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Vihiga's Kaimosi Water Project Uses Solar Energy to reduce the cost of producing quality, accessible and affordable water for all

County:	**Vihiga**		
Sector/s:	**Water**	**Sub-sector/Theme:**	**Water services**
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Target Audience:	**County Governments, County Departments of Water development partners in WASH,**		
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Introduction (Context and Challenge):

The County of Vihiga operated on an old water pump system that was started in the 1940s which could not effectively treat the high turbidity[1] of water that came from the Kaimosi Dam. It provided 1500m^3 of water per day.

Following devolution, towns emerged and water supply became a major challenge following the construction of more schools, hospitals and other facilities. The water scheme serves Kaimosi and the surrounding areas, Shamakhokho and the surrounding areas and Mago towards Sabatia. The population in these areas is steadily increasing with the growth of market centres like Cheptulu, Shamakhokho and Mago, and learning institutions, among them, Kaimosi Friend's University College, Kaimosi Teacher Training College, Kaimosi Girls' Secondary School, and several primary schools. Health facilities have also come up.

The increasing population in these institutions increased the water demand. The utility could not, therefore, satisfy its customers with adequate water of good quality, and

[1] Turbidity is measure of the degree to which the water loses its transparency due to the presence of suspended particulates (ScienceDirect.com)

resorted to rationing water. For example, during power disconnection or blackout, pupils and students would go to nearby rivers and springs to fetch water, thus affecting their class hours. Businesses like hotels and kiosks would lack water, affecting them economically.

The County, therefore, had to commit to providing safe and clean water, noting that water service provision is a devolved function and access to water a human right.

Implementation of the practice (*Solution Path*):

- Staff at the County Government of Vihiga brainstormed on ways to expand safe water provision to its residents and settled on establishing an additional water scheme, the Kaimosi Water Scheme. The water comes from the Kaimosi Dam into the treatment station.
- Before the project was done, elaborate public participation was undertaken to agree on where pipes would pass, markers, tanks (elevated and pressure) in schools and hospitals, etc. In addition, through Environmental Impact Assessment (EIA), the persons to be affected by the project were identified and compensated through the Resettlement Action Plan (RAP).
- The County, through the national government, received funding from Belgium, which was managed by the Lake Victoria North Water Development Agency, a partner they worked with to deliver the new water project designed to serve water in the entire County of Vihiga.
- The County Government provided part of the land and technical support before, during, and after implementation. The County was also the beneficiary of the project through its water utility company, Amatsi Water Services Company (AWASCO) which ultimately took over management of the project after construction of the new water treatment station. The County has 100% shareholding ownership of AWASCO.
- The Presidential Delivery Unit provided sector-wide coordination and oversight during implementation.
- Water Resources Authority provided a permit for abstraction from the river.

- The new station runs sustainably on green/renewable energy — solar and hydropower — and gives cleaner water.
- The new system provides 2500m^3 (2.5 million litres) of water per day. This caters to 80% of the demand. The 20% is obtained from boreholes, local springs, shallow wells and rivers.
- There are 250 solar panels each producing 265 Watts, which is equivalent to 70 kilowatts of energy; the current energy demand for pumping the water is only 50 kilowatts per day. The electricity bill is now at KSh 250 000 per month (50% less than before) as the system can run 2 machines on solar during the day and pump using electricity from the national grid at night.
- KENGEN, Vihiga County and the Ministry of Water undertook a feasibility study to complete the Kaimosi mini-hydro power plant.
- The Kaimosi Water Scheme is one of three in Vihiga County and serves Kaimosi as well as Maseno University and Yala. Others are Lunyenyere (Mbale) Water Scheme and Maseno Water Scheme.

Resource implications

The Government of Kenya and the County Government of Vihiga provided land for project implementation and technical support during implementation. The Belgian government provided funding worth KSh 1.7 billion for three water schemes, i.e. Kaimosi, Mbale and Maseno water supplies.

