

Tugwi Mukosi Dam and Climate Change: Unlocking Economic Value from Field Cropping for Chivi and Masvingo Rural Districts

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Abstract

Climate change is real and water harvesting is a promising strategy for food and income insecurity for struggling communities. This study proposes how crop agricultural crop value can be unlocked by Masvingo and Chivi rural district communities around and downstream Tugwi Mukosi Dam (TMD). The TMD is Zimbabwe's largest inland water body is located at the confluence of Tugwi-Mukosi rivers. The dam is on the boundary of in the two districts of Masvingo Province. The study applied both qualitative and quantitative data from Zimbabwe's Ministry of Lands, Water, Agriculture Fisheries and Rural Development, Tongaat Hulett Zimbabwe Limited, local leadership (elected and traditional), development agencies in Chivi, and Masvingo districts, the Zimbabwe National Water Authority (ZINWA), as well as agronomists from a local university. Study participants were purposively selected. Interviews, observation and questionnaires were the main data collection instruments. Findings from this study established that local communities around and downstream this dam still suffer severe food and income insecurity despite being on the fringes of this mega water body. It also established vast agricultural crop potential for local communities given supportive national policy and capital investment by the government. It established that the dam was planned and constructed to serve economic interests of corporates only. The study recommends liberalisation of the ZINWA policy to allow local communities to benefit fully from the dam, particularly now as the districts suffer the effects of climate change.

Keywords: climate change, agricultural value, Tugwi Mukosi Dam, economic opportunities

1. Introduction

Despite Zimbabwe is the second most dammed country in southern Africa after South Africa. However, food and income insecurity remain some of the most daunting tasks for the rural

districts in Zimbabwean. Tugwi Mukosi dam (TMD), with a water carrying capacity of 1.8 billion cubic metres is Zimbabwe's largest inland water body. In the country, there is a growing concern over the economic use of major dams

constructed during the colonial and post-colonial eras as many rural communities around and downstream these dams remain in economic poverty (Batasara, 2015). Makururu et al. (2018) and Mashingaidze (2013) observed that the socio-economic advantages of most dams in Zimbabwe are realised by non-locals who live hundreds of kilometres away at the expense of local communities. Similarly, local communities in Masvingo and Chivi rural districts continue to experience water-related growth challenges despite their close proximity to TMD. The planners of the dam prioritised corporate interests more than those of the local communities. The reason could be that the dam was planned over 60 years ago when climate change was not an issue. The need to reconsider giving local communities huge water rights is unquestionable in the face of devastating climate induced droughts in the districts under study.

According to FEWSNET (2019) Zimbabwe, particularly the southern part of the country (where Chivi and Masvingo districts are located) has been subjected to periodic droughts strongly correlated to El Nino events. The Report notes that in the twenty years (2000 to 2019), the area under study experienced El Nino droughts in seven seasons namely in 2002/03, 2004/05, 2006/07, 2009/10, 2014/15, 2015/16 and 2018/19. Apparently, the 2015/16 El Nino caused the worst drought in 35 years. The El Nino experience has invigorated SADC countries' resolve to invest generously in irrigation infrastructure to enable farmers to grow crops all year round and not only depend on rain-fed cropping. The Water Sector Plan of the SADC Regional Infrastructure Development Master Plan contains a total of 34 infrastructure projects aimed at improving access to water in the region.

Tugwi Mukosi Dam accounts for 27% of the irrigation water yield for the 12 large dams in Masvingo Province (Chazireni & Chigonda 2015). The sugar industry in the southern part of Masvingo is indicative of the potential of the dam to help local communities to grow out of drought induced poverty. Such a strategy is sync with Vision 2030, which was enunciated by His Excellency, the President of Zimbabwe, Emmerson Dambudzo Mnangagwa.

2. Research Methodology

The study was carried out on local communities around and downstream Tugwi Mukosi Dam in

Chivi and Masvingo districts of Masvingo Province. These districts are located within the geographical confines of the dam and the Tugwi River as it meanders towards Runde River towards the Indian Ocean. Data collection for the study was carried out in two phases namely: i) the first phase being preliminary visits /phone calls to key informants. These included government officials from line ministries, Tongaat Hullet Zimbabwe officials, Zimbabwe National Water Authority (ZINWA) officials as well as community leadership (both traditional and elected). The purpose of the visits was to sensitize the key informants of purpose of the study. The second phase comprised subsequent trips to the area for information gathering from the key informants. The researchers used interview guides, questionnaires, focus group discussions and narrative cases of specific incidences/experiences. Data was captured by interview guides informal interaction as well as through observation. Thematic content analysis was used to analyse data. Twenty-eight persons participated in the study.

