

## Annex 1:

Draft Policy Brief on the need, relevance and the opportunity for use of decentralized, nature based solutions for recycling of wastewater and stormwater in Cape Town and Dar es Salaam

# Policy Brief on the need, relevance and the opportunity for use of decentralized, nature based solutions for recycling of wastewater and stormwater in Cape Town and Dar es Salaam

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## 1 Introduction

Rapid and under-planned urbanization and the instances triggered by climate change have strengthened the case for reuse and recycling especially in the Sub-Saharan African cities. While traditional urban planning and development policies have been promoting unsustainable or non-inclusive growth models, disregarding the environmental and social challenges, water sensitive planning has been regarded as a potential solution targeting the urban form and supporting sustainable development [1] [2]. This desk study has been carried out taking Cape Town and Dar es Salaam as case studies - two of the largest cities in sub-Saharan Africa with distinct urbanisation patterns and water challenges.

The Cape Town Water Crisis of 2017 serves as a significant evidence of the water scarcity challenges faced by the Western Cape Province. In 2017, the city experienced a severe drought, resulting in critically low dam levels and the threat of Day Zero, when the city would run out of water. This crisis brought to the forefront the urgent need for sustainable water management practices and highlighted the region's vulnerability to changing weather patterns and limited freshwater resources [3].

In Dar es Salaam, floods have repeated almost on a yearly basis since 2009 and have severely impacted diverse sectors. With 80% of the city being unplanned and only 13% of the city's residents being served by adequate sewerage systems, the urban poor

have been disproportionately affected by these floods and have had limited means to recover [4].

Water-sensitive cities integrates sustainable water management practices into urban planning and design, aiming to enhance water security, reduce demand on traditional water sources, and build resilience to future water stress. Water recycling, including stormwater and greywater reuse, has been practiced for centuries but is rarely implemented as a system solution in conventional urban water management practices. Even in developed countries, the amount of recycling and direct use is very limited. While numerous studies have demonstrated the economic and agricultural benefits of recycling, its adoption in informal settlements and dense urban areas, particularly in Southern Africa, remains limited. This study explores the policy and institutional challenges that limits the application of decentralized approaches for recycling and reuse of water while applying the principles of Water-sensitive urban design (WSUD). It integrates holistic management of the urban water cycle into urban planning and design, considering all aspects of water management and urban design principles and has been recognized as a key approach to combat urban water stress [2]. In the face of mounting water challenges, the need for water-sensitive cities in South Africa, this approach could be a pathway ensuring a sustainable and resilient water future.

## 2 Water Scarcity and Demand Management

The Western Cape Province, encompassing urban centers such as Cape Town and Stellenbosch in South Africa, has observed a consistent rise in its population, consequently escalating the demand for water resources. Statistical analyses based on the South African National Census data have demonstrated notable population growth rates within these locales, exacerbating the pressure on existing freshwater reservoirs. Detailed assessments conducted by the Western Cape Government's Department of Water Affairs and Forestry have elucidated a persistent decline in dam levels over successive years, serving as a clear indicator of the enduring challenges related to water scarcity in the region [5]. This urbanization and growth pattern, puts additional global pressure on the limited water resources due to climate change, reinforcing the need for sustainable water management practices and alternative water sources to meet the rising demand.

Amidst the water crisis of 2017, the city of Cape Town enacted stringent measures aimed at curbing water consumption. Demand management strategies, including restrictions on flush frequency and the widespread adoption of wastewater recycling from washing machines, were widely embraced by the city's inhabitants. Despite ongoing efforts by the city to advocate for water-saving practices, there exists a limited comprehension regarding the extent to which these measures are genuinely being adopted by residents to their regular lives beyond the crisis. This ambiguity arises due to the fact that these practices have been presented as commendable guidelines rather than quantitatively enforced regulations, contributing to the existing knowledge gap in understanding residents' adherence to these conservation initiatives.

