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Managing overflowing Cape Town dams a challenge, warns UCT academic

Good rains bring relief to Capetonians but headache to dam managers

Last week the Berg River Dam reached full capacity for the first time in five years. Capetonians were relieved to see the first of its supply dams overflowing and releasing water into the Berg River.

However, the sight of overflowing dams raises a question that "overflowing dams are a waste of water", says Dr Kevin Winter, senior lecturer in the Environmental & Geographical Science Department at the University of Cape Town (UCT). With more rain ahead, it looks likely that parts of the Berg–Olifants catchment will receive average winter rainfall for 2019 when compared to historical records.

"Signs are encouraging that the major dams supplying Cape Town and the surrounding region will be 80% full by 1 November, which signals the start of the hydrological year, compared to 34% in 2017," says Winter.

He however warns that managing dams might be a lot harder than we think. Dam managers clearly understand the storage part, but they must deal with a complex set of requirements, such as groundwater recharge, abstraction of water (legal or otherwise), maintenance of aquatic life and discharges to release the build-up of pollutants, in addition to supplying sufficient water for downstream users.

Winter says calls to build another large storage dam in the Western Cape ought to recognise the limitations and immaturity in monitoring and understanding of complex natural systems.

The R1.5 billion Berg River Dam was commissioned by the South African Cabinet in 2002 and completed in 2008. The project was approved on condition that the City of Cape Town reduce its water demand by 20% by 2020. This was the first time that a bulk water resource project in South Africa was directly linked to a water demand management strategy.

The record of decision that followed meant the dam had to provide enough flow to service the ecological reserve. The dam had to be managed so that enough water is released to maintain important aquatic life, biodiversity and habitat integrity; support ecological goods and services; and ensure sufficient water for downstream users. All of this is a big ask for reservoir managers whose brief is to operate a storage system, particularly while they have limited feedback about the condition of ecological systems and water requirements in the Berg River, which stretches for over 300 km from the dam.

"During the Western Cape drought, water was deliberately stockpiled in the Berg River Dam. It made sense to pump water from the Theewaterskloof Dam, a shallow dam with a large surface area exposed to evaporation, to the Berg River Dam, a deeper dam with a smaller surface area. Storing water in the Berg River Dam during 2017 and 2018 also meant that water could be released to meet the needs of the ecological reserve," explains Winter.

He says managers of the dam can justify the position that they took, but what effect did this have on the ecological reserve, and what indicators are available to tell the story? Studies of the Berg River upstream from the dam show that the stretch between Paarl and Wellington are permanently hypertrophic (very high in nutrients), resulting from failed or poorly functioning municipal sewerage systems and contaminated storm water, but mostly from runoff from informal settlements. Releasing more water from the Berg River Dam helps to flush out the build-up of nutrients in the Berg River but is by no means an effective way of managing a deteriorating river system.

Following the logic of the role of water release in servicing the ecological reserve, the data shows that when more water was released from the Berg River Dam during winter rainfall (2010–2014), there are signs that trophic levels were reduced. By contrast, low-flow conditions during the dry period (2015–2018) caused trophic levels to rise above the hypertrophic threshold, notably in the months of August and November.

But the data doesn't give a conclusive analysis. The number of times that sampling occurred at the Hermon site (2015–2018) shows a 40% reduction by comparison, with no sampling taking place during the month of December for the entire period. The only conclusion that can be drawn from this is that data and information informing catchment and dam managers is so limited that it would be impossible to balance the needs of water supply against the needs of the ecological reserves of the river.

Winter concludes: "It seems that there is a long way to go before new dams are considered for storing excess water without understanding the effect on riverine ecological goods and services. The blame cannot reside entirely with the management of the Berg River Dam, considering the limited feedback that they receive. What is urgently needed is a comprehensive monitoring plan that includes indicators about the state of the ecological reserve and offers timely information to managers involved in a range of functions for maintaining and regenerating the river."

ENDS

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