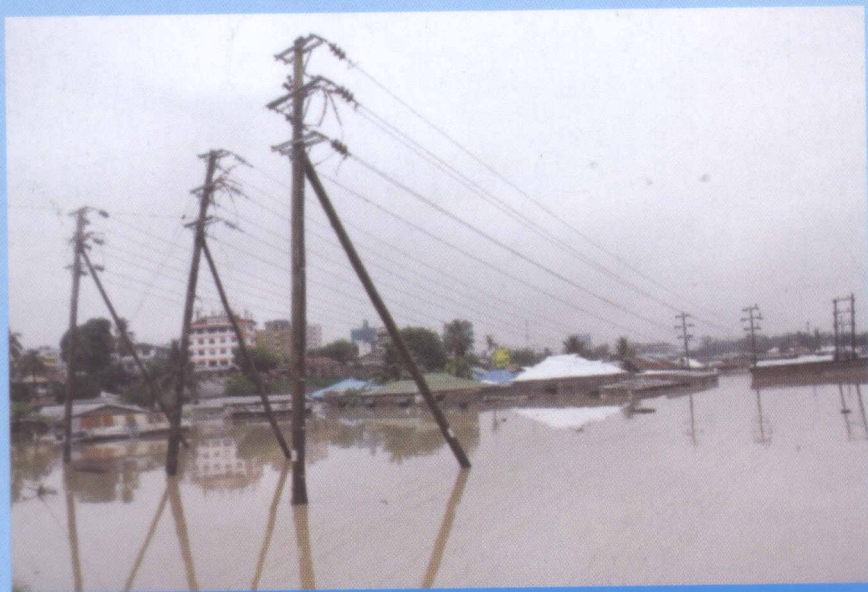




WATER RESOURCES AND CLIMATE CHANGE



Mainstreaming Environment and Climate change
Adaptation in the Implementation of National
Development Policies and Plans

July, 2013

1. Background

Major water resources in the country include rivers, lakes, wetlands, springs, reservoirs and groundwater aquifers and many water bodies are shared with neighbouring countries. In Tanzania water management is divided into nine water basins namely Lake Victoria, Lake Tanganyika, Lake Rukwa, Rufiji, Lake Nyasa, Ruvuma and Southern Coast, Wami-Ruvu, Pangani and Internal drainage basins. Water is an important resource to all sectors; such as agriculture, health, manufacturing, energy, mining, livestock and tourism. It also supports livelihoods by sustaining both rainfed and irrigated traditional farming systems, fishing as well as environment (terrestrial and aquatic systems) including provision of ecosystem services such as climate regulation and water purification (UK AID, 2011, Stacey, 2011).

More than half of the country receives on the average less than 800mm of rain per year (URT, 2007). The seasonal changes in atmospheric circulation and precipitation associated with unequal heating of land and sea that exist in the country, accounts for extreme temporal variability in rainfall and even more extreme variability in river flows.

Climate Change: Is a change in the state of the climate that can be identified (i.e. through statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period typically decades or longer.

Tanzania's annual renewable water resources are 89 cubic kilometers or 2,700 cubic meters of water per person per year (World Resources Institute 2000- 2001). The current amount is 2,020 cubic meters per person per year and will continue to drop over time as population increases and it is anticipated in 2015 population will reach 52 million people, if current rate of population growth from previous censuses are put into perspective i.e. 10 million in 1960 and 44.8 million in 2012 (URT, 2012) making country's per capita water resources to fall below 1,700 cubic meters per person, making Tanzania one of the water stressed country.

Climate Change is already and will continue to negatively impact on water resources which are so vital for Tanzania's socio-economic development. Findings already indicate significant changes in the hydrology of the various vital river basins in Tanzania. Mainstreaming adaptation measures in policy and plans in water sector provides opportunity to address challenges posed by Climate Change

With climate change, there will always be stresses on most nations' water resources particularly their hydrological systems and also economic/social consequences to arise due to inadequate storage infrastructure to cope with climate variability.

