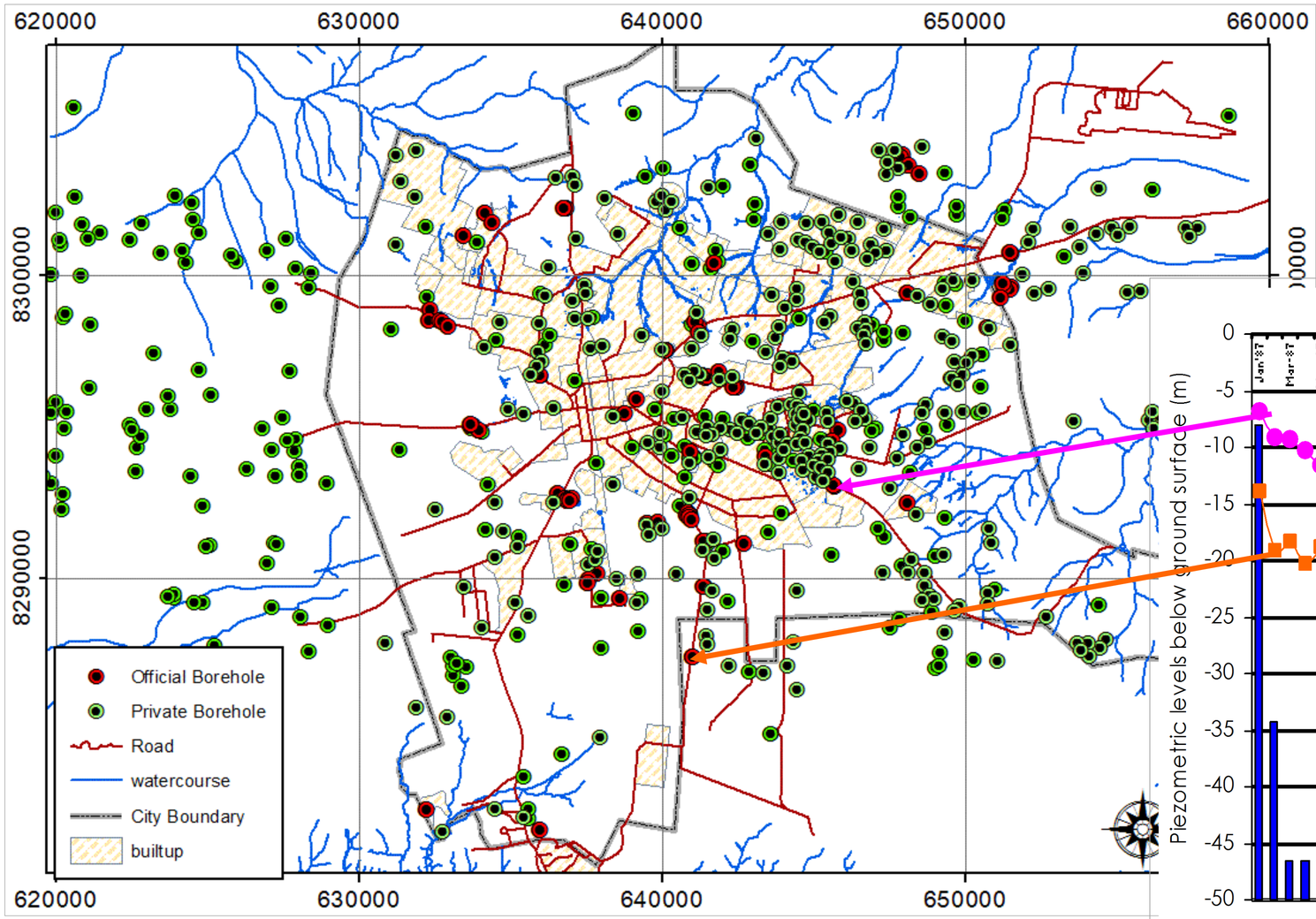
## **Example:** Lusaka – Zambia's Capital City



