# Maximising data resources key to water crisis

By Kroshlen Moodley

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With an average annual rainfall of 450mm - compared to a global average of 870mm - South Africa is a water scarce country, ranking 30th driest in the world. One would assume that we would be more cautious when it comes to water usage and wastage and that conservation would be a priority for everyone. Unfortunately, it's not, and the current drought has brought this into stark focus, sparking crucial conversation about how to secure future supply to meet increasing demand.

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We can prevent an even bigger crisis. But it requires public-private partnerships, better resource management, efficient infrastructure planning and, most importantly, the aggregation of all available data to inform decision-making.

## It's a data problem

When talking about water management and advanced data analytics, we have to consider the whole picture. This includes water sources and treatment plants, the distribution network and usage, as well as overarching legislature and weather and demand/supply analysis to obtain a holistic view of the current situation. According to water expert Anthony Turton, many of the country's water problems are because of poor government data. To have the biggest impact, we need reliable data analysis in the following areas:

## Supply

SA's drought is the result of an El Niño, a complex weather pattern that results in drier than normal conditions from December to January in south-central Africa. Historical weather data shows that an El Niño occurs every two to seven years. By analysing this data, as well as normal rainfall data, we could have predicted the current drought with relative accuracy five years ago.This would have given us time to plan accordingly for water shortages, for example, by making better decisions on how to supplement supply and prioritise infrastructure development.

## Treatment

Waste water treatment plants spew more than four billion litres of untreated or partially treated sewage into rivers daily because of management issues and poor functioning plants - another problem that could have been avoided with analytics. Water quality is affected by physical, chemical, biological, microbiological and radiological parameters. With analytics,

plant managers can monitor these factors via sensors installed at source points, treatment plants and reservoirs. These sensors provide a constant stream of data - known as event stream processing - which, when analysed, can reveal certain patterns in water quality. Managers would be alerted to an anomaly in a 'normal' pattern, which could indicate a problem in quality.

For example, fluctuations in microbial data could suggest that there is a problem at the water source. Response teams could then be dispatched to investigate and might find that a large water source is being polluted by industrial waste. Action could be taken immediately to prevent irreversible contamination of the source. Currently, only 60% of SA's category I and II dams comply with basic dam safety standards, while quality levels at some category III dams - SA's largest water sources - are also concerning. With analytics, much of this contamination could have been prevented. Treatment plants and distribution networks comprise many working parts, including pipes, pumps, filters and transformers. It's crucial that these are continuously monitored to prevent failure.

Sensors supply information on assets - including when they were last serviced, how old they are, when a certain part was replaced - producing patterns that indicate normal functioning of the asset. Again, an anomaly in a pattern could indicate a problem - a leaking valve, for example. This allows municipalities to perform predictive plant maintenance - as opposed to reactive maintenance when it might be too late - to reduce downtime and maintain quality.

## Distribution

SA loses R7 billion, or 25% of its non-billed water, due to leaking or burst water pipes and collapsing infrastructure annually. Advanced data analytics can drastically reduce the amount of water lost by predicting where losses are likely to occur based on demand - a new residential development that will have to be served by ageing infrastructure, for example - and asset data. Sensors in pipelines monitor water flow and will alert a municipality if there is a sudden and abnormal increase in pressure, which could suggest that a pipe has burst. Damage can be repaired timeously rather than having to rely on a member of the public to report the leak, which could be days - and millions of litres of water - later.

## Policy management

Pravin Gordhan, Minister of Finance, has attributed SA's current water crisis to adverse weather conditions and water management issues.

While SA has some of the world's best water legislature, it is not effectively implemented, especially at municipal level. This is because municipalities not only lack the funds and skills needed to act on the legislature but also because national government cannot govern how local municipalities provide water. Advanced analytics can help government better understand population growth and the effect that new residential and industrial developments could have on supply and demand. This information, combined with weather data, can help government decide where to build new catchment areas.

Analytics can help government to understand what legislation is not working and where it should be focusing, like on alternative water resources and removing red tape for those who develop solutions to water challenges, for example.

According to Turton, you can't measure something you can't manage. This is especially true for SA's water crisis.

The only way to solve some of the problems is to adopt powerful analytics systems that aggregate data and help government make better-informed decisions about water supply and demand. Now that the conversation has started, government should take it into the boardroom and form partnerships with the private sector to protect this precious resource and secure our future water supply.

## ABOUT THE AUTHOR

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