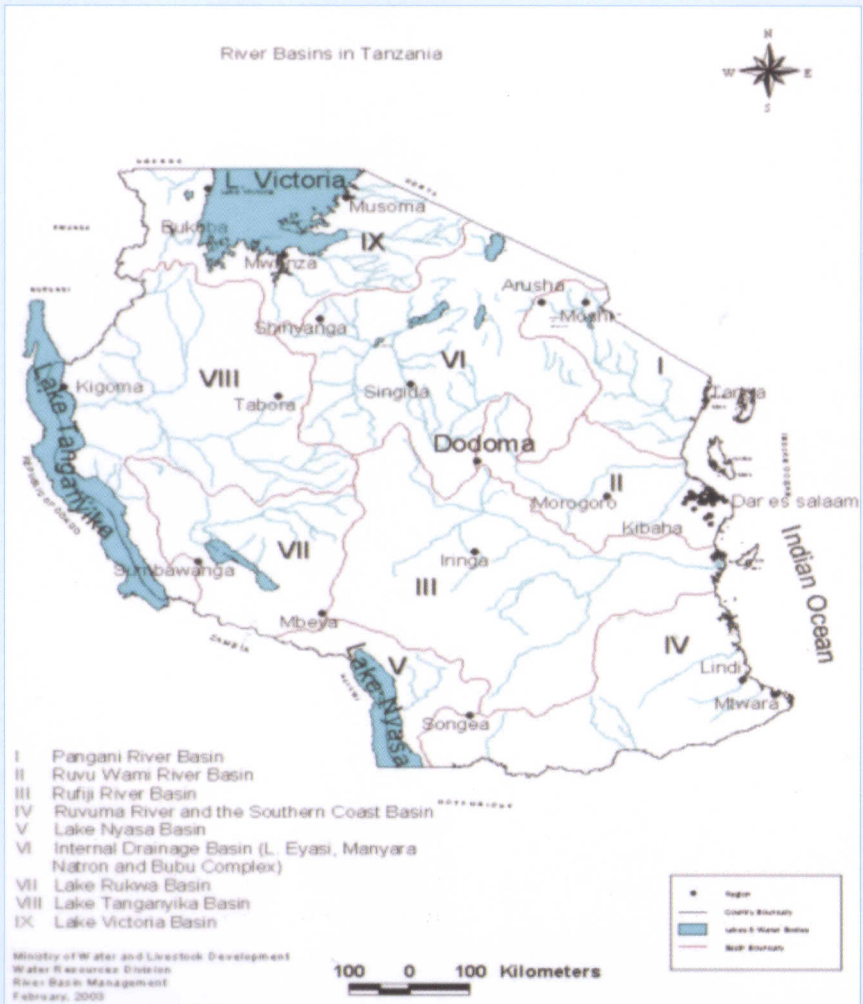


Fig. 1 Water management structure in Tanzania: The nine water basins.

2. Impacts of Climate Change on the Water Sector

2.1 Flooding, Water Borne Diseases and Destruction of Infrastructure

Climate change effects are widespread and seen in many water sector related aspects. Some examples of Climate Change impacts on water sector are; frequent flood events accompanied with spread of water borne and water related diseases and destruction of natural systems and infrastructure. Example of this kind of events is the heavy rains that occurred in Dar es Salaam in December 2011 resulting in flooding, deaths (at least 20 people died) and destruction of houses and infrastructure (See Figures 2(a) and 2(b) below).



2(a)



2(b)

Fig. 2 A section of Dar es salaam during (a) and after (b) the flooding event in 2011
(Note the water level and the the subsequent damage to houses and infrastructure)

2.2 Recurrent Drought and Impacts on Wetlands and Hydro Power Generation

The water sector is already experiencing climate change impacts through severe and recurrent droughts. Stacey 2011 shows that there is a rainfall decrease of 5-15% in central, western, south western, southern and eastern parts of the country. This has manifested itself in disappearance of wetlands, decreased water flows in rivers and water levels in some lakes. Such water bodies include Great Ruaha, Ruvu, and Pangani Rivers as well as Lakes Victoria and Rukwa. Likewise hydropower plants such as Mtera and Kidatu have also been seriously impacted by Climate Change. Long term rainfall data show a decline in annual mean rainfall in many places; this will have serious impacts on water resources (See Figure 3 below).

