

Building resilience to climate change: experiences from Southern Zambia

As the effects of man-made climate change become more pronounced, water shortages are becoming more common throughout Africa, with Southern Africa identified as a particular climate change hotspot¹.

This has severe implications on the ability of vulnerable residents to access safe, clean water. Water utilities which had already been playing catch-up with the rapid rate of urbanisation are now finding that as demand for water increases, water supply is falling and become more erratic.

Simply searching for new water sources, whilst important, is not enough. WSUP is advocating that utilities faced with these challenges need to look across the breadth of their operations to devise solutions to five goals: continuous water supply, safe drinking water, staff empowerment, long term financial planning, and customer focus. Only by embracing change from across the whole organisation will utilities have a change of adapting to a rapidly changing climate.

This case study from Southern Zambia demonstrates how the Zambian utility Southern Water & Sanitation Company Limited (SWSC) is embarking on a programme of change designed to climate-proof its operations, in the face of water shortages across the Zambezi River Basin.

“A warming world will have implications for precipitation. At 1.5° C, less rain would fall over the Limpopo basin and areas of the Zambezi basin in Zambia, as well as parts of Western Cape in South Africa.

But at 2°C, Southern Africa is projected to face a decrease in precipitation of about 20% and increases in the number of consecutive dry days in Namibia, Botswana, northern Zimbabwe and southern Zambia. This will cause reductions in the volume of the Zambezi basin projected at 5% to 10%.”

United Nations, Africa Renewal December 2018-March 2019



Image: A disused water kiosk in Livingstone, Zambia, built before the water utility built a new water network for the community

The impact of climate change on Southern Zambia

Climate change is severely impacting the water supply in southern Zambia, affecting areas such as the towns of Livingstone, Zimba and Choma.

Hundreds of thousands of people are dependent on water supply from the regional utility SWSC. How is the utility responding to this challenge?

Across the south of Zambia, the water supply is mostly dependent on the River Zambezi, the fourth largest river in Africa, and its tributaries, as well as a few smaller sources not connected to the Zambezi.

Decreasing rainfall and increased evapotranspiration across the Zambezi River basin has reduced the river level of the Zambezi River.

According to the International Panel on Climate Change, the Zambezi River basin is one of the most vulnerable in Africa to climate change².

¹ <https://www.wits.ac.za/news/latest-news/research-news/2019-08/southern-africa-heading-towards-climate-tipping-points.html>

² <https://www.ipcc.ch/site/assets/uploads/2018/03/wg2TARchap10.pdf>

How climate change is affecting the Southern Water & Sanitation Company Limited (SWSC)

SWSC is responsible for serving customers across 13 districts containing several urban centres, the largest of which is Livingstone, a city with a population of 190,000 on the border with Zimbabwe.

SWSC is grappling with the twin challenges of increased population growth, particularly in urban communities – leading to increased demand for water – and a changing climate which is reducing the amount of water available.

This challenge reached a climax in 2018-2019, where many regions in Southern Zambia only received 20-30% of the normal annual rainfall.

Communities suffered crop failures, widespread hunger and even the flow of the world-famous Victoria Falls dried to a trickle.

Zambia's president, Edgar Lungu, mentioned climate change some 44 times in his annual address to parliament in September 2019³, emphasising how significant the crisis was for the nation.

For SWSC, the issue brought the climate crisis into sharp focus. SWSC's ability to provide water for the city of Livingstone was seriously affected because its raw water intake from the Zambezi – built way before climate change



Image: A Southern Water and Sewerage Company employee. **Credit:** Wasser Fuer Wasser



Image: A peri-urban community in Livingstone, Zambia

had become a reality – was only able to abstract minimal amounts, due to river levels falling so low. It was forced to use different methods to get enough water for residents.

In total, during the drought seven dams dried up on the plateau. The dam which is responsible for servicing the provincial capital of Choma had to be completely abandoned because it had dried up, resulting in SWSC having to drill emergency boreholes. In total, SWSC had to spend an unexpected 5,200,000 ZMW (US\$273,000) drilling new boreholes across the region. Heavy rain during 2020 has improved the situation but with water shortages forecast to become the norm in the region, SWSC needs to find a way to provide water to residents.

Energy shortages caused by climate change present another challenge for SWSC. Zambia as a whole derives 85% of its energy from hydroelectricity⁴ but declining rainfall has produced energy shortages estimated at nearly one-third of Zambia's total hydroelectric capacity⁵. The regular loadshedding, on average 80 hours per month, means that SWSC is frequently unable to pump water.

Yet at the same time, the climate crisis is creating a knock-on effect on SWSC's financial position. Since 2015, SWSC's annual revenue has been around \$160,000 lower than it used to be, due to reduced water production because of lower river levels.

This decline has served to reduce the funds available for tackling water shortages, meaning that as the need for SWSC to adapt to climate change grows, so does the need to find realistic, affordable solutions.

³ <https://www.bloomberg.com/features/2019-zambezi-river-climate-crisis>

⁴ <https://www.usaid.gov/powerafrica/zambia>

⁵ <https://www.dandc.eu/en/article/zambias-dependence-hydropower-becoming-increasingly-problematic>

Response from SWSC

With the support of WSUP, in 2019 SWSC embarked on a utility strengthening programme, designed to look at all its operations. The programme was designed by WSUP and implemented by SWSC with the support of Wasser fuer Wasser. The different stages of the utility strengthening programme are presented on the following page.

The challenges brought about by climate change are too fundamental to be solved simply by drilling new boreholes to access new water – the utility recognised it needed to assess all parts of its operations, from financial management, to governance, customer engagement and staff capacity.

