The role of Observational data in assessing climate change induced water stress in Egypt and the Nile Basin

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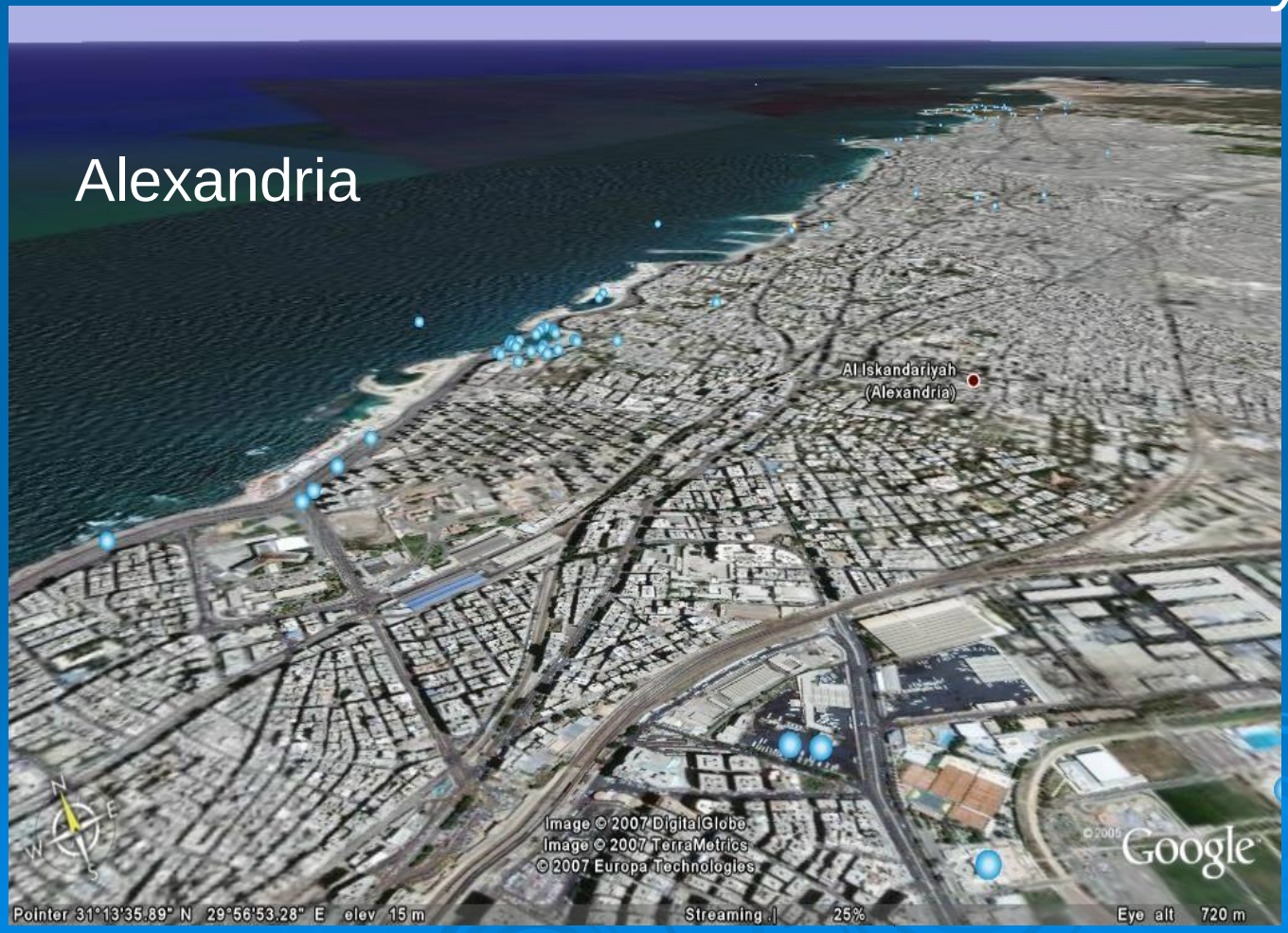
Predictions for Egypt

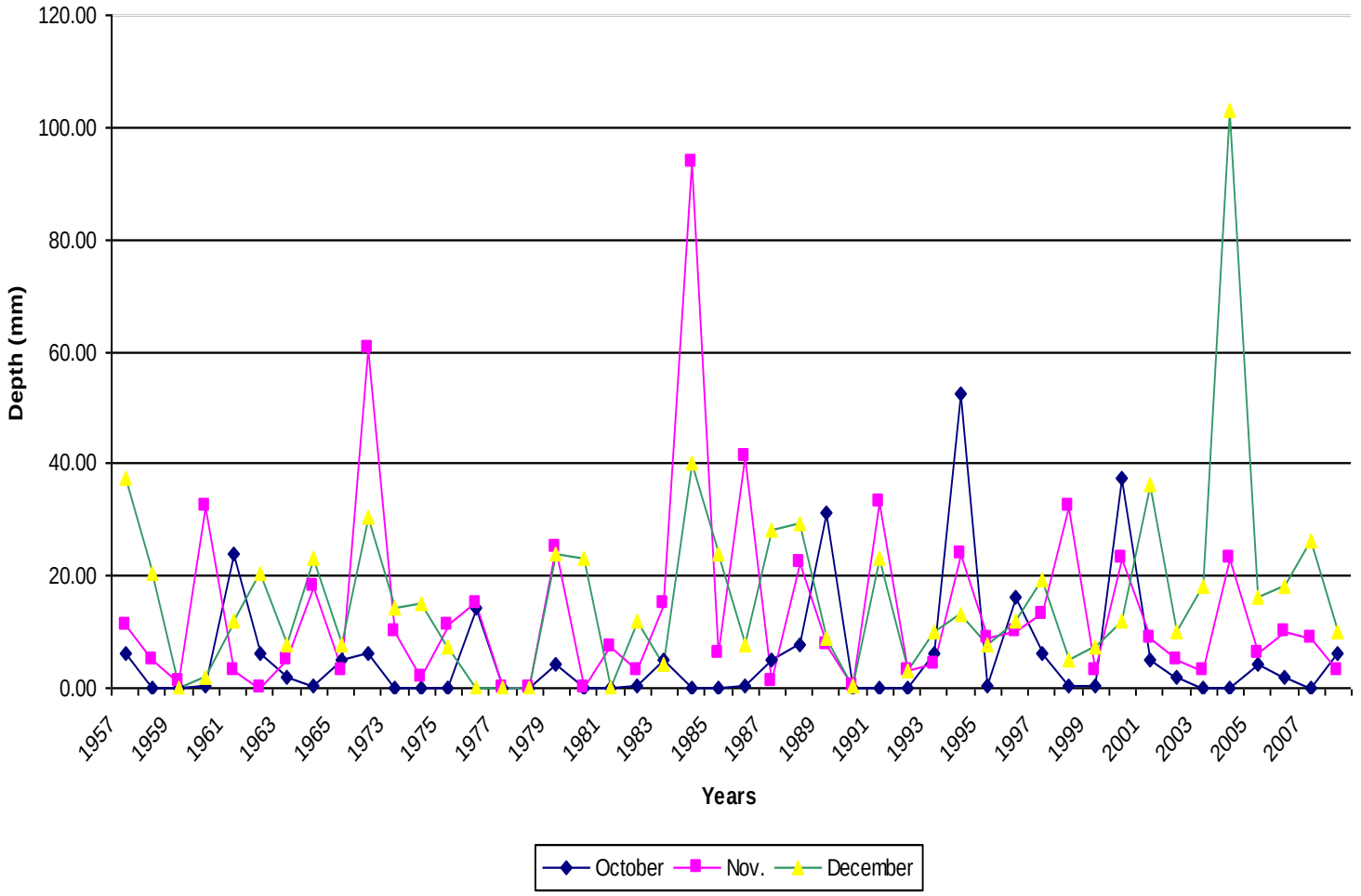
- Increased temperatures raises the possibility of enhanced water losses from evapo-transpiration, which might imply reduction in stream-flows, and increased water demand.

- Increased precipitation in source waters of Nile (Ethiopian highlands), implies increased stream-flow downstream to the Nile's waters in Egypt.

Urbanization of coastal cities at risk of flooding with the little-left infiltration areas of the city

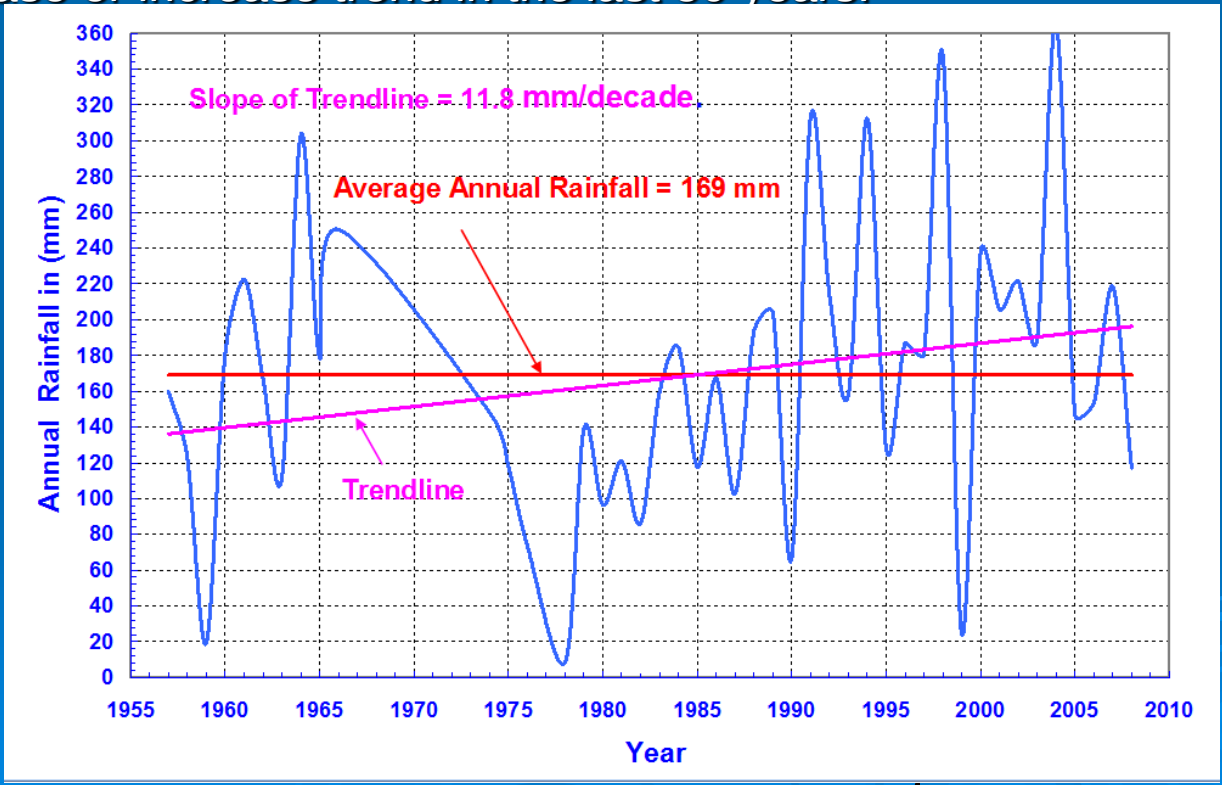


Max Monthly Rainfall for City of Alexandria (mm)



Precipitation in Alexandria

- It was found that there is no concrete evidence on a constant precipitation decrease or increase trend in the last 50 years.

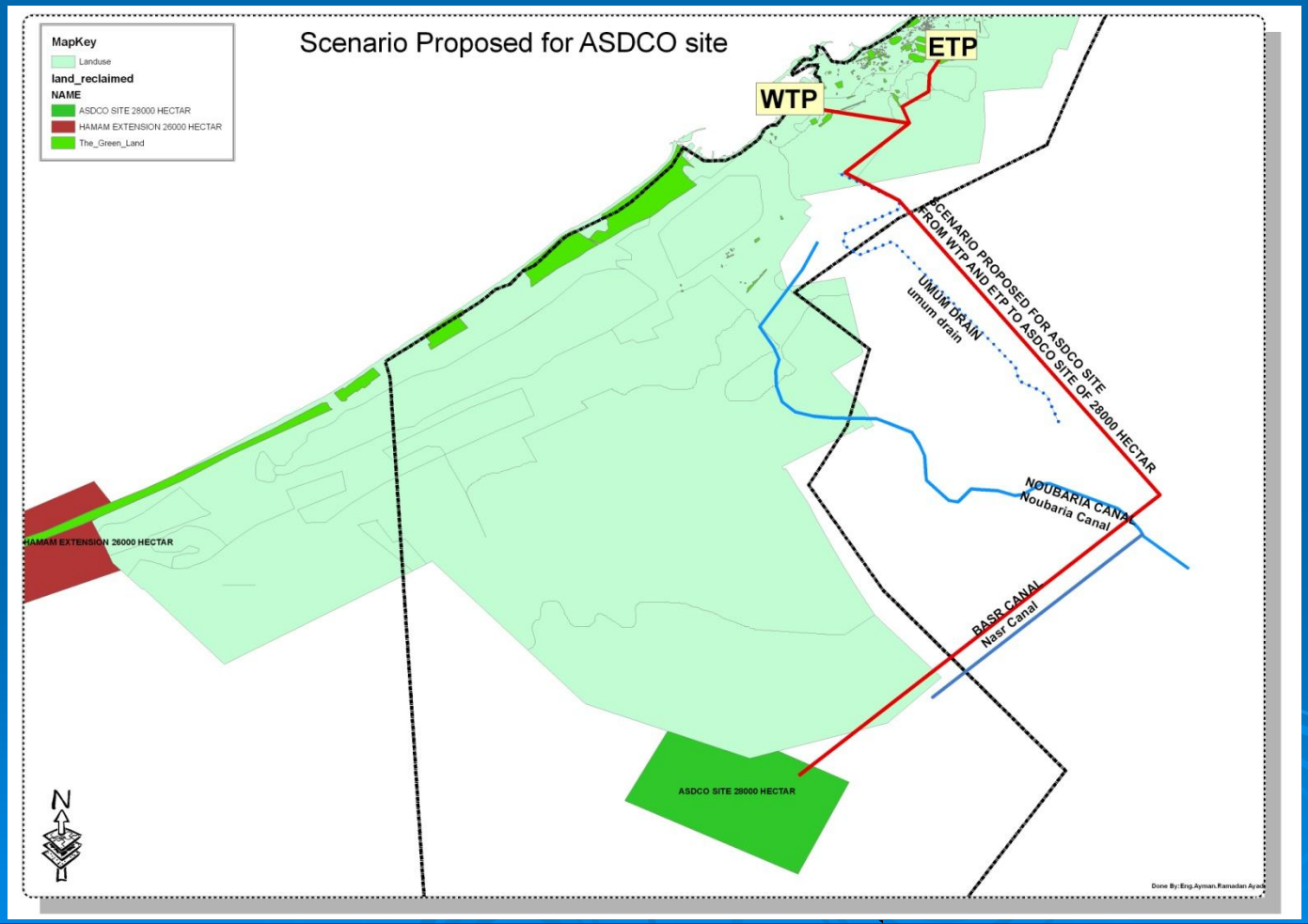


Future Measures Under Consideration

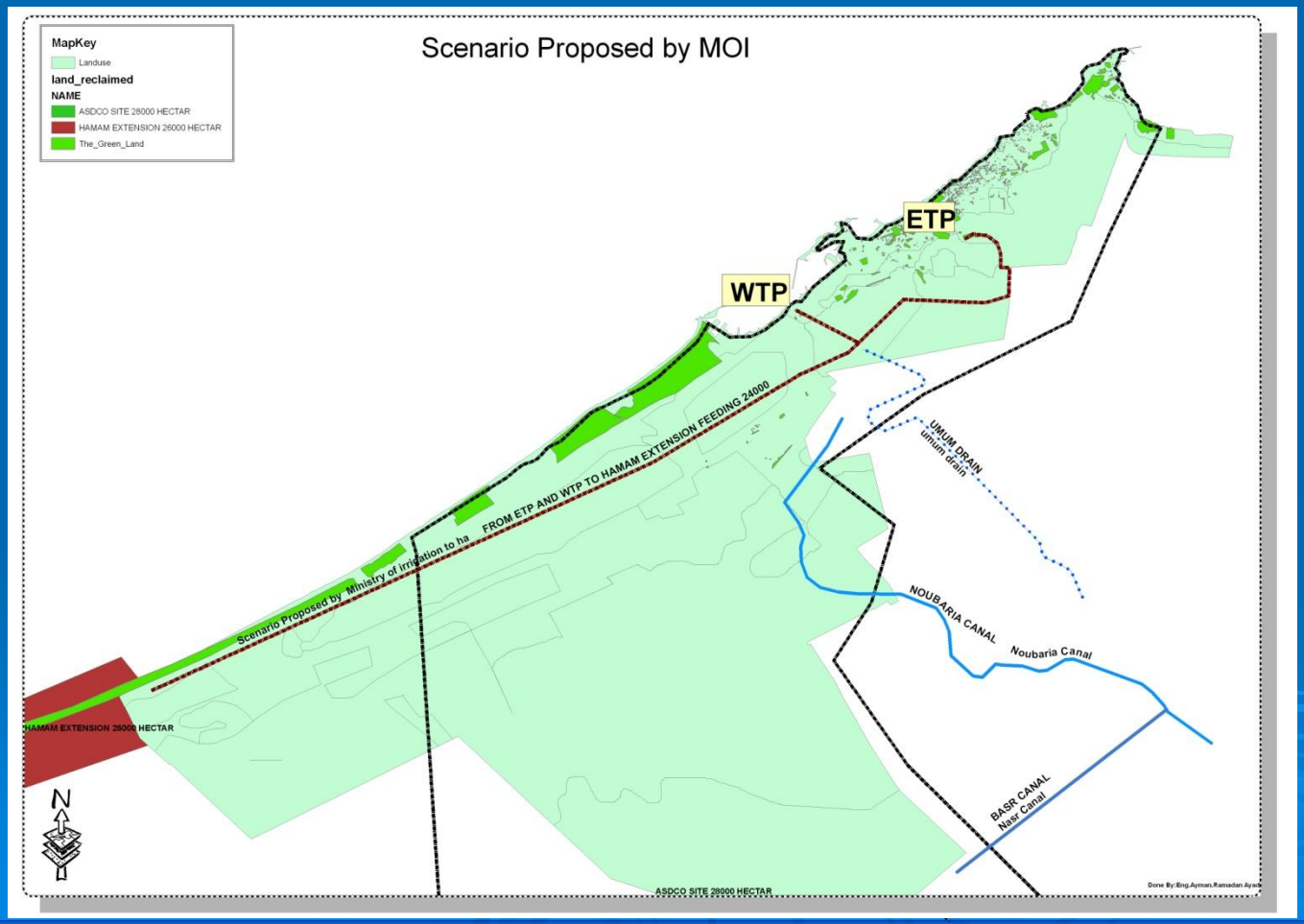
- Pervious Pavements
- Constructed wetlands

CEDARE&SHUTES,2009

Adaptation measures: Waste Water Reuse



Waste Water Reuse (2)



Nile Basin

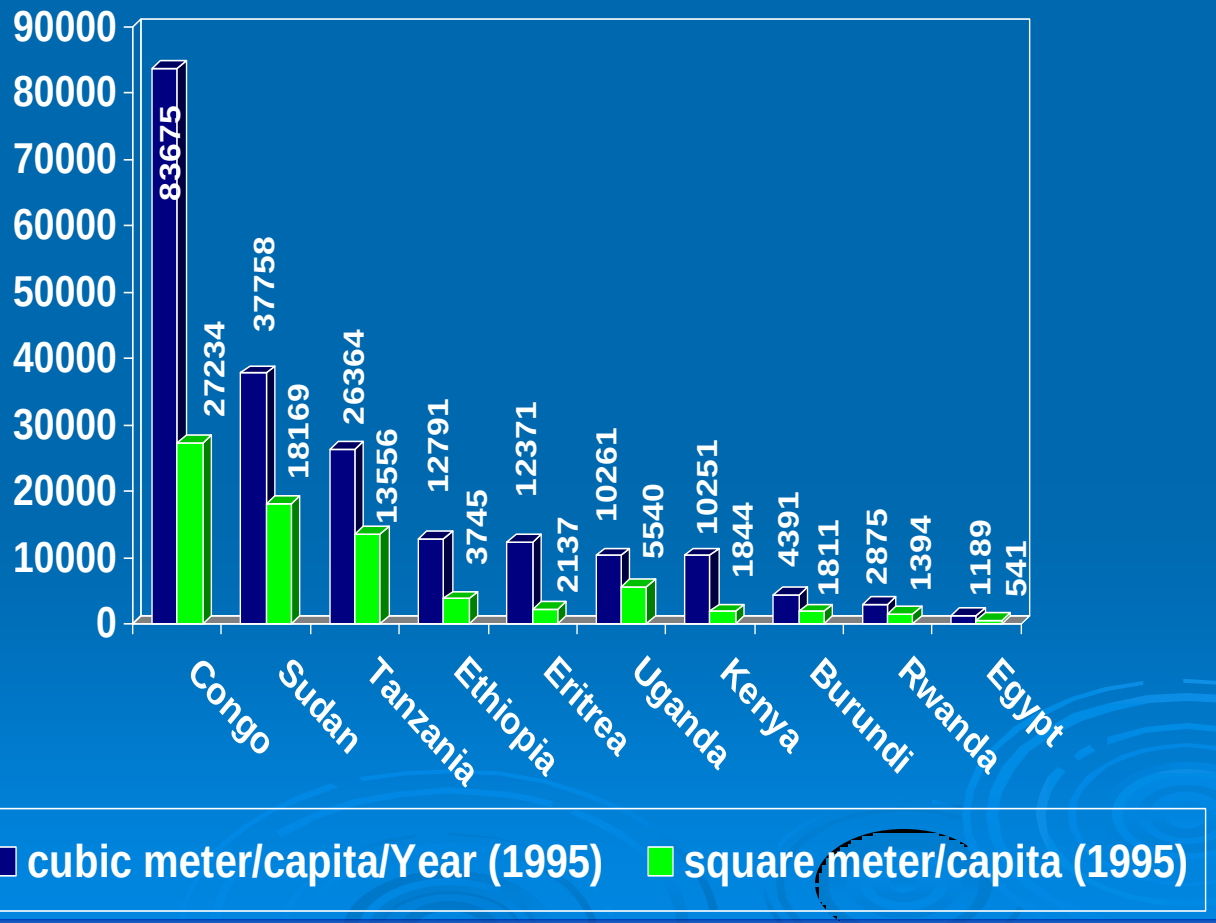
- 10% of Africa
- Drainage area of 3 Million sq. km
- 171 million inhabitants with various levels of dependency.
- 11 countries
- Three rainfall regime zones: Arid, tropical, and equatorial
- Annual rainfall varies from 120 mm to 2450 mm

Source: Loucks and Beek, 2005

The need for accurate data

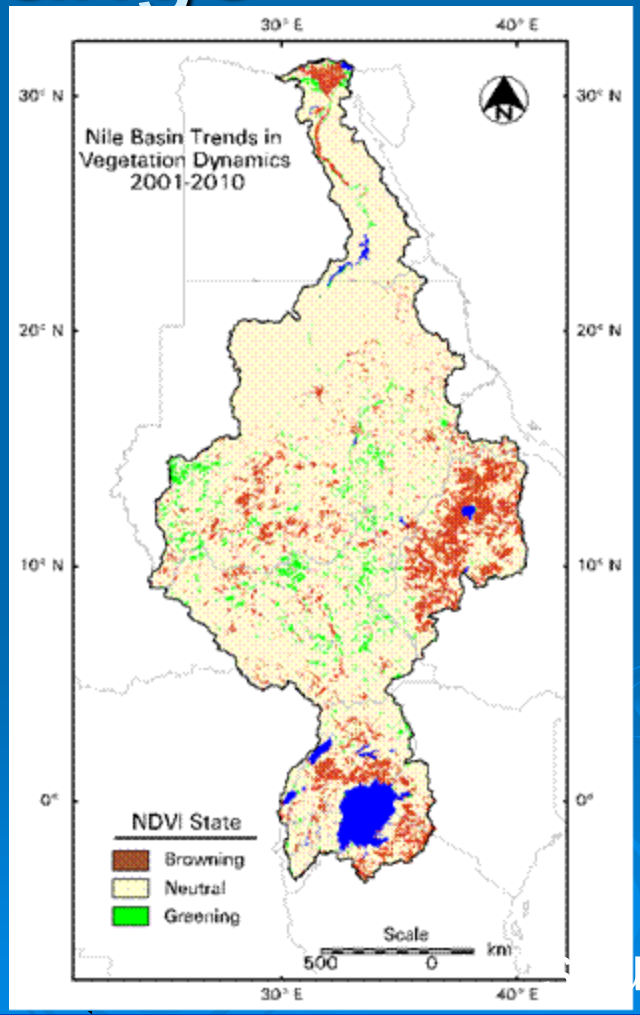
- Reliable data are strongly needed to assess climate change vulnerability in the Nile Basin.
- The irrigated areas as well as the rainfed areas had to be located to decide which areas will be affected the most by the scenarios that predict decreased precipitation.
- Evaporation and evapotranspiration trends had to be assessed, so that future trends could be estimated

Blue and Green Water Assessment



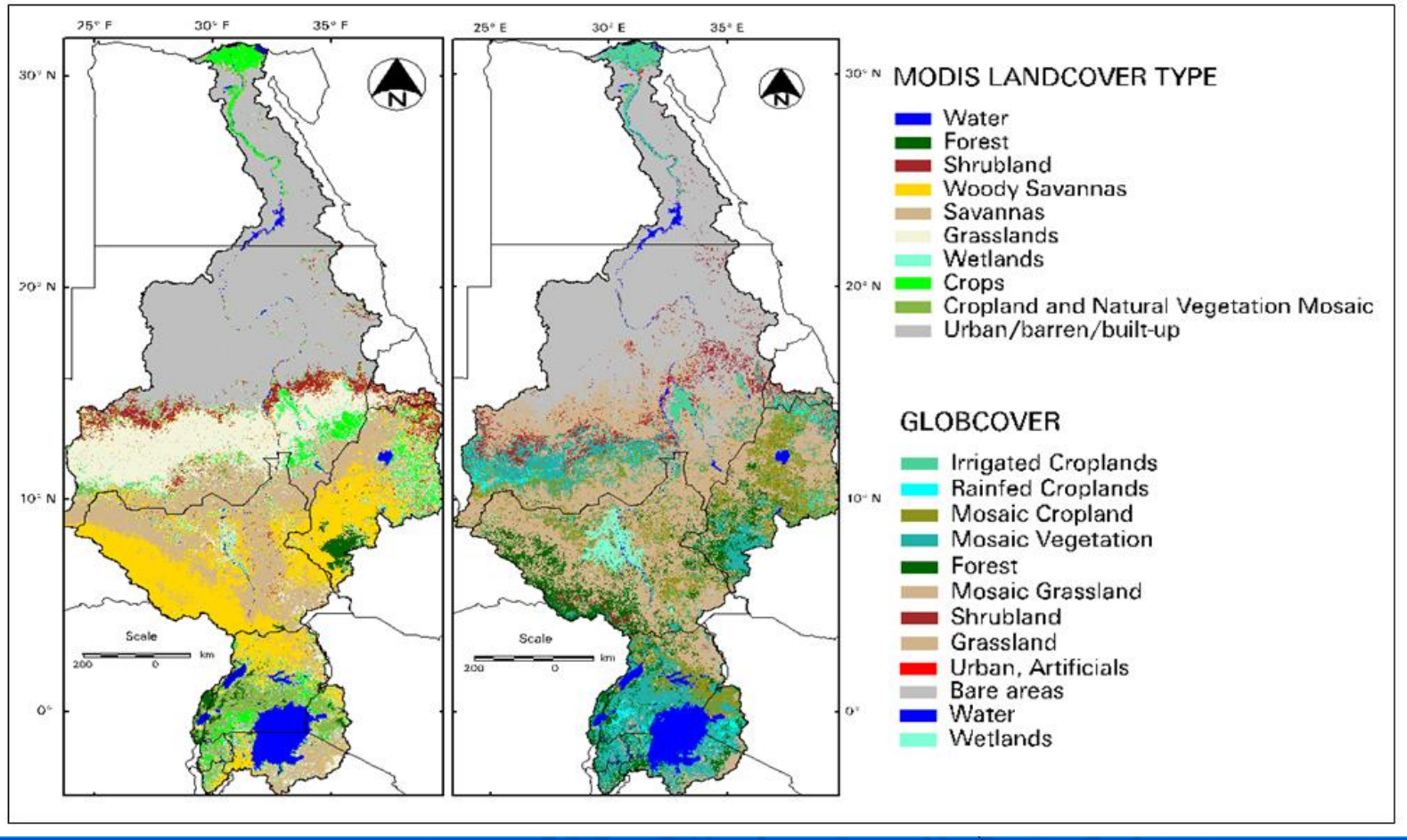
Land Use change

- Normalized Difference Vegetation Index (NDVI) is used to indicate the spatial and temporal variation of green cover.
- Terrestrial Evapo-Transpiration (ET)dynamics in the Nile Basin is governed by climatic factors and change in land cover.



Source:
Henok et al.
2012

Rainfed and irrigated agriculture



Important Findings

- There is evidence from instrumental records that due to climate change, rainfall trends and river flow regimes have changed.
- Areas that require attention in regards to fresh water supply due to climate changes:
  - Ruwenzori Mt, Ethiopian plateau
  - Nile confluence in Sudan
  - Nile Delta and Nile valley in Egypt
- Areas with Increased green cover:
  - Toshka Depression and Aswan in Egypt
  - Wadi Halfa, Ash shalal ar Rabia, and Korti in Sudan
  - Busia in Uganda
  - Kisumu in Kenya Toshka

Ongoing & Future Research

- Updating green and Blue water Assessment using NDVI and GIS.
- Assess the impact of current and future urbanization on water resources.
- Modeling different climate change scenarios.

THANK YOU