3. Study Findings

3.1 Administrative Boundaries

Administratively, there are eight districts in Masvingo Province. Of these, four have the potential to agriculturally benefit from Tugwi Mukosi Dam. These are Masvingo South, Chivi South, Chiredzi North, Chiredzi West, Chiredzi South, Chiredzi East and Mwenezi East.

3.2 Tugwi Mukosi Irrigation Potential

According Rajagopal (2002) and Gebre (2003), the world over, mega water bodies have the capacity to drive socio-economic growth. In Zimbabwe, the Tugwi-Mukosi Dam, commissioned in 2017 has an estimated capacity of 1, 8 billion litres, making it the largest inland dam in Zimbabwe. The dam's water holding capacity is sufficient to irrigate an additional 25 000 hectares of land in the southeastern Lowveld of the country. The Masvingo Provincial Agricultural Extension Officer pointed out that preliminary studies done by the Ministry of Agriculture in the eight constituencies, established that 32 000 hectares of irrigated land in the districts, can be developed for approximately 16 000 families. Each district would have 2 000 families farming on 4 000 hectares of irrigated land. A family would be allocated 2 hectares on which to grow 1.0 hectare of maize, 0.25 hectares of soya beans and

0.75 hectares of cotton under irrigation as summer crops with 0.5 hectares being grown in rotation for winter wheat production. The Provincial agricultural extension officer for Masvingo Province further pointed out that economies of scale and optimal irrigation efficiency could be achieved with 20 families operating a 40-hectare centre pivot.

Also, agricultural experts in the province recommend that citrus production on 1 000 hectares can be carried out on a commercial estate to be located in Mwenezi East and Chiredzi South in close proximity to the Rutenga railway line. A mixture of oranges, lemons, lime, grapefruits and naartjies could be

grown on the citrus estate. Annual cash crops can be grown in the citrus orchards during the eight or so years it takes for the trees to start bearing fruit.

Table 1 below shows strategic crop production by constituency as proposed by Masvingo Province extension office. The columns show the 8 constituencies which have the potential to benefit from the dam, the number of families from each constituency, the size of irrigated plots per family, crops grown including the hectareage and tonnage expected per crop. This will culminate to food sufficiency in the province with the surplus being directed to the national food reserves.

Table 1. Proposed strategic crop production by Constituency

Constituency	Families	Irrigated ha Per Family	Maize		Soya bean		Cotton		Wheat	
			ha	Tons	Ha	Tons	ha	Tons	ha	Tons
Masvingo West	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Masvingo South	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Chivi South	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Chiredzi North	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Chiredzi West	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Chiredzi South	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Chiredzi East	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Mwenezi East	2,000	2.00	2,000	16,000	500	1,000	1,500	4,500	1,000	8,000
Total	16,000	2.00	16,000	128,000	4,000	8,000	12,000	36,000	8,000	64,000

3.3 Expansion of the Existing Sugar Industry

In addition to the already established estates of Triangle, Hippo Valley and Mkwazine, the study established that there are 10 000 hectares of a sugarcane plantation development on the cards in Chiredzi West and Mwenezi East. These call for the establishment of a new sugar processing mill at Mwenezi Ranch. This mill would be in addition to the existing two processing mills at Triangle and Hippo Valley sugar estates. In an interview with the Masvingo Agricultural Extension Officer indicated that there was a proposal of 10 000 hectares of a sugarcane plantation development on the cards. This would include 4 000 hectares-plantation that Tongaat Hulett is already developing. He further pointed out that there is scope to develop a further 6 000 hectares on Mwenezi Ranch to the south of the existing 2 179 hectares of Mutirikwi Sugar Company land that stretches

from the confluence of the Runde and Tugwi rivers towards the Mutirikwi River to the east. The 6 000 hectares would straddle the Runde River with 3 000 hectares on either side.

The Mwenezi Ranch in Mwenezi East which was identified for the 6 000-hectare sugarcane project by the Zimbabwean Government offers the greatest opportunity in Masvingo Province for developing irrigation schemes using water from Tugwi Mukosi Dam. The study established that the ranch has vast tracts of sparsely populated arable land in close proximity to the Mutirikwi, Tugwi and Runde rivers which can all be used as an integrated bulk water conveyance system drawing from Tugwi Mukosi Dam. Five district namely, Chiredzi North (Ward 16), Chiredzi West (Wards 27 and 28), Chiredzi South (Wards 7 and 10), Chiredzi East (Wards 6 and 8) and Mwenezi East (Ward 13) have tracts of land that can be earmarked for the new sugarcane

development. Parts of Mwenezi Ranch located in Chiredzi West and Mwenezi East Constituencies have existing irrigation schemes that can be incorporated into the Tugwi Mukosi Irrigation Master Plan.

