



## **A water budget analysis of conjunctive surface and sub-surface waters: An urban metabolism approach to drought response in Cape Town, South Africa.**

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The metropole of Cape Town, home to more than 3.5 million residents, recently experienced its worst drought since 1900. Situated in a Mediterranean climate, Cape Town is currently reliant on six main dams (with a storage capacity of ~600 Mm<sup>3</sup>) for its water supply. As highlighted by the current drought, this single source surface water supply is dependent on increasingly variable seasonal rainfall. Cape Town, like many cities, faces threats to its urban resilience from a less reliable surface water supply and increasing demand for water. Current risk management practices, such as surface storage or the canalisation of surface waterways to mitigate flooding, are unlikely to prove adequate strategies for resilience against future shocks to the City's water supply and system as a whole. Under current practice, the reliance of water supply on surface storage would entail continually extending the city's boundaries to meet the projected growing pressures on water resources.

We propose a shift from the linear practices of urban water management (i.e. without resource reuse) to one of cyclical and regenerative approaches to water resilience. This would see varied approaches to water capture and supply, increased use efficiencies and in particular, multiple use pathways of waste water at a city scale. Such a shift requires a comprehensive quantification of the current urban water cycle (via parameters such as rainwater, imported supply, decentralised water, waste water, stormwater, evapotranspiration, groundwater recharge, groundwater storage and abstraction, water reuse, environmental water requirements and demand) through a lens of urban metabolism. Through this lens, we have undertaken an assessment of 'urban water resilience' under current and projected climatic conditions, and have included the conjunctive surface and subsurface storage as a novel approach to resilience. We present our preliminary analysis and lessons learnt.