Having secured buy-in for the programme from the company's leadership, SWSC conducted an internal assessment of its strengths and weaknesses, mapped against the WSUP Utility Diagnostic.

The diagnostic helps utilities to analyse their effectiveness against seven business areas, as outlined in figure 1, right.

The assessment enabled SWSC to identify priority issues and start work on possible solutions. As of July 2020, the following initiatives have already commenced:

- A revised strategic direction for the organisation, encapsulated by an **updated Strategic Business Plan**, which incorporates the utility's plans for its response to climate change from 2020-2022. The business plan is built around a series of project charters developed by the utility which outline the programmes of work which are needed.
- One of the priority areas identified by the business plan was **sanitation**. With SWSC being forced to rely more on groundwater (through boreholes) as opposed to surface water, protection of groundwater becomes a major issue. In urban areas, unmanaged sanitation can lead to significant contamination of groundwater and so SWSC has understood the need to focus more on providing onsite sanitation, particularly to those marginalised communities who live outside of the central urban areas where sewers are not available.
- As water availability reduces, so the importance of making best use of existing water resources increases. This has led SWSC to redouble its efforts to control **non-revenue water**, or water that is not billed for due to leakages, poor billing or theft. The utility aims to reduce its 35% non-revenue water ratio down to 30% by 2022.

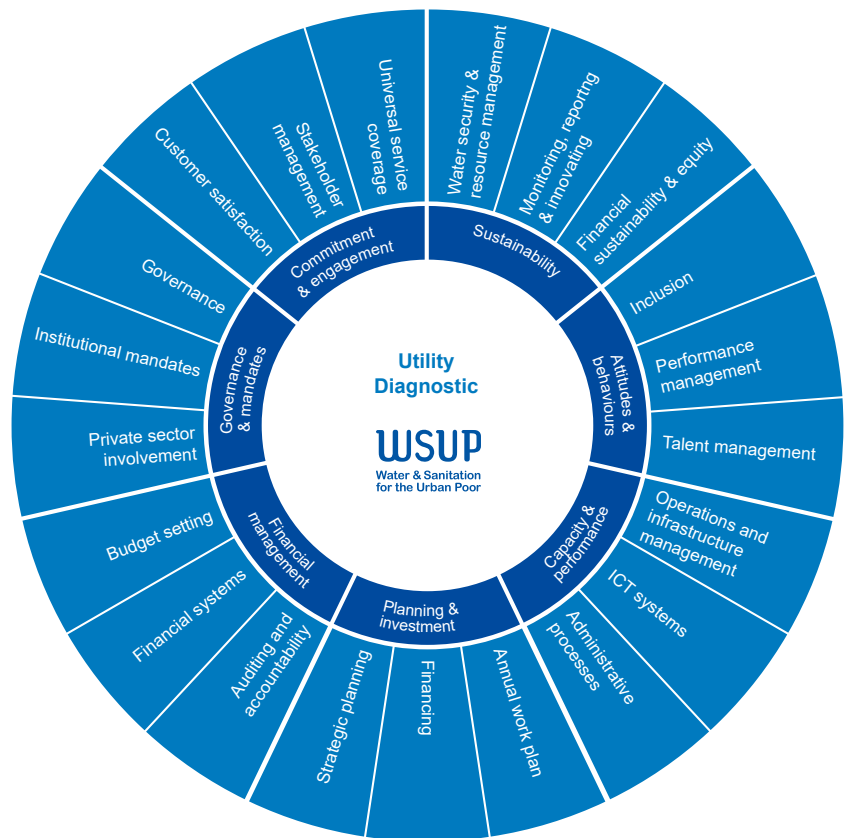


Figure 1: WSUP's Utility Diagnostic

- A crucial part of making better use of water is through **working more closely with customers**. SWSC concluded that improving its communications with customers was an essential strategy because in a situation where service levels were being impacted by climate change, it was important that customers understood the reasons for this. By engaging more closely with customers, especially those in low-income communities, customers become more loyal which over time has a positive impact on billing and SWSC's overall financial viability.
- Finally, SWSC identified the importance of **developing alternative energy sources** for its equipment to deal with times when energy from the main grid is not available. With much of Zambia's electricity dependent on hydroelectric dams, loadshedding has become a more regular feature of life as operators are forced to switch off the dams when water levels are low. As a result, SWSC is now installing boreholes which are solar-powered – a climate-proofed solution to loadshedding.

SWSC leadership appointed staff champions to move these different projects forward, helping to empower staff and ensure broad buy-in for the changes being proposed.

WSUP will continue to work closely with SWSC to support the implementation of these initiatives and embark on new projects to support SWSC's goal of becoming resilient to the growing threats of climate change.

Utility Strengthening Framework

Empowering utilities
towards universal water
access in cities

WSUP | Water & Sanitation
for the Urban Poor



1. Top-level commitment
Ensure top-level buy-in



2. Current situation
Gather current status, long-term goals and strategic direction



3. Securing advocates
Identify staff who are open to change and able to drive change forwards



4. Self-assessment
Employees assess business areas using the WSUP Utility Diagnostic



5. Fresh thinking
Generate ideas of ways to develop that align with strategic goals of the utility



6. Definition
Structure ideas into defined packages of work



7. Prioritisation
Align projects with objectives of the strategic business plan, prioritising programme implementation



8. Making change happen
Projects which drive towards the strategic goals, such as talent management, digitisation and water quality testing

A STRONGER UTILITY

Engaged staff

Loyal customers

Long-term financial planning

Safe drinking water

Continuous water supply

UNIVERSAL ACCESS IN CITIES