Cape Town, South Africa, turns to rainwater harvesting in preparation for Day Zero

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"We should have preempted this better."

Will van der Merwe, managing director for Water Eco Technologies & Treatment (WETT), expressed the chagrin shared by many water professionals in Cape Town, South Africa, as they face an impending Day Zero. If Cape Town reaches this ominous date, it will become the first city in the world to run out of water.

The country is battling a years-long drought, even declaring a national disaster as its southern and western regions experienced the two driest years on record in 2015 and 2016, Reuters reported. According to van der Merwe, the dry season in Cape Town historically is January to April; however, in recent years, it has not rained until June. This drought, paired with a dramatic increase in population, which reached 3,740,025 in a 2011 census, put stress on the city's water supplies. One of Cape Town's primary sources of drinking water, the Voëlvlei Dam, had a water level of less than 20% of its capacity in January 2018, CBS News reported. Day Zero will mark the day Cape Town has so little water that it turns off its taps.

Rain Delays

To avoid Day Zero, the city has encouraged water-saving procedures, notably instituting a water restriction of 50 liters per person per day. NBC News offered a tool to help put this restriction into perspective. It noted that the average person uses 50 liters—or the entire allotted water usage for 24 hours in Cape Town—in a 5-minute shower.

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Currently, Cape Town is close to meeting this goal, but not all Capetonians have limited their usage. Individuals can limit consumption, but industrial and commercial entities consume a lot of water, too. The city's targeted daily water usage is 450 million liters, but the average for the last week in April 2018 was 507 million liters. The average water levels in the dams remain at 20% capacity, and the Voëlvlei dropped to 13.8% in the last week of April. Unfortunately, because Cape Town is a popular tourist destination, water usage by visitors is more difficult to regulate, as they will not experience the long-term ramifications of running out of water.

But Day Zero has not arrived yet. Originally slated for April 16, 2018, the date has now been delayed to 2019, due to some unexpected rain and diligent water saving across residential, commercial and industrial sectors. Capetonians are implementing measures to save water where they can, such as limiting bathing, toilet flushing and water used for cooking. Many residents are digging boreholes to tap into groundwater, despite the stress they place on the water table. And the city is building desalination plants, but these are not quick projects. Other residents have turned to rainwater harvesting.

Reduce, Reuse, Recycle

How do you harvest rainwater in a drought? This may be one of the first questions Capetonians ask when considering rainwater harvesting. But even without rain, rainwater harvesting systems provide benefits to keep users afloat in a drought—no pun intended.

Erika Theron of H20 Harvesting Gauteng and NW Province told SWS about the role rainwater harvesting can play in South Africa, should the requirements for it line up. Rainwater harvesting systems provide a source of water for a number of uses: toilet flushing, laundry, potable water and more. This alternative source to municipal water reduces demand and allows the system user some independence. In other words, the user has control over their water, she said.

"You have almost complete control over your water source," agreed Ryan Hertel, sales manager for Suez, who has worked on rainwater harvesting systems in California. "You know what the rain is and you know what's in the rain, and you have control over what is falling on your own roof and the cleanliness of that roof."

But importantly, particularly in times of drought or the dry season, the systems offer a reliable backup supply. If the system can collect rainwater when the home or facility

1 Due to the low levels of its reservoirs, the city of Cape Town has instituted a water restriction of 50 liters per person per day.

2 Intelligent water harvesting systems can help Capetonians reduce their consumption.

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>
> *– Alex Holmes*

does not need to rely on it, the harvested water can sit in the tank until it is needed. However, this backup only is useful if the system has a large amount of stored water and if the users are willing to dramatically reduce their water usage.

"It is almost impossible to store enough water for an extended period of time," Theron said. "Some people can store enough water to last them through the dry season, but it is not always possible. It is only effective if you are aware. You need to reduce your ... overall water consumption."