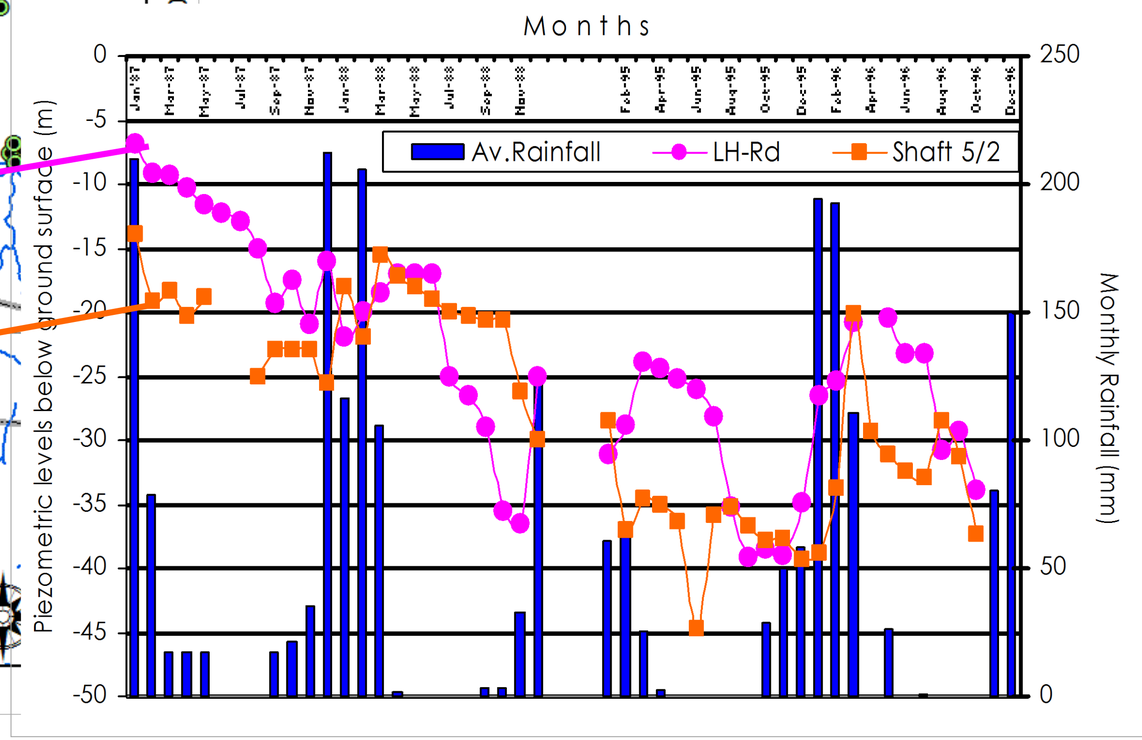




***Data Source:*** Lusaka Water & Sewerage company (LWSC) and Central Statistical Office (CSO)

# Water Demand vs. Supply…..contd.

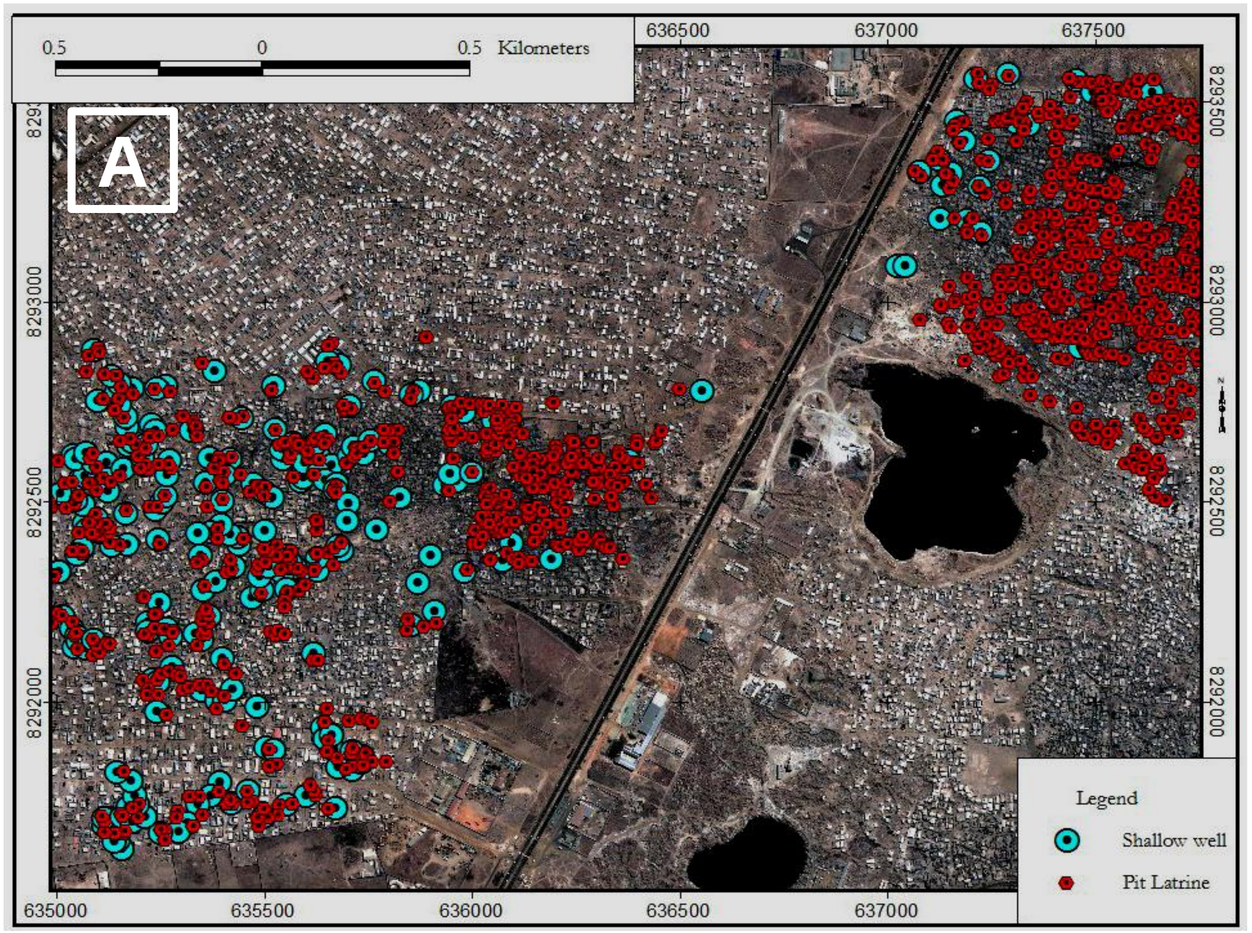


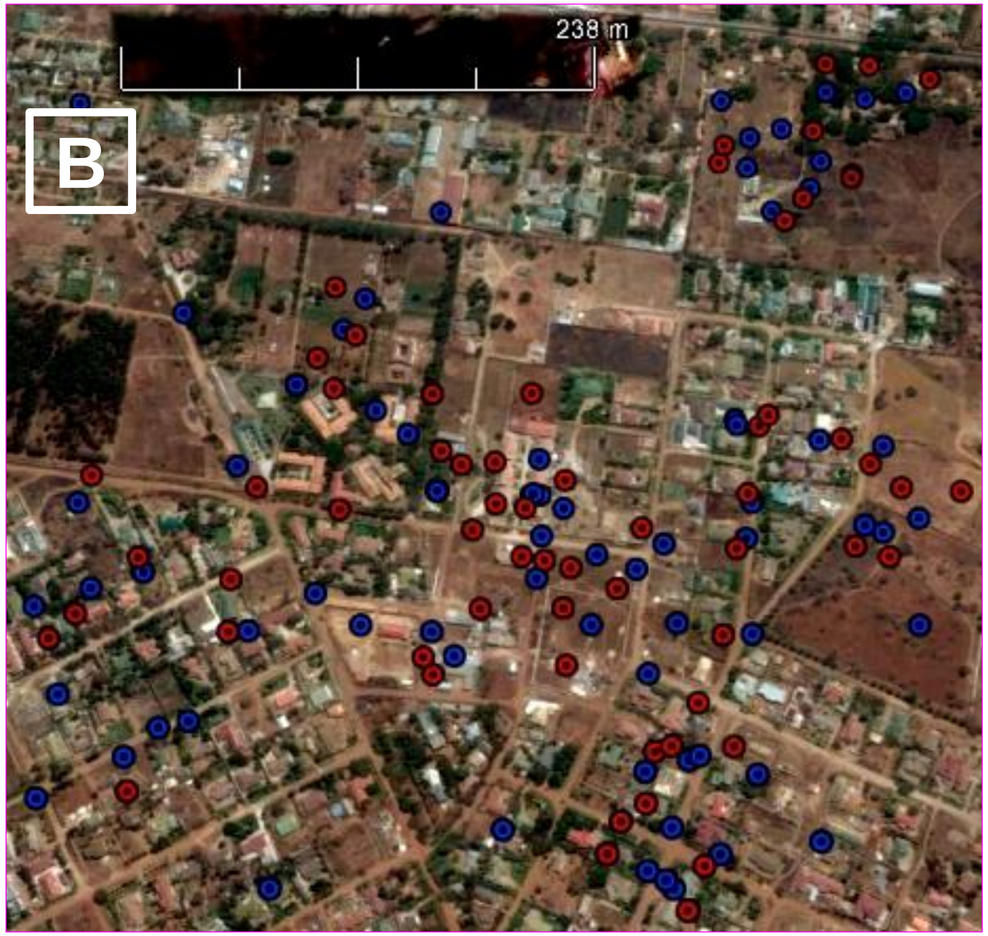

Partial spread of private and public boreholes in Lusaka




Fluctuation of grdwater table in some LWSC bhs (87 – 96)

