Impacts of Climate Change on Egypt and the Nile River

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PH.D. CANDIDATE IN ERASMUS UNIVERSITY ROTTERDAM IN THE NETHERLANDS, DOING HER RESEARCH DISSERTATION ON GOOD WATER GOVERNANCE OF THE NILE RIVER BASIN IN EGYPT UNDER CLIMATE CHANGE AND OTHER WATER STRESSES.

Outline

Egypt's GHG Emissions

Summary of Climate Change Impacts on Egypt

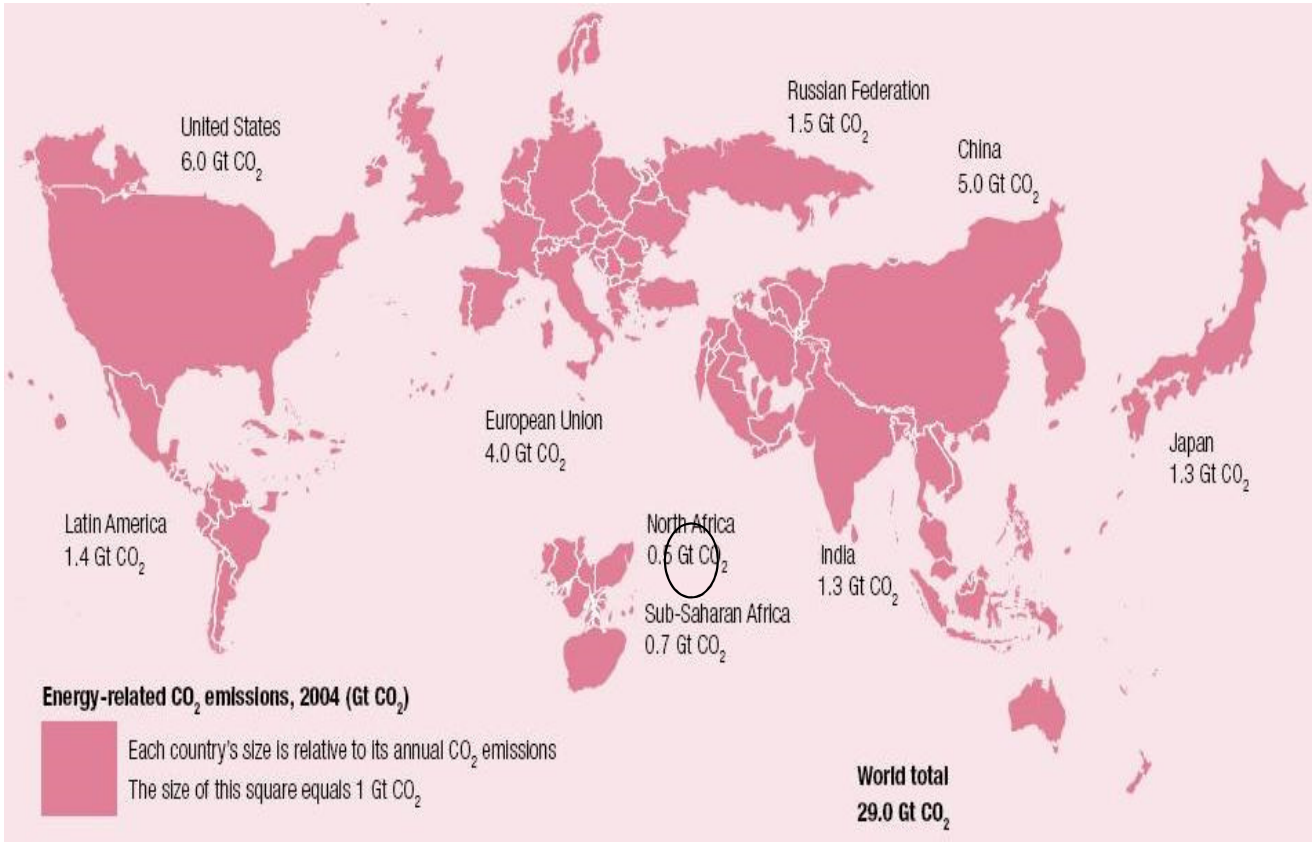
Focus on Water Resources

Pressures on Water Resources in Egypt

Climate Change impacts on the Nile River

Moving Forward