3.4 The Local Communities' Expectations

Interviews by respondents from local communities concur with Cernea (1999) and Katsaura, (2010) that Chiredzi North, Chiredzi West and Mwenezi East looked forward to socio-economic improvement in their lives due to the TMD as depicted in the following narratives.

"This area is very dry, but the soils are rich for crop production particularly cotton and wheat. For your information these crops were experimented by white farmers during the colonial era and did well in Mkwazine and Hippo Valley Estates! However, sugarcane farming took over due to the economic benefits derived from the crop as a result of many by-products from sugarcane. As local farmers we looked forward to some irrigation plots along both natural (rivers) and artificial (canals) water conveyance systems from the TMD to the sugar plantations in Chiredzi District." (A male respondent (Mr X) in Chiredzi North in Ward 16).

Mr Y from Chiredzi West thought otherwise. His thinking resonates Narayan et al. (2000) who feels that those people affected by a development project should also benefit from it. While the irrigation infrastructure could be developed for them, he thought this would be a great boost to the orphaned crops, for example rapoko, sorghum and millet. These grains do well in the area but have been slowly abandoned over the years in preference of commercial crops such as maize, wheat and sugarcane.

"I thought advent of the TMD would boost the production of small grain crops in the region if irrigation facilities were introduced in our area. These small grains have health benefits due to their lack of starch which contribute to sugar related diseases. Besides boosting small grains, irrigation facilities would also improve the production maize which has been adopted as a staple food in the area."

Yet in Mwenezi East Mr Z thought irrigation facilities if introduced would improve the socioeconomic well-being of those people who had been resettled in some portions of Mwenezi Ranch. Irrigation facilities would break barriers

to entry by local farmers to commercial crops such cotton and sugarcane.

"Mwenezi East in the agroecological Natural Region 5. The scanty rainfall patterns in our area have been making it difficult for the recently resettled farmers to partake in the lucrative sugarcane farming practised by Tongaat Hulett in Triangle Sugar Estate close to us. Our food security would be enhanced as irrigation could boost both small grains and exotic crops."

Mr Z concurs with Narayan et al. (2000) who strongly recommends participation by small farmers into capital intensive farming activities.

3.5 Value Addition Opportunities

According to an interview with Zimbabwe National Water Authority Provincial Water Engineer, the full capacity of the dam can last three good seasons irrigating existing sugarcane fields in the southeastern lowveld.

"Irrigation development to produce citrus, cereals, traditional grains as well as expanding the existing sugarcane plantations in the lowveld that can also create scope for opening agro-processing industries which will in turn precipitate urbanisation with potential to create conurbation from Chisumbanje in Manicaland Province in the east to Mwenezi District in Masvingo Province in the south."

This will dovetail with the government of Zimbabwe's modernisation agenda as more investment will come to the southeastern lowveld as the new found hub exporting agricultural produce as value addition opportunities abound in the following activities;

- Maize and wheat milling;
- Expansion of cotton ginning facilities;
- Garment manufacturing;
- Cotton and soya bean oil expression;

Stock feed manufacturing using molasses, cotton and soya cake;

- Livestock fattening and processing;
- Sugar refining and packaging;
- Fermentation of molasses into ethanol;
- Electricity generation from sugarcane fibre;
- Fruit packing and canning;
- Fruit juice extraction and processing.

4. Conclusion and Recommendations

From the above proposals and findings if the

Tugwi Mukosi Dam Irrigation scheme is implemented that would unlock agricultural crop. Irrigation plots along both natural and artificial conveyance channels would boost crop production in both small grain crops as well as commercial crops like sugarcane wheat and sugar with local communities around and downstream benefitting. As a result of increased productivity due to irrigation, value addition opportunities can be explored in the region by the government, private sector as well as individuals. This would offer livelihood options to the southeastern region of the country which has been devastated by the vagaries of climate change for some time.

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Conflict of Interest

No conflict of interest was identified.

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Authors' Contributions

Both authors discussed the results and contributed to the final manuscript.

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Interviews

Insights were sought from the following groups of people:

- 1) Zimbabwe National Water Authority (ZINWA) official
- 2) The Masvingo Minister for Devolution
- 3) The agricultural extension officer for Masvingo Province