In Dar es Salaam, the supply of piped water by Dar es Salaam Water Sewerage and Sanitation (DAWASA) met only about 51% of the total water demands and a significant proportion of Dar es Salaam population has still no adequate access to water supply. Especially those areas (wards and streets) located far from the City centre have no piped water supply. The main water sources in the such are bore-holes, shallow wells, rain water and water vendors. There are seasonal streams which are used for vegetable irrigation and livestock watering, but not for domestic uses because of perceived water pollution[6].

However, during the rainy season, localized flooding has been a regular challenge at several parts of the city repeating almost every year during the last decade. Rain-water harvesting (RWH) has been promoted by the Ministry of Water through the National Water Policy (2002) and subsequently RWH Guidelines were published in 2020. Studies on parts of Dar es Salaam city have reported that only 10% of households had complete RWH systems (with functioning collection, diversion components and a storage tank)[7].

### 3 Greywater & Stormwater recycling in practise

In the urban context of Cape Town, domestic greywater recycling is recommended as a practice by the City of Cape Town through various methods to mitigate water scarcity and promote sustainable water management. The commonly promoted approach involves the installation of greywater systems that capture wastewater from sources such as showers, baths, and washing machines. This collected greywater is then recommended for reuse in garden irrigation and toilet flushing.

In Cape Town Greywater recycling is a well established concept for landscaping and urban gardening with several private service providers operating in the city. However they have been limited applications in informal settlements and low income housing. Energy or space requirements in treatment, capital requirements or lack of awareness have been mentioned as potential reasons by multiple studies[8].

In the case of Dar es Salaam, there has been very little research on the topic. The studies on the impact of untreated reuse have highlighted the need for appropriate treatment referring to the health risks that are prevalent. Multiple studies have referred to the lack of social acceptance towards recycling as wastewater, even after treatment is considered as a dirty source [9][10].

**Zandvliet Wastewater Treatment Works:.** The City of Cape Town is currently working on developing Zandvliet Wastewater Treatment Works as an example of centralized solution for wastewater recycling. By improving the treatment capacities of the plant at Zandvliet the city aims to produce high quality treated water that will be used for augmenting water supply in the city. While this centralized approach can cater to the overall needs of the city, it may not have any direct effect in mitigating the existing challenges in water supply of the informal settlements which have limited access[11].

The use of stormwater however is already an accepted and well understood concept in both Dar es Salaam and Cape Town. Particularly, rainwater harvesting has

been widely practiced solution as guidelines exists in both countries and several institutional and commercial buildings use it for augmenting water use. Several studies on stormwater infiltration basins have been carried out in Cape Town. Studies at Zeekoe basin and Mitchells Plain areas have validated the use of WSUD measure types in recharging the local aquifers in the region[12].

## 4 Institutional, Socio-Economic & Regulatory Challenges

The institutional structure in the Western Cape Province has various entities responsible for water management, including government departments, municipalities, and water boards [12]. While the municipal offices take the overall responsibility, their actions are guided by several departments both at national and provincial level. Previous studies have highlighted the complexity of water management institutions and their interrelationships with urban planning as a major challenge for building water-sensitive initiatives. The coordination and collaboration among these institutions as well as other institutions which traditionally do not have responsibilities in water management (such as Parks or housing related departments) is required for planning and implementing measure types. Efforts have been made to establish platforms for coordination, such as the Western Cape Water Sector Forum, which brings together different stakeholders. During through the field research visits, this was iterated as an existing bottleneck. This is also the case in Dar es Salaam as the management responsibilities of storm water and wastewater are split between the municipality and the water operator. The infrastructure and service delivery gaps affect the management of both systems adversely.

To a certain extent, financial systems have been crucial in implementation of grey-water reuse in Cape Town. Especially during the water crisis of 2017, heavy fines were announced for high water consumption which triggered the adoption of reuse concepts. To a certain extent, domestic rainwater harvesting practices have been adopted in both cities for its financial benefits. However there are no financial institutionalized incentives are for implementation of decentralized, nature-