Sustainability

Future plans to sustain safe water provision in the County are:

- To expand the system to 100% water provision — the budget for the 3 water schemes is KSh 1.7 billion.
- A feasibility study done with KenGen established that KSh 150 million is needed for the completion of a mini-hydro power station where civil works were done, with only electromechanical works remaining to finalize the project. Resource mobilisation is ongoing.

- A proposal for KSh 270 million was submitted to the National Government for the last-mile water supply. Piped connectivity is at 20%. In FY 2020/2021, KSh 50 million was allocated for water distribution while in 2021/2022, Ksh 20 million was allocated.
- The old water pumping station is to be rehabilitated as a standby backup.
- Zero cost of production by investing more in mini-hydropower to pump at night and solar energy during the day to reduce electricity costs (KPLC bills) and have lower water tariffs for residents. There are plans to buy more land for solar panels and to maintain low overhead costs.
- To sell excess power to the national grid to offset KPLC bills.
- To get a license to sell power to residents.
- To have all boreholes solarised — currently, 2 are fully solarised.
- To get water through gravity from Nandi County which is 3 kilometres away.
- To achieve SDG 6 by ensuring that water is clean, safe, accessible and affordable to all.
- The County is currently doing an MoU with Kisumu County to sell water in bulk.

Results of the practice (*outputs and outcomes*)

- Water coverage in the County is currently at 60% (both piped and unpiped, e.g. boreholes and protected springs), up from 40%. WASREB puts piped water coverage at 20%.
- The primary uses of the dam include a mini hydropower station, drinking water, recreation and irrigation.
- Before the use of solar energy, the County would pay KSh 500,000 to KPLC to pay for electricity bills for water pumping in Kaimosi. The cost has now gone down by half to KSh 250,000 a month.

Project activities that yielded positive results entailed:

- Rehabilitation of intake works
- Construction of gravity mains
- Construction of treatment works
- Construction of pump houses and installation of pumping sets

- Installation of solar panels to provide solar energy for pumping water as an intervention to reduce the high cost of electricity
- Laying of rising main pipelines from treatment works to storage tanks
- Construction of storage tanks

Lessons learnt:

What worked really well

- Public participation was done well and the citizens, including those whose land was affected, supported the project. Community conflicts were well managed.
- The parties in the project had regular project meetings and reporting and technical decisions were consultative.
- The technical standards were upheld and quality of works was highly achieved.

What did not work and why

- The Kaimosi dam is colonized by microphytes and heavily silted and therefore requires to be desilted to increase reservoir water capacity. Desilting will cost Ksh 300–500 million.
- The hilly topography in the County makes it challenging to supply water without pumping, which leads to a high cost of electricity. This calls for considering alternative and cheap energy supply with the priority being renewable energy — hydropower and solar energy, which will make the water services resilient and sustainable.
- COVID-19 affected implementation during the tail-end of the project and caused delays in the completion of the project.

What would be done differently

The project did not provide for last-mile connectivity. In the future, this should be done to ensure the County realizes immediate impact on water service provision.

Recommendations (*Conclusion*)

Advice to those seeking to replicate the model

- Public participation in any project is vital before, during, and after implementation. Counties should undertake comprehensive community participation.

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- A comprehensive feasibility study should be done to take advantage of all available project alternatives to exploit and ensure sustainable measures are undertaken for long-term gains.
- Coordination of relevant sectors in the implementation of projects is key to surmounting challenges in the project.

What to avoid

- Delays caused due to the shipment of equipment to avoid high demurrage costs.
- A traditional conventional treatment system that requires more land space.

Further reading:

1. County Government of Vihiga, "The Promise Delivered": World Water Day 2022, *The Standard,* March 22, 2022
2. Vihiga County social media pages

Photo gallery

Water outlet from Kaimosi Dam to the Kaimosi Water Treatment Station

The solar panels which capture the sun's energy and convert it into electricity

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Sand filters with draining pipes

Lagoon for sludge water during water treatment

Clear water tank with a dosing unit on top

A set of four new pumps connected to hybrid energy supply (solar and electricity)

Old plant sedimentazione basin

Old water pumps