Reducing consumption only is one piece of the puzzle. Van der Merwe added that incorporating greywater recycling into a rainwater harvesting system can greatly help users maximize the efficiency of their stored water. For example, harvested rainwater can be used in the shower, then the greywater from this use can then be treated to flush a toilet. Avoiding using drinking water to flush a toilet dramatically reduces consumption. However, systems of this complexity are expensive, and it can be easier said than done to install one.

Broader Implications

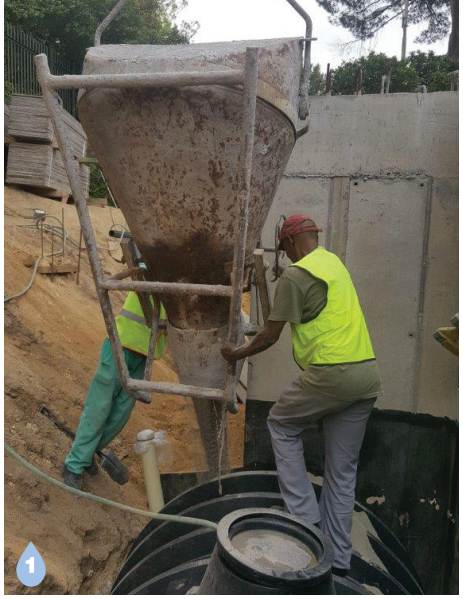
Not all rainwater harvesting systems are created equal. They range from fully equipped and long-term systems to simple collection tanks. On the smaller end of the spectrum, some Cape Town residents have begun using their pools to collect rainwater as an emergency measure during the drought.

"[Homeowners] had pipes in the roof leading into their swimming pool, and you start seeing the swimming pool getting lower and lower, and soon it's not being used as a swimming pool; it's being used as an emergency catchment for rainwater," said Alex Holmes, Atlantis distribution agent of Sub-Saharan Africa for Pula Water Systems.

Others are installing "jojo tanks," which are modest molded tanks used in case of emergency, according to Holmes. He said jojo tanks are being sold on the black market at a high price due to the increased fear of Day Zero and subsequent increase in demand for alternative water supplies. Advanced rainwater harvesting systems, such as those sold by Holmes, van der Merwe and Theron, have been in higher demand in Cape Town, as well. Van der Merwe's company, WETT, typically installs approximately 20 to 30 systems annually, but in light of Day Zero, its installations have nearly doubled to approximately 40 to 50 systems per year.

Hertel has worked with similar systems in the U.S., particularly in California, which also

has suffered from a drought for several years. He explained that rainwater harvesting systems can require different levels of treatment technology, depending on water quality. According to Hertel, some water will require reverse osmosis treatment for a high level of purification, while water of different quality might only require some form of pasteurization or ultraviolet sterilization to ensure it is safe for human contact.



1 **Rainwater harvesting systems vary in size and complexity.**

2 **Additional water storage can offer a backup supply if the correct measures are taken.**

Because the complexity of the systems varies, so do the costs. For many people, rainwater harvesting systems are not a viable option, regardless of location. But particularly for South Africa, which has a significant low-income population, according to the South African newspaper Business Day, these systems only are an option for the wealthy. Van der Merwe said that homeowners may spend a decade paying for an intelligent rainwater harvesting system. While demand has increased due to the drought, systems still are not affordable for everyone. Rather, the price is increasing for Capetonians who purchase them on the black market.

However, low-income Capetonians may not experience a noticeable difference in their access to water as Day Zero approaches. "They've always had to walk 5 km to a standpipe, and at the standpipe they are collecting their 50 liters a day. That hasn't changed," Holmes said. Alternatively, wealthier families also may not notice a stark difference in their lifestyles, as they have the resources to purchase rainwater harvesting systems or water from natural springs, which they can then store in their intelligent systems, thus maintaining alternative water supplies.

Nonetheless, Holmes offers a harsh truth. At the heart of Day Zero, communities worldwide are forced to reflect on their water usage. While water is an undeniable human right, it is not an unlimited resource.

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