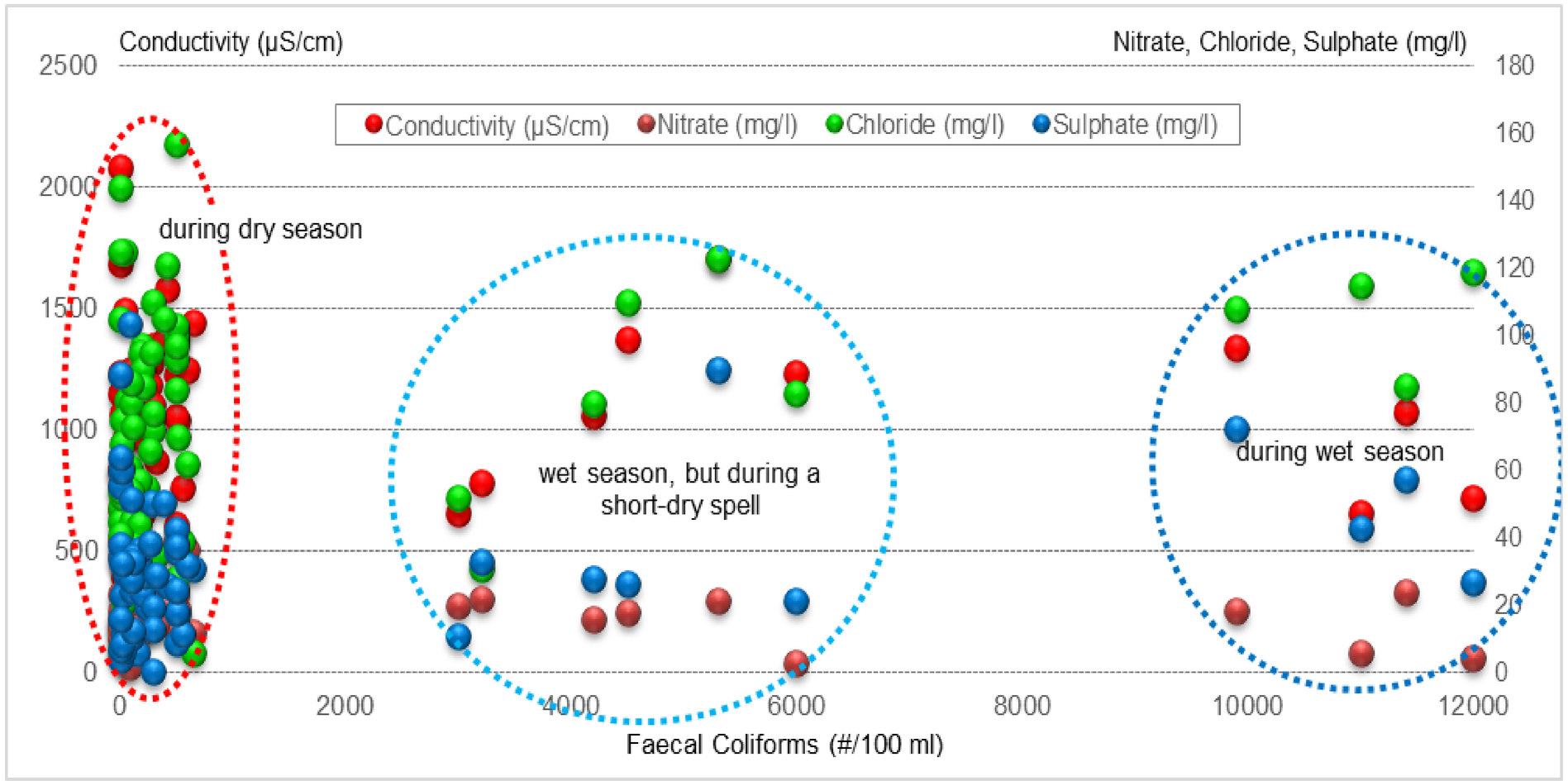
# Sanitation Systems vs. Water Quality



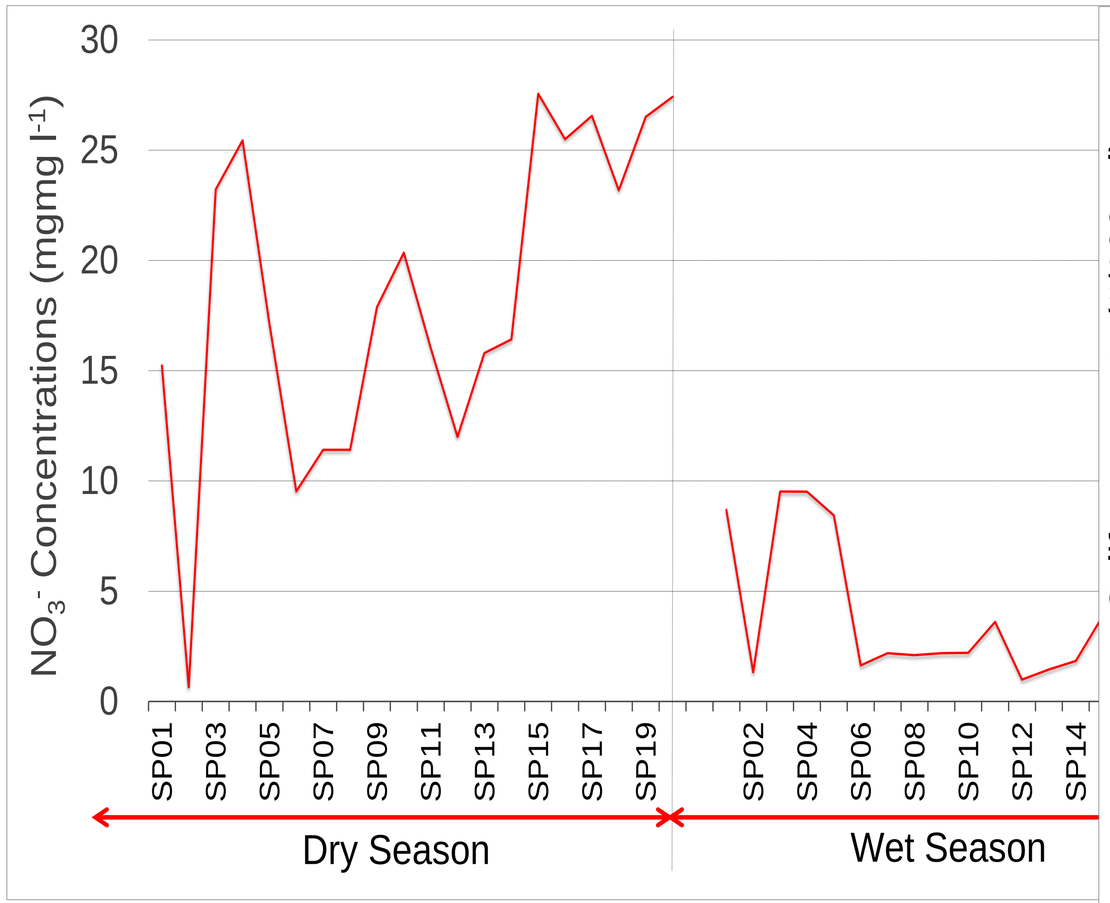

Water points and On-site sanitation systems: (A) pit latrines + shallow wells in a high-density settlements; (B) septic tanks (RED) & boreholes (BLUE) in a low-density settlement

