The physical and social dimensions of the WEF nexus: interdependencies in the Rufiji River Basin, Tanzania.

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Overview

• Research project ‘UMFULA’
  • ‘Future Climate For Africa’
• Rufiji River Basin
  • Problem-framing
  • Stress testing development pathways; WEF-E
  • Political economy......
• Conclusions

Image source; http://aquate.com/
Climate change - Rufiji River Basin case study.... high stakes decisions?
Climate risk to major infrastructure

Rufiji River Basin development plans

Irrigation expansion
Hydropower dams
Wetlands and environmental flows
Modelling system
Climate risk
To what extent will climate change compromise development objectives?
Includes:

- existing (4) and all planned dams (7)
- 2 wetlands
- 2 national parks
- Formal (4) and informal irrigation offtakes (9)
Development plans – trade-offs and co-benefits across the Water-Energy-Food-Environment sectors

Irrigation expansion up to 400,000ha

Abstractions up to 6.2BCM

New hydropower plants JNHPP

Image source: http://aquate.com/
Identify most important concerns of managers / stakeholders
Performance indicators

Irrigation
reliability of meeting irrigation water demand

Ecosystem services
peak flow frequency downstream of JNHPP flow disruption metric

Hydropower production
reliability of annual and monthly total annual production

Image source: http://aquate.com/
Wet and dry projections...

Runoff enhances risk of drying

Rainfall – 5 dry models out of 28
Runoff – 12 dry models
Impacts of historical variability

What if JNHPP had been built in 1900?

Failure rates (%) to meet performance objectives under 24 GCM scenarios

- Three performance indicators
- Stress test under range of climate projections + JNHPP + irrigation
- Positive and negative impacts – different between indicators

Multi-objective optimization – Rufiji Basin

- Infrastructure options
- Multi-year drought risk
- Contingency plans

The role of governance / political economy

1. *Sufficient water but multi-year drought and trade-offs need consideration*

2. *Management / governance crucial (effectiveness and capacity of delivery systems)*

3. *Political economy factors underpin decisions and outcomes (big decisions, ministerial responsibilities)*
Rufiji Basin work;

Designing a process for assessing climate resilience in Tanzania’s Rufiji river basin

Overview
This brief introduces the concept of climate information and reasons for its use in major decisions about water, energy, and agriculture, including new infrastructure investments. It outlines the innovative approach taken in the Rufiji river basin in Tanzania by the SMFLA research team of the Future Climate for Africa (FCA) programme to assess trade-offs between plans for water use in the economy, agriculture and environment sectors in order to identify adaptation options that are robust and resilient in the face of climate change. A second brief will share the results of the analysis. This brief is designed to inform programmes, donors, and government decision-makers who need to make similar assessments.

Key messages
- Major policy and sectoral decisions require careful planning in cases involving large investments, long life times and irreversibility; there is a strong argument for assessing resilience to future climate change. The Rufiji River Basin exemplifies this as it targets development via new hydropower infrastructure. The Jabali Small Scale Hydropower Project is being implemented by the Sustainable Energy Development Services Tanzania (SEEDS) and investment in agricultural water canals through the Southern Agricultural Growth Corridor of Tanzania (SAGCOT).
- The process of assessing climate resilience involves developing an understanding of the basin and the key decision making trade-offs, identifying what is important to stakeholders and how these generate benefits, identifying options that are sustainable, and making sustainable development benefit decisions based on climate risks and delivering their merits to stakeholders.

Thank you
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Climate change impacts – implications for policy and practice in Tanzania’s Rufiji River Basin

Overview
This brief synthesizes the results of undertaking a climate risk analysis for the Rufiji River Basin, Tanzania. The basin supports extensive socio-economic and environmental services and is targeted for major development via hydropower infrastructure and investment through the Southern Agricultural Growth Corridor of Tanzania. The implications of climate risk for development objectives that cut across the water-energy-food-environment sector are outlined and recommendations for programming that addresses climate resilience and sustainable development are made.

Headline messages: Rufiji Basin development
- Major decisions require careful planning, in cases involving large investments, long life times and irreversibility, there is a strong argument for assessing resilience to future climate change. The Rufiji River Basin exemplifies this as it targets development via new hydropower infrastructure. The Jabali Small Scale Hydropower Project is being implemented by the Sustainable Energy Development Services Tanzania (SEEDS) and investment in agricultural water canals through the Southern Agricultural Growth Corridor of Tanzania (SAGCOT).
- Under current climate conditions there is a considerable potential for energy and irrigation expansion at this basin scale. However, there are many trade-offs depending on the extent of development. Hydropower reliability in the APR, affected by the higher spatial extent of future expansion of formal and informal irrigators, may not be shared equally reliability depends with the two key aspects of irrigation expansion, which if sustained could contain additional energy generation from this basin.
- Development scenarios that prioritize energy production ultimately rely on the reliability of the energy grid. The APR is likely to generate surplus energy initially, it is likely possible to reduce environmental and livelihood impacts. Greater use of groundwater, taking into consideration observed variability in recharge events could reduce trade-offs between agriculture, energy and the environment in dry years. Many small-scale water works associated with increasing water use impacts on local scale water scarcity (long term and seasonal) already leading to certain upstream tributaries, generating