

Executive Summary: Hydro-Economic Overview— An Initial Analysis in Tanzania

In 2014 the 2030 Water Resources Group undertook a targeted analysis of Tanzania's water challenges as well as opportunities to subsequently raise awareness, mobilize, and engage "new actors" from the private sector and civil society for sustainable water activities. The project objective was to provide the basis for supporting the Government of Tanzania in initiating and catalyzing reforms designed to ensure sustainable water resources management, and thus enable long-term economic development. Find the full report at www.2030wrg.org.

Purpose of this Report

This report has been prepared under the direction of the 2030 Water Resources Group (2030 WRG) with the Ministry of Water of the Tanzanian Government for the 2030 WRG Tanzania Partnership.

The purpose is to summarize the results of preliminary hydro-economic analyses to support a business case for sustainable water resource management in Tanzania and identify opportunities across the public and private sectors. In particular, it highlights the water resources challenges, identifies the links between economic performance and water availability, and clarifies existing and future constraints which need to be overcome.

As well as a high level national assessment, the analysis includes a focus on two regions of Tanzania where economic opportunities are of national importance and will be constrained without better water management. The Rufiji basin has large scale potential for development of agriculture, tourism and hydropower while the Wami-Ruvu basin requires balancing demand from existing agriculture upstream and urban pollution downstream to ensure the high industrial growth in the largest city—Dar es Salaam—can continue.

National Assessment

Tanzania has significant annual average renewable water resources of 94,000 Million Cubic Meters (MCM) per year amounting to some 2,300 CM per capita; well above the Falkenmark indicator¹ for "water sufficiency" of 1,700 CM per capita. Despite the abundant water resources, availability is highly variable in space and time and remains a constraint for Tanzania in meeting overall water demand. Taking into account environmental flow requirements, during dry periods, national demand is 150 percent of accessible water. Under a business as usual scenario and factoring in economic growth projections this increases to 216 percent by 2035. High river flows in the wet season are not all practically available for use due to low water storage capacities. An increase in surface water availability, particularly in the dry season, could be achieved through the increased capture of water in storage reservoirs in the rainy

seasons. Tanzania's economy is already suffering directly from lack of water. Recent government analysis estimated that overall GDP growth in 2011 was reduced from 7 percent to 6.4 percent due to drought affecting water and hydropower. A 0.6 percent reduction in GDP corresponds to \$142 million in 2011 prices and, based on average GDP per capita figures, is equivalent to contribution to GDP of over a quarter of a million people.

The Rufiji Basin

The Rufiji is the largest of Tanzania's nine water basins and, with 25 percent of national river flow and 33 percent of national rainfall, is the main focus for opportunities for increasing development in agriculture, and hydro-electric power. It is the location for a proposed US\$3 billion investment under the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) program, which aims to expand commercial farming by 350,000 hectares including an increase from 16,000 to 120,000 hectares in just one valley—a factor of almost 10. However, irrigation is already causing seriously depleted water flows in some sub-basins and new irrigation schemes planned for the Mpanga and Udagaji catchments in the Kilombero Valley will lead to zero river flow in the dry season unless water management interventions such as increased irrigation efficiency and new reservoirs are implemented.

The potential for hydro-electric power in the basin is five to ten times current levels of generation with corresponding increases in revenues from \$172 million to \$800 million, providing energy output two and a half times the current national electricity use. Currently, considerable irrigation is practiced upstream of hydropower facilities which reduces flows and generation levels. Low irrigation efficiencies and unlicensed abstractions are contributing factors but could be addressed by well chosen water management interventions that mitigate the tradeoffs and choices required between new agricultural development and hydropower, while maintaining environmental quality and supporting tourism.

¹ Falkenmark, M., 1989. The massive water scarcity threatening Africa—why isn't it being addressed. *Ambio* 18, no. 2 : 112-118.

The Wami–Ruvu Basin

The Wami Ruvu basin includes Dar es Salaam, the largest economic and urban center in Tanzania. Water users in the basin are already consuming all water that can be supplied. By 2035, the volume of water consumed is projected to double due to new agricultural schemes and high industrial growth. Plans for the development of water supplies expect to use the large Kimbiji aquifer and a new dam at Kidunda but the aquifer is at a very early stage of investigation and construction of the dam has not started. Yields from the aquifer are unpredictable and also depend on overcoming difficult technical challenges of retrieving water at a depth of 1,000 meters. Both developments will require substantial investment but are realistic long-term solutions which could address the acute water supply problems already affecting health and economic development in the rapidly growing city.