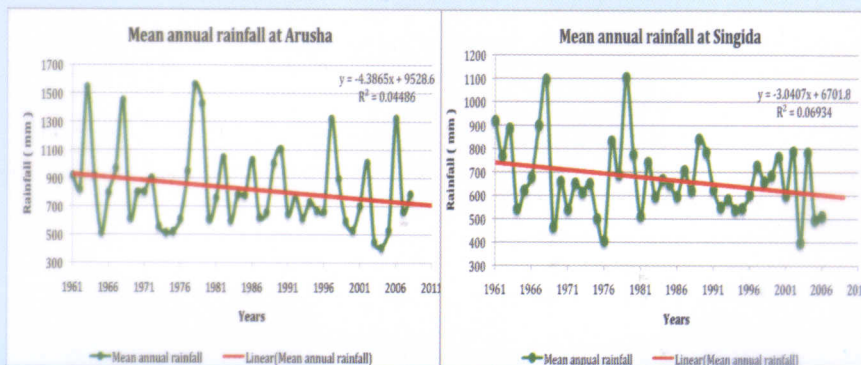


Fig 3. A Ten Year Mean Annual Rainfall Trend for Arusha and Singida.

2.3 Climate Change Impacts on Productivity and Sustainability of River and Lake Basins

Climate change threatens the productivity and sustainability of river and lake basins activities thus affecting, river flow and groundwater systems that will have potentially large impacts (and high economic costs) on household water supply, irrigation, power generation, industry, and the functioning of existing water infrastructure and ecosystem services. Studies show, for instance, that high temperatures and less rainfall during dry months in the main Pangani river catchments could affect its annual flow by a reduction of 6-9% and for the Ruvu River by 10% (Stacey, 2011). Future climate change could make closing the water supply—demand (deficit) gap even harder. Indicators of a declining trend are captured in Figure 4 below.

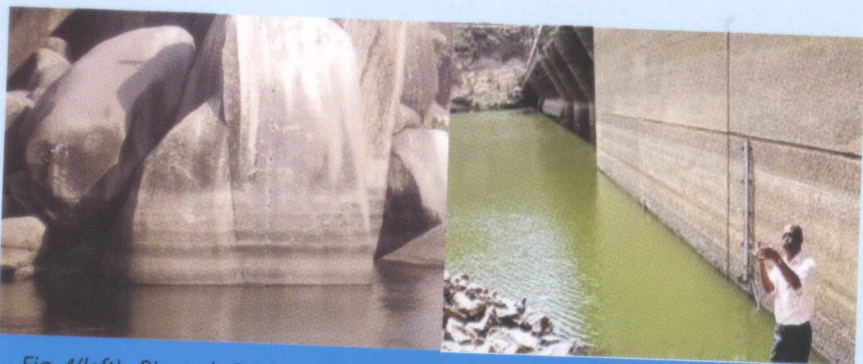


Fig 4(left). Bismark Rock in Mwanza showing receding water levels in Lake Victoria) and Fig. 4(right) Mtera Dam reveals a decline in water level.

2.4 Intrusion of Salty Water into Fresh Water Aquifers

As a result of Climate Change and sea level rise, salt water intrusion into fresh water resources has been reported in some places. In some coastal areas which used to have fresh water like Bagamoyo and Rufiji have now been affected as a result of salt water intrusion. With increasing abstraction of ground water resources coupled with sea level rise, the problem is expected to worsen with time.

Other Climate Change impacts associated with the water sector are decrease of underground water levels, excessive water contamination due to drought, increased deforestation rates and sedimentation due to increased runoff and flooding.

3. Selected Ongoing Climate Change adaptation measures in Water Sector

To cope with climate change effects through adaptation, the Government has put in place different initiatives such i.e. policies, legislation, strategies, plans, programmes and projects. A selection of these includes:

- a) Developed the National Water Policy of 2002 with the main objective of developing a comprehensive framework for sustainable development and

- management of the nation's water resources in which an effective legal and institutional framework for its implementation will be achieved;
- b) Enactment of the Water Resources Management Act No. 11 of 2009 (with its regulations) which provides a legal framework for implementation of the 2002 water policy. ;
- c) Implementation of different programmes, plans and projects for conservation and management of water resources such as:-
- Water Sector Development Programme (WSDP) focusing on establishing and strengthening institutions (National Water Board, nine Basin Water Boards and nine basin water offices, sub catchment councils and Water User Associations (WUA) and developing integrated water resources development and management plans in all basins;
 - Implementing Lake Victoria and Lake Tanganyika Environmental management projects in which catchment management and conservation, poverty reduction, fisheries development, and waste water management are major areas of focus.
 - Carrying out water point mapping to support assessment of availability of safe and clean water to the rural communities in the country;
 - Assessment of impacts of climate change in all nine water basins;
 - Promotion of the use of appropriate technology in water conservation, rain water harvesting, sanitation, wastewater treatment and increasing access to safe water;
 - Dissemination of efficient water utilization technologies (See Figure 5).
 - Investing in groundwater exploration;

Adaptation refers to the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities

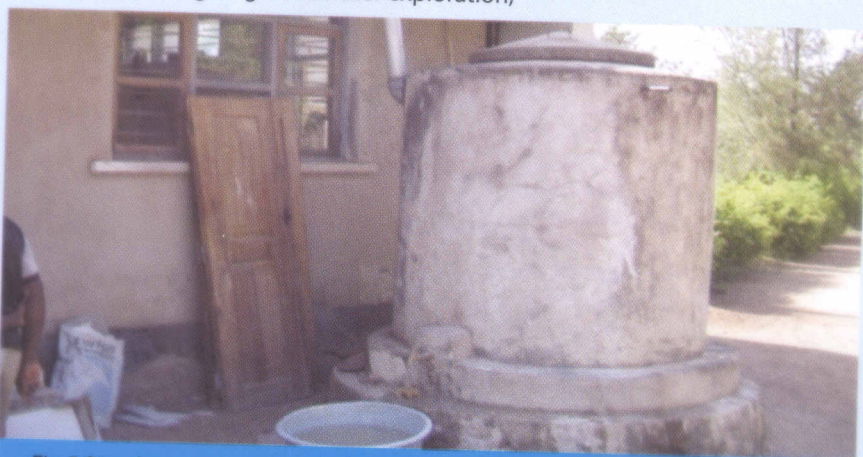


Fig 5. Simple water harvesting technologies like this one are vital in adapting to climate change impacts.

4. Benefit of investing in adaptation measures

Although Tanzania has abundant freshwater resources compared to its neighbouring countries, these resources are under serious threat with Climate Change. Adapting to Climate Change in water sector has the following benefits, among several;

- Ensured availability of adequate, safe and clean water to the population;
- Availability of water for key economic sectors which are dependent on water availability. With Climate Change it is expected that food security in future will be attained through irrigation. The Government has recently launched agricultural development initiatives such as “Kilimo Kwanza” and the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) of which their success depends very much on availability of water; and
- Reduced water use conflicts among different users.

5. Some Key Policy recommendations

In order to adapt to climate change impacts the following policy actions are recommended;

- Developing a regulation for environmental water allocation;
- Developing operational guidelines and procedures for conducting Environmental Flow Assessment;
- Rehabilitation/Improvement and development of new additional water storage infrastructure for distribution e.g. new dams, water harvesting technologies especially for rural communities;
- Strengthening integrated water resources management and promotion of community based catchment conservation and management programs;
- Strengthening water permits register with a reasonably well-defined system for all user groups and develop process, procedures and methods and legal requirements for allocating water for various uses such as generation of hydro power, mining, irrigation, domestic, industrial and livestock uses;
- Capacity building to district authorities in water point mapping to facilitate future plans for water uses;
- More investment on groundwater, exploration, monitoring and extraction;
- Promote the use of appropriate technologies in water conservation (e.g. in irrigation development), rainwater harvesting, recycling and reuse, improved sanitation, and wastewater treatment for assured access to safe water and adequate sanitation;
- Implement simplified and practicable Private Public Partnerships (private sector, civil societies, and other relevant players) for innovative and adaptable technologies for climate change effects in water sector;
- Reinforce initiatives to address transboundary water resources issues;
- Strengthen efforts in establishment of Water User Associations (WAUs) for the conservation of catchments and sub catchments as well as conflict management.

6. Further Reading

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