Mapping the Global Variation in CO2 emissions



Source: UNDP Human Development Report, 2007/2008

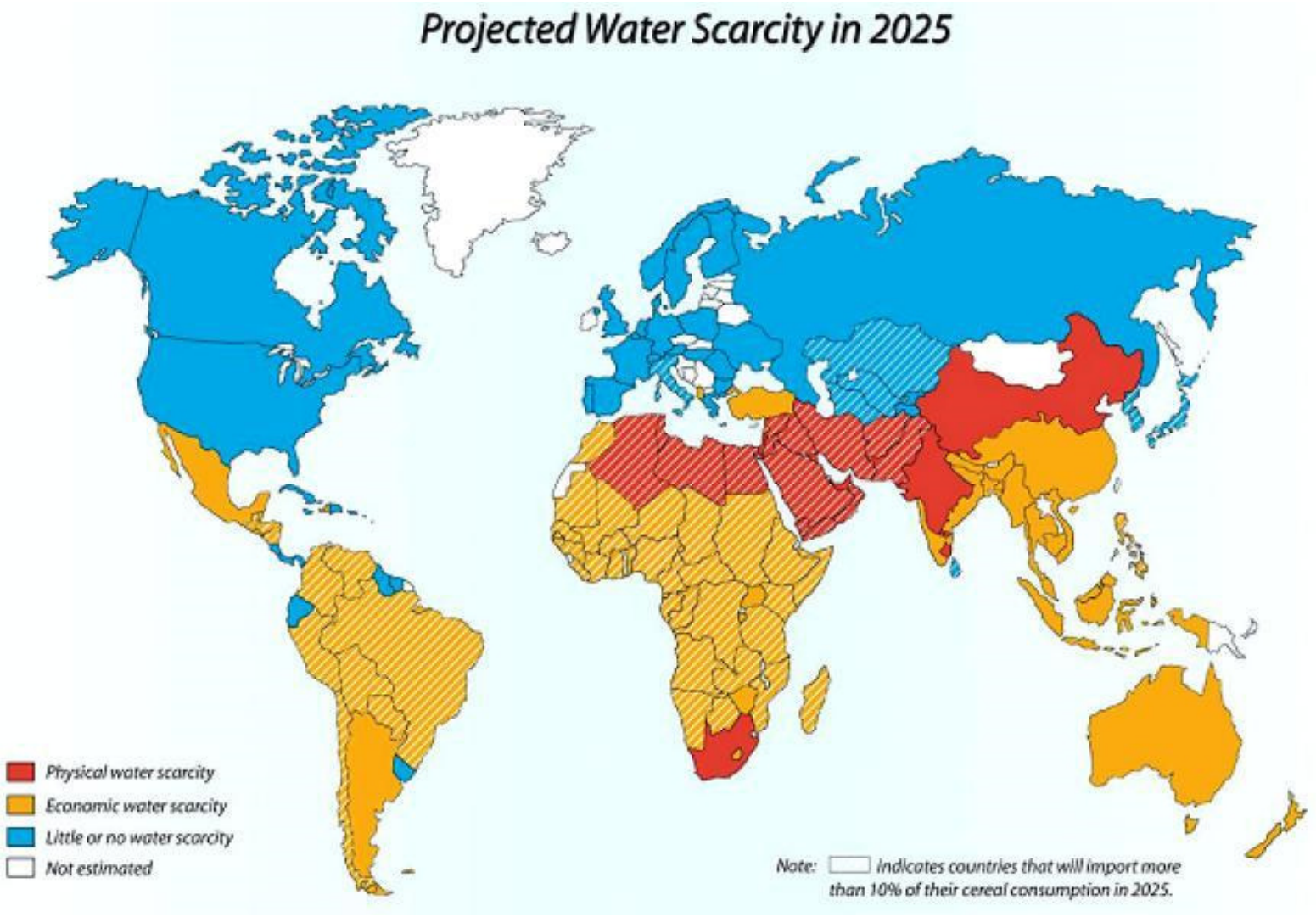
- With 1.1% of the world's population, Egypt accounts for only 0.5% of global emissions; an average of 2.3 tons of CO_2 per person
- Egypt is ranked 29 in terms of global polluters
- Energy, electricity, and transportation are the leading sectors contributing to GHG emissions in Egypt
- Egypt contributes 31% of the CO2 emissions from North Africa, and 13% of the CO2 emissions from the whole of the African continent.