Incremental development of additional storage in the basin would provide benefits from better regulation of seasonal flow supplies and while a number of dam sites have been identified they are currently uncosted. Urban areas supplied from existing surface water resources, like those in the commercial and industrial center of Dar es Salaam, are vulnerable to poor agricultural practices upstream which affects water quality and quantity. In Dar es Salaam, less than half the inhabitants have access to the main water network and instead use private and unlicensed boreholes. Overuse of the shallow aquifer under the city has led to contamination from sea water and health risks resulting from poor disposal of industrial effluents and the reliance on on-site sanitation by 90 percent of the population. The urgent need to tackle these water resource challenges requires new solutions such as water treatment and reuse, industrial water efficiency measures and tackling non-revenue water.

Recommendations

Tanzania requires both strategic national and local solutions and the literature reviewed during this assignment included a wide range of detailed and high-level recommendations at both the national and basin levels.

The 2030 WRG Tanzania Partnership Kick-Off Workshop in November 2013 brought together stakeholders and began this process by identifying focus areas including **water use efficiency, water security and cross-sectoral coordination**. It identified the need for further in-depth hydro-economic analysis in priority basins such as those with expectations of significant new economic growth.

The recommendations identified and presented below will require **convening groups of stakeholders** to assess opportunities and develop focused proposals. The main recommendations are:

- **Large and Small Scale Water Storage, including Multipurpose Reservoirs.** Lack of water storage in Tanzania limits the possibilities for managing and regulating water supplies in meeting current and future demand. The future investment in

storage infrastructure at large and small scales for irrigation purposes is a necessary component for achieving the planned increases in agricultural production. Multipurpose storage schemes would also provide industry with more secure water supplies as well as playing a role in hydropower development. It is proposed that the multipurpose schemes presented in the Integrated Water Resources Management Development Plans (IWRMDPs) as well as new proposals are brought to convening sessions at national or basin level and explored by stakeholder groups for development opportunities including cross-sectoral interactions, collaboration and shared investment.

- The potential for **wastewater treatment and reuse** is very relevant to the urban areas in Tanzania. These are growing rapidly, particularly in Dar es Salaam which is the main commercial and industrial hub. Reuse increases water availability locally and contributes to greater water security for business and domestic consumers. The largest industrial water uses in Dar es Salaam are for cement manufacture, and food, drink and textile production. It is proposed to convene representatives from these groups and the water and sanitation provider, together with potential investors to identify opportunities for partnerships to develop such schemes.
- The same stakeholders should also address the issues of **non-revenue water** and **industrial water use efficiency**. Additional revenues are valuable as an immediate source of funding for improved water infrastructure. Increased water efficiency will reduce water costs and risk to industry. The water savings from both will release additional supplies to other users.
- **Efficiency Improvements in Irrigated Agriculture.** Over 80 percent of irrigated land is farmed using traditional practices for water use with efficiencies as low as 15 percent (compared to modern efficiencies of over 90 percent). Investment in new or rehabilitated irrigation schemes would reduce water use and often leads to increased agricultural productivity. Such developments may, at the same time, benefit existing enterprises, provide infrastructure for smallholders and form hubs for wider added-value initiatives. It is proposed that a selection of irrigation development plans identified from the IWRMDPs are brought to a convening session with potential investors, commercial enterprises and smallholder farmers to assess specific opportunities.
- The **System of Rice Intensification (SRI)** is a strategy that can be adopted by commercial farmers and smallholders to increase productivity and reduce water use. Studies of SRI in Tanzania have shown yield increases of between two and four times while also reducing water requirements significantly. The experience of commercial rice growers already using SRI and other successful agribusinesses using modern water use techniques should be showcased to new and potential investors, smallholders and larger enterprises.
- Achieving these results in these areas will require strong collaboration between the public and private sector and civil society. The 2030 WRG Tanzania Partnership has been established to facilitate this collaboration.

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