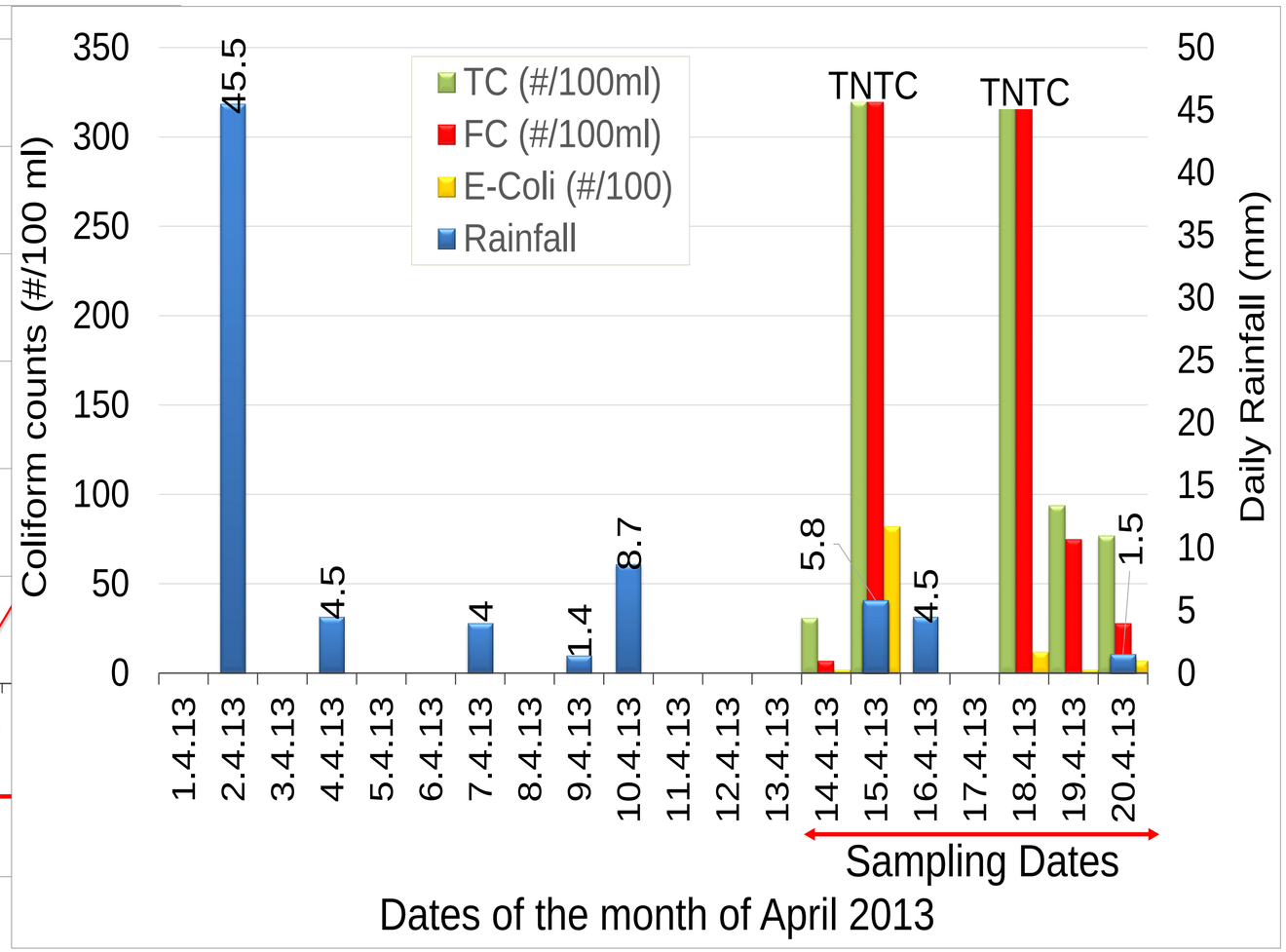
# Sanitation Systems vs Water Quality…..contd.




Water quality from shallow wells in a high-density settlement of Lusaka (dry seasons 2003 & 2004; wet seasons 2004 & 2005)

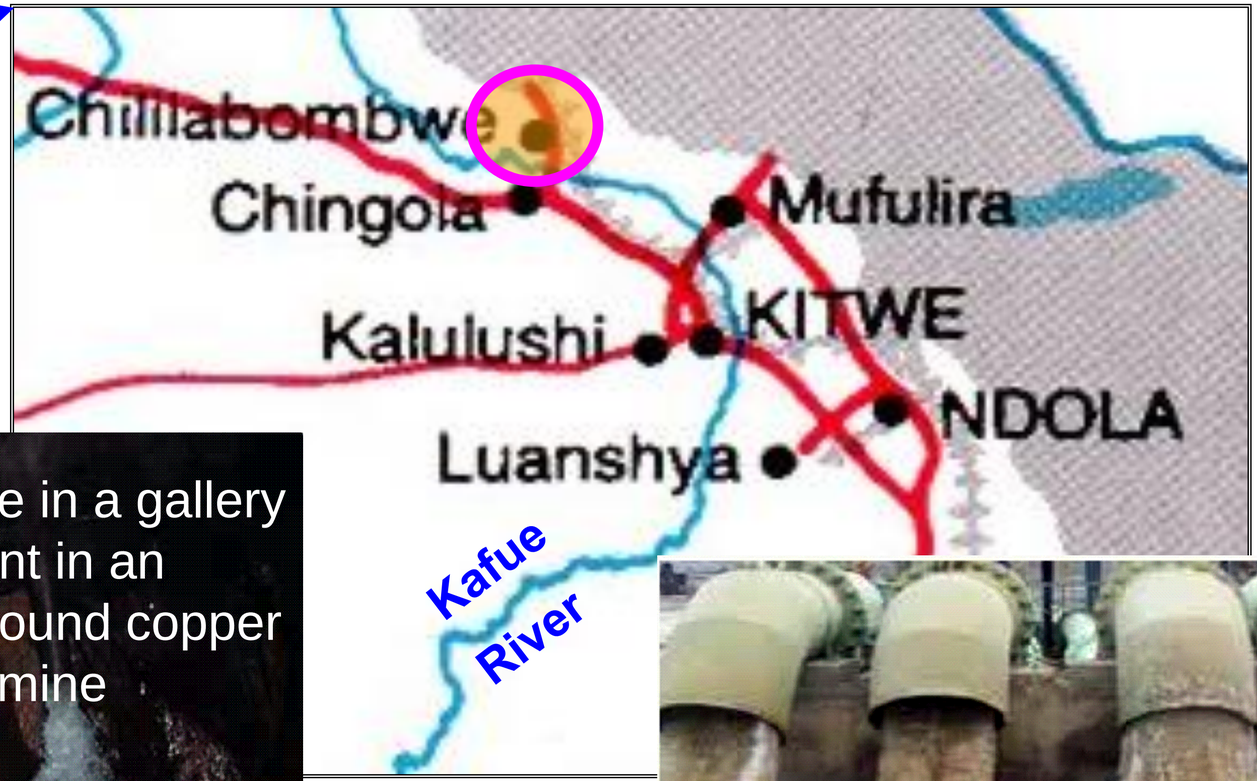
# Sanitation Systems vs Water Quality…..contd.




