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Climate Change Impacts on Ecosystem Services and Food Security in Eastern Africa

Increasing Knowledge, Building Capacity and Developing Adaptation Strategies

POLICY BRIEF 4

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Likely Impacts of Climate Change on Access to Water

Upper Catchment of Pangani River Basin in Tanzania and Wundanyi Catchment in Taita Hills of Kenya



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Introduction

The water basin boundaries for CHIESA's WP6 have been defined based on the upper catchment of Pangani River Basin (upstream of Nyumba ya Mungu Dam) in Tanzania and Wundanyi catchment in Taita hills of Kenya.

What do we know so far?

1. The prediction of hydro-climatic trends shows that mean rainfall distribution in Wundanyi is highly variable over time compared to Voi area. Nonetheless, mean temperatures show an increasing trend in both locations. These differences arise from both local and global environmental changes affecting Wundanyi Catchment.



Smallholder irrigated agriculture in one of plain areas in Moshi.

What action is being taken?

The public and private sector in East Africa is adequately informed and able to adapt to the effects of climate change on ecosystem services. The WP6 has been able to deliver the planned outputs/results as follows:

- Analysis of data sets using Soil and Water Assessment Tool (SWAT) for development of predictive hydrological models under different land cover/use change and climate change scenarios. Results of SWAT model for Pangani River Catchment (in Tanzania) are satisfactory for simulations of the catchment stream-flows
- Analysis of data sets using SWAT and WEAP models for assessment of areas for water provision, their management and uses under different scenarios for Pangani river catchment have been completed
- Assessment of likely impacts of climate change on access to water and related health problems of vulnerable populations have been completed for six villages in Kilimanjaro transect. Furthermore, baseline study on impacts of climate change on livelihoods and relevant adaptation strategies by local communities have been completed
- Two short training courses on Integrated Water Resources

2. Socio-economic data to assess climate change impacts and local adaptation strategies have been collected and analysed in six villages of Kilimanjaro transect namely: Nduoni, Kyou, Oria, Ngorika, Lang'ata Bora and Lemkuna.

Most of respondents in these villages mentioned that, changes in the quantity, timing, intensity and duration of rainfall contribute to water stress in many areas, making people more vulnerable.

As local adaptation strategies, farmers in mountainous areas (upper catchment) are practising agro-forestry, while farmers in low plain areas (middle catchment) are engaged in smallholder irrigation to sustain crop production.

Management and Climate Change Adaptation have been conducted for key stakeholders of Pangani water basin in Moshi, Tanzania and Jimma in Ethiopia.

What other activities have taken place?

1. Development of predictive hydrological models

After analysis of the collected climate data and spatial data (DEM, land use map and the soil map), the SWAT model was setup and simulation of results was done. The model was run successfully and preliminary results were obtained.

2. Capacity for assessment of climate change impacts

Training course on the integrated water resources management (IWRM) and climate change adaptation strategies was organised by University of Dar es Salaam, Tanzania with support from WP6 and WP8 of CHIESA project. The training addressed the following key areas:

- The impacts of water use for agricultural production on water availability and quality
- How IWRM can improve the performance of the agricultural sector.
- How water supply is being affected by use of water

resources by other sectors

- The relationship between water availability and people's livelihood
- How the environment is being affected by water use in other sectors
- Conjunctive use of surface water and groundwater
- Protecting and restoring natural systems.

Each participant expressed appreciation for the training and that they have learned some new issues on water resource management, climate change and the importance of IWRM as a tool for adaptation and mitigation.

Recommendations

- Availability of good datasets on hydrology, climate and socio-economic is a key component for successful development of predictive hydrological models.
- Enforcement of the laws and regulations effectively can provide positive results on sustainable water resources management and climate change adaptation.
- A major instrument to explore water-related adaptation measures to climate change is provided with Integrated Water Resource Management (IWRM).

Successful integrated water management strategies include, among others: capturing society's views, reshaping planning processes, coordinating land and water resources management, recognizing water quantity and quality linkages, conjunctive use of surface water and groundwater, protecting and restoring natural systems, and including consideration of climate change.

- Second phase is strongly recommended due to the fact that, some of the activities will end up prematurely because of limited resources (in time and finance).



Top: Miwaleni Spring in Moshi and, above, Nyumba ya Mungu Dam/ Reservoir, also in Moshi.



Participants and facilitators during CHIESA-sponsored Integrated Water Resources Management (IWRM) Course held in Moshi in January, 2013.

What is CHIESA?

The Climate Change Impacts on Ecosystem Services and Food Security in Eastern Africa (CHIESA) is a four-year research and development project aimed at increasing knowledge on the impacts of climate change on ecosystem services in the Eastern Afrotropical Biodiversity Hotspot (EABH).

CHIESA is funded by the Ministry for Foreign Affairs of Finland, and coordinated by the International Centre of Insect Physiology and Ecology (icipe) in Nairobi, Kenya.

Through research and training, CHIESA will build the capacity of research communities, extension officers and decision makers in environmental research, as well as disseminate adaptation strategies in regard to climate change. The general areas for environmental research are in agriculture, hydrology, ecology and geoinformatics.

CHIESA activities focus on three mountain ecosystems in Eastern Africa, namely Mt. Kilimanjaro in Tanzania, the Taita Hills in Kenya and Jimma Highlands in Ethiopia. The project consortium monitors weather, detects land use/land cover change, and studies biophysical and socio-economical factors affecting crop yields and food security.

The project also builds the climate change adaptation capacity of East African research institutions, stakeholder organizations and decision-makers through research

collaboration and training.

Together with local communities, the project will develop, test and disseminate climate change adaptation tools, options and strategies at the farm level.

Further, CHIESA provides researcher training for staff members of the stakeholder organizations, enhances monitoring and prediction facilities by installing Automatic Weather Stations, and disseminates scientific outputs to various actors from farmers to policy-makers.

WP6 - Assessment of Impacts on Water Provision

In WP6, the impacts of climate and land cover change on water resources and water provision are studied.

Climate change will impact upon water provision services directly by shifts in precipitation amounts, variability and intensity; potential evapotranspiration, and indirectly by changes in land cover and soil properties. It will aggravate the water stress currently faced in some countries, while others that do not currently experience water stress will become at risk of water stress.

Irrigation may help in water demand, but it is dependent on the conservation of forests to maintain water resources for supplying water for domestic and industrial uses, including hydropower.



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