Summary of Climate Change Impacts

- Affected sectors by Climate Change in Egypt:
  - Water resources
  - Agriculture
  - Public health
  - Housing and settlements
  - Coastal zones
  - Biodiversity and coral reefs
  - Fisheries
  - Telecommunications
  - Tourism

Highest priority issues for Egypt:

- Water resources scarcity
- Sea level rise
- Agriculture crop deficiency



Source: IWMI Water Scarcity Map, 2000

Pressure on Water resources

Climate Change – Environment

Population increase

Development of a country – industry, agriculture

Transboundary water conflicts – re-negotiation of treaties

Nile Basin

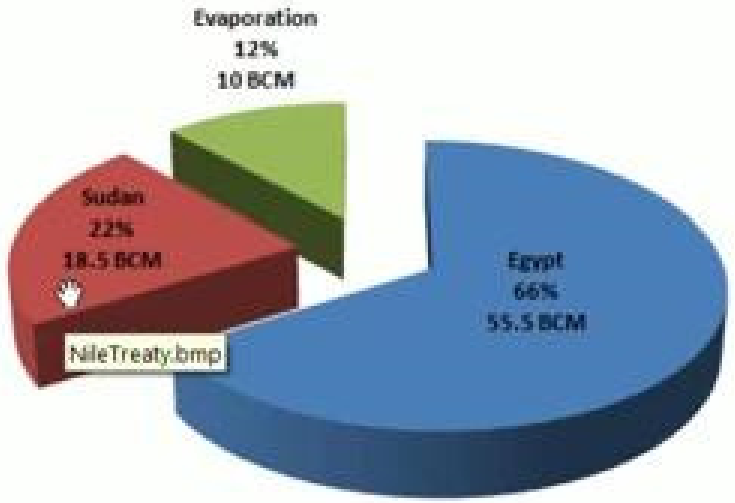
- 3,112,369 km²
- The main and almost exclusive source of surface water in Egypt is the River Nile
- The River Nile runs about 6,650 km through 11 countries
- The last 1,600 km runs through Egypt

Interesting Facts

- Egypt's biggest dilemmas in water resources - variability and uncertainty of the impact.
- Egypt relies heavily on the Nile River as its source for water resources
  - Nile River supplies 95% of Egypt's fresh water needs
  - Extremely vulnerable to changes in rainfall patters throughout the Nile Basin.
- Egypt most downstream nation of the Nile River Basin
  - Most at risk.
- Egypt is in a hot arid region with little to no rainfall.
- Mean annual rainfall in Egypt
  - maximum of 180 mm/year to as little as 2 varying on location (North coast – South)

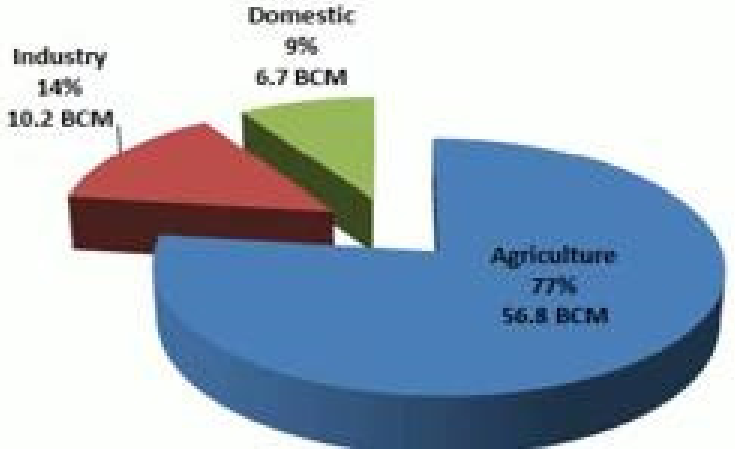
The Nile Water Treaty 1959

Aswan Inflow 84 BCM/year



Egypt Water Demand in BCM

Total = 73.7 BCM (year 2008)



Water CC Impacts on Egypt

- With climate change it is still unknown what the impacts upon the Nile River flow will be.
- There are studies that suggest that with the increase in global temperatures there will be increased evaporation in the Nile River and thus less water supply and ultimately water scarcity.
- Other studies suggest that with the increased evaporation in Egypt, will result in increased precipitation in the Ethiopian highlands (more upstream from Egypt) which will lead to increased runoff in the Nile River flows downstream in Egypt.
- This may ultimately cause floods as the Aswan Dam at Lake Nasser in Egypt may not be able to cope with this increased runoff.
- The ultimate problem is that these two scenarios requires completely opposite adaptation strategies; one entails floods and increased runoff, the other is water scarcity and possible drought.

The population at risk of increased water stress in Africa is projected to be between 75-250 million and 350-600 million people by the 2020s and 2050s, respectively (IPCC 2007).

Examples of climate variability are presented from areas in the basin where it exerts a strong influence on society

- Ethiopian highlands (links with food security)
- Lake Victoria (management of non-stationary lake levels)
- Egypt (exposure to inter-decadal variability of Nile flows)

Warmer temperatures increase evapo-transporation which in turn cause higher precipitation, leading to higher Nile floods.

- Climate change clearly influences the size of Nile floods.

Egypt's most vulnerable sectors to climate change are coastal zones, water resources and agriculture.

1. A 0.5 m Sea Level Rise (SLR) that can occur in about 50 to 60 years would lead to:

   - Permanent submersion of 1,800 km2 of cropland in low lands in the Nile Delta
   - Increase soil salinity in the remaining lands
   - Economic losses estimated at over US$ 35 billion (Land area, 195,000 jobs)
   - Jeopardizing the food security balance
   - Relocation of more than 2 million people in Nile Delta and Valley
   - Severe damage on the large investments in summer resorts along the North West Coast of Egypt.
   - Propensity of industrial hazards and accidents
   - Disruption to the industry's supply and distribution chain and access to key production inputs and feedstock.

2. Significant variation in Nile stream flow, which was predicted by an increase of 30% or a decrease that can reach 70% (highest convergence) in the annual Nile flow which lead to:

- Serious implications in terms of increased flood risks or droughts
- Cultivated lands shrinking associated with decrease in food production
- Increase in number of jobs lost and water conflicts

Following assumptions can be made

1. The Nile extremely sensitive to climatic fluctuations
2. The impacts of climate change on water availability uncertain
3. Egypt already presently exceeding its long-term available water resources
4. New sources of water/water saving needed regardless of climate change
5. Other threats: increased water use in the upstream countries
6. Due to the highly divergent scenarios found in the research, water management is thus one of the most important adaptation actions needed in Egypt

Climate Change: With every challenge stems an opportunity

- Mainstream climate change into national strategies
- Education and awareness on CC on a massive scale
- Adaptation strategies to be secured with climate finance support
- Transparency of information and data between states with natural resource sharing (trans-boundary watersheds, etc.)
- Virtual water trade – mutual benefit sharing. End of the age of self-sufficiency.
- Dialogue and cooperation
- Individual behavior changes

Thank you

Questions ?