Nitrate and coliform loads in borehole water from a low-density settlement of Lusaka (Dry season 2012 & rainy season 2013)

# Excessive Pumping of Groundwater – Mine Dewatering


Drainage in a gallery front in an underground copper mine

Discharges of GROUNDWATER to surface water bodies

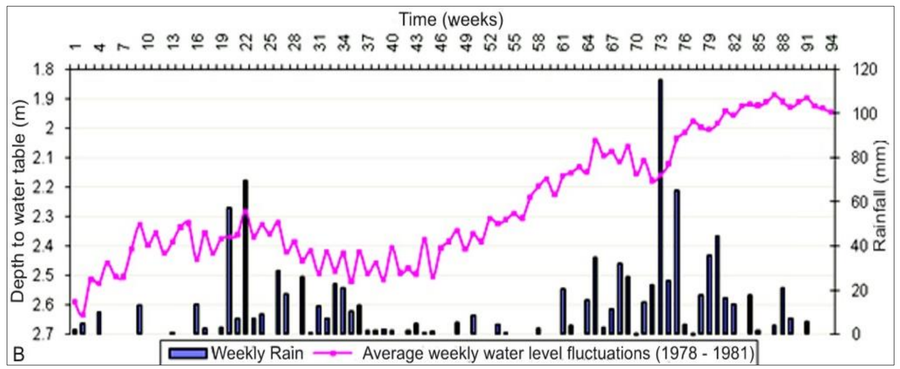
***Source:*** Brazilian Mining Association (IBRAM)/National Water Agency (ANA), (2013)

# Excessive Pumping of Groundwater – Mine Dewatering…..contd.

Research activities by CoE in water sector area have involved:

- Water quality issues
- Acid Mine Drainage (AMD)
- Water quantity issues – from groundwater level fluctuations.

2007



# Climate Issues

According to IPCC Tech. Paper VI (2008):

- best-estimate in global surface temp. (1906-2005) is a warming of 0.74°C (range 0.56 - 0.92°C), with
  - a more rapid warming having occurred over 50 years preceding 2005 (i.e. since 1945)…..

……although


***Source:*** Unknown

# Climate Issues…..contd.

Some consequences of rises in temperature have included vulnerability to RAVAGES of:

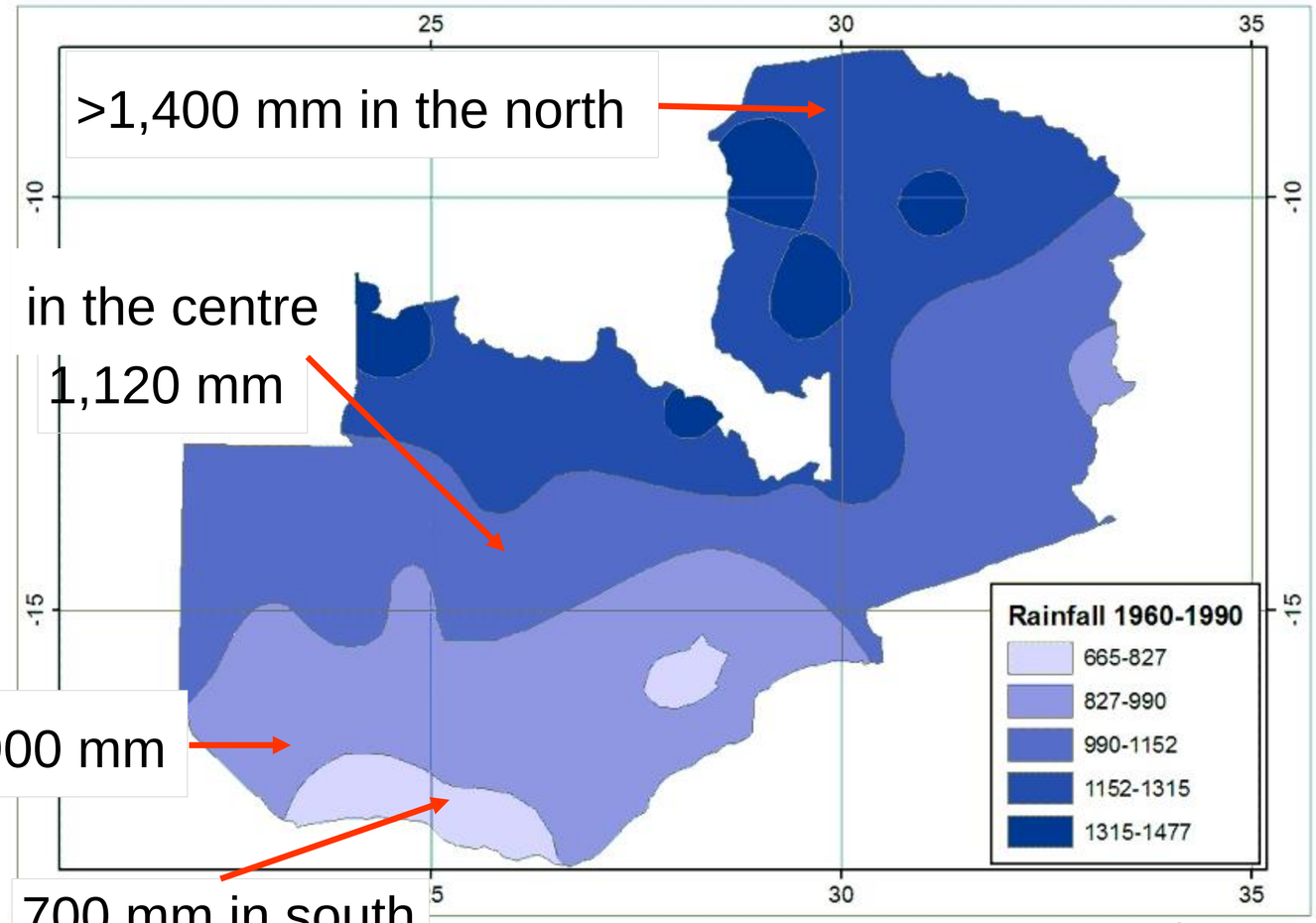
Droughts

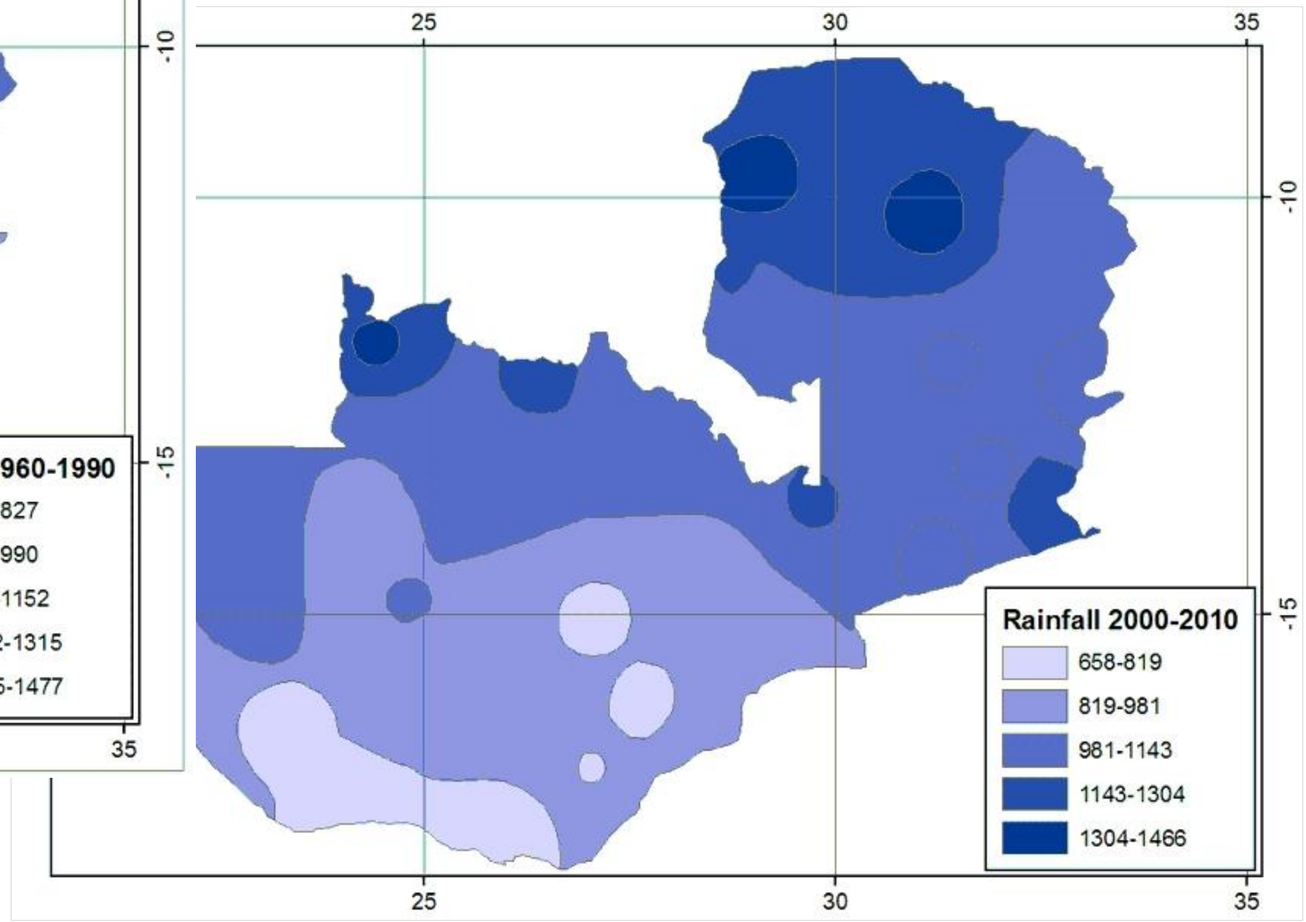
Floods

Poor Sanitation

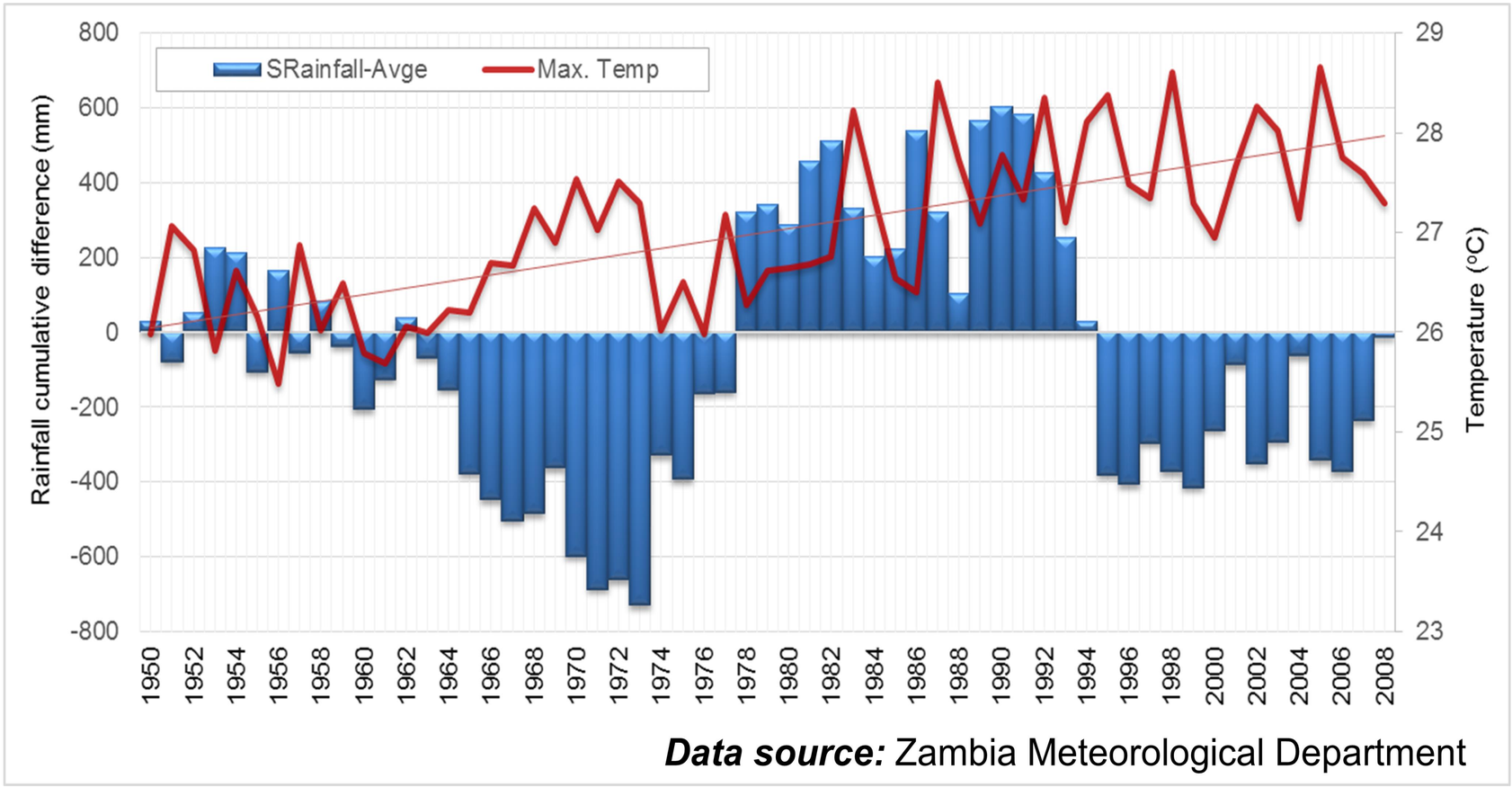
***source:*** Mutua (2013)

# Climate Issues…..contd.



# Climate Issues…..contd.



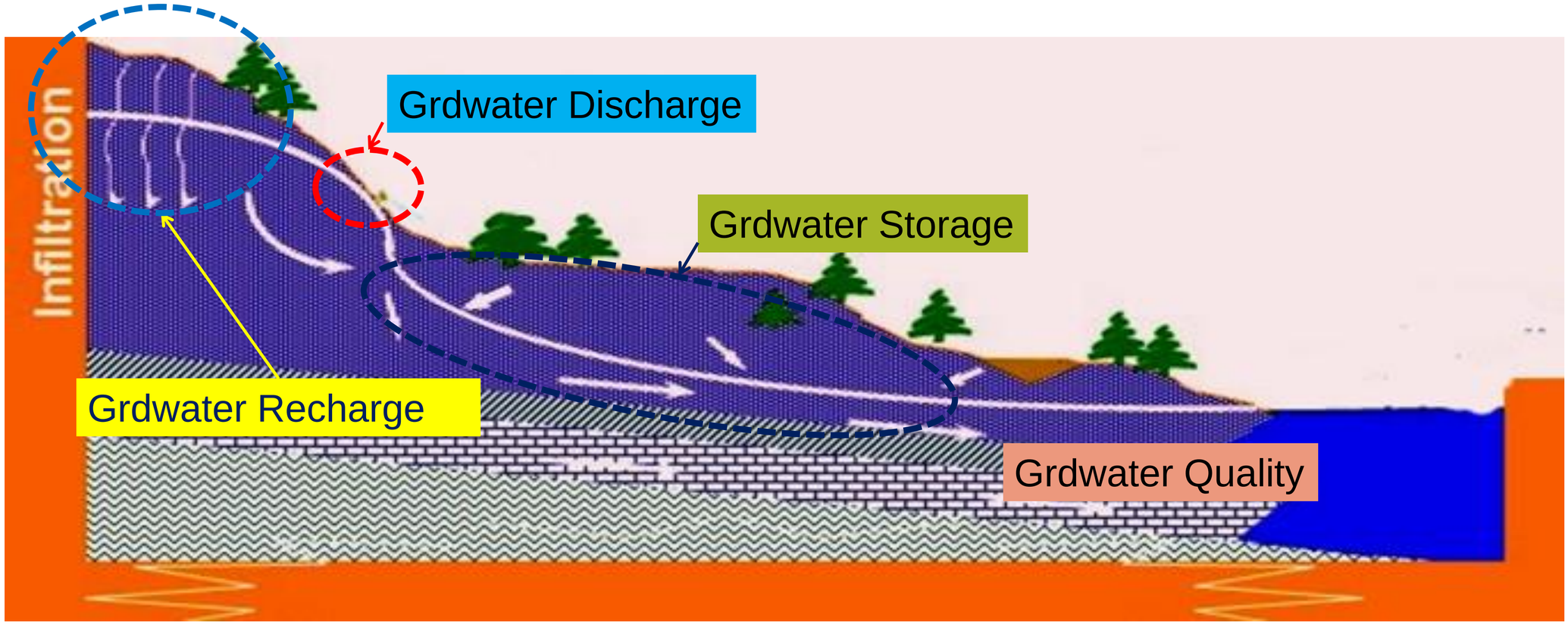

***Data source:*** Zambia Meteorological Department

Variability of rainfall and temperature over Lusaka (1950 – 2008)

- Of the 59 years, only 24 years had rainfall above average
- Period experienced max. temperature rise of about 2°C.

# Climate Issues…..contd.

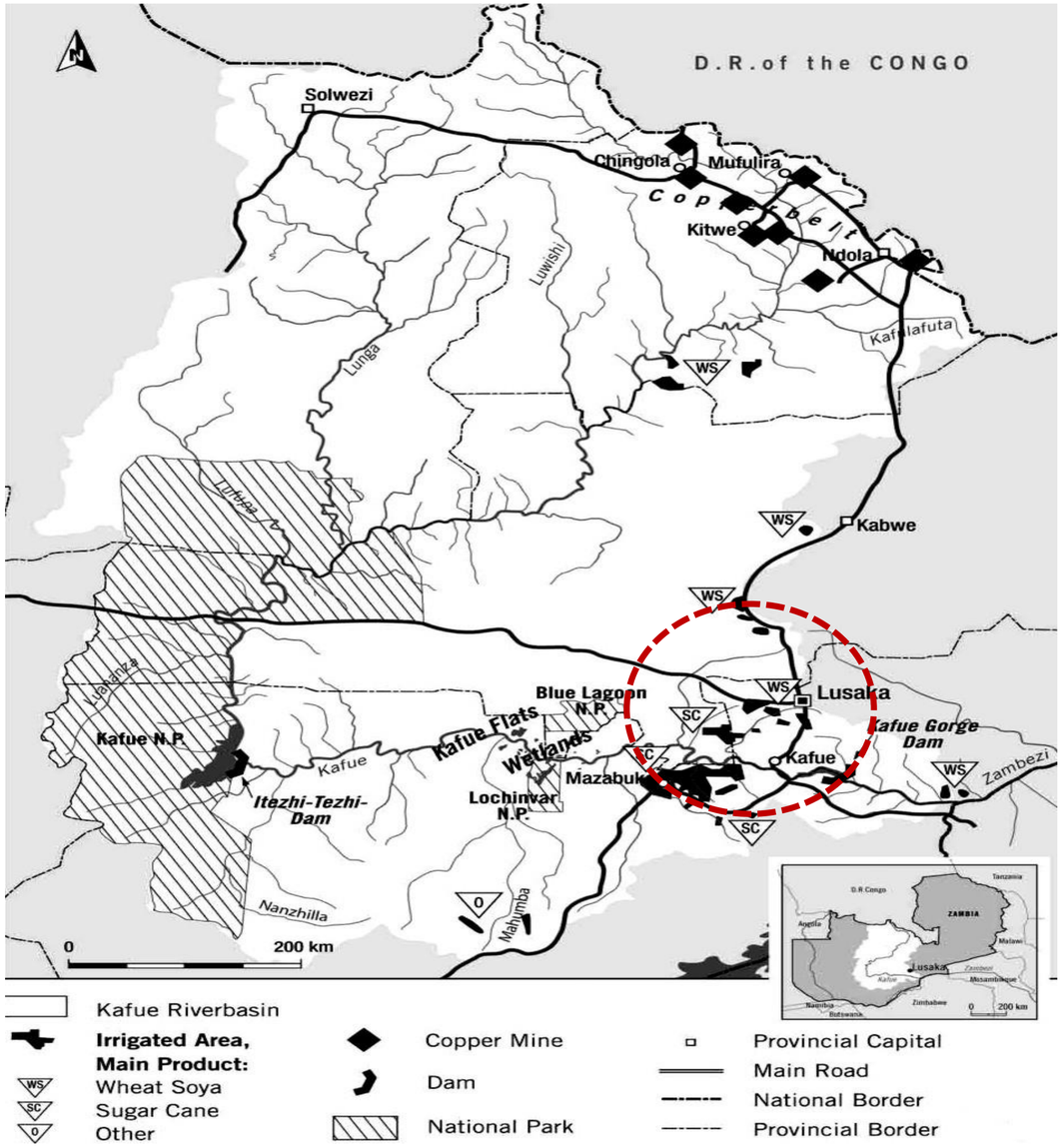
Subsequently, these will / have affect(ed):



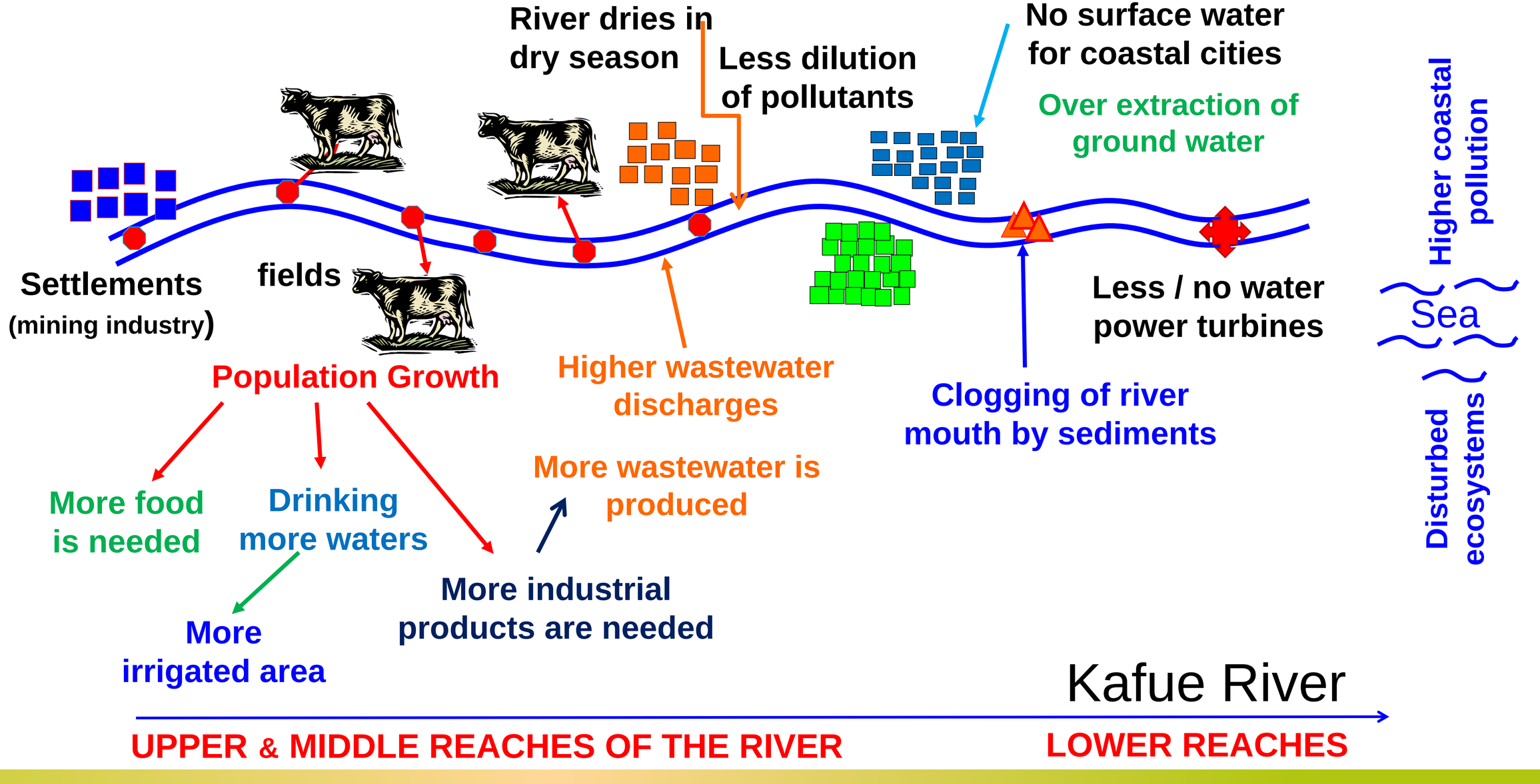
# Water – Food – Energy Nexus

Kafue River Basin is lifeline of Zambia's development. Basin:

- is 'home' to major commercial farms – producing rice, wheat, sugar cane, etc.
- Has the country's major power stations – Kafue Gorge, New Kafue Gorge Lower and Itezhi-Tezhi.
- Is country's most populated.



# Water – Food – Energy Nexus…..contd.



# Research and Development

The foregoing challenges requires availability of:

- Adequate, and
- Credible

  spatial & time-series monitoring data & information, to;

- inform decision-making & facilitate sustainable
  - development,
  - utilization and
  - management

    of the country's water resources.

# Research and Development

In this regard, the country needs to:

- Adequately fund and coordinate research.
- Train a cadre of adequately skilled water sector professionals at all levels.
- Create platforms for disseminating research results
- Develop a culture of using research results to inform decision-making processes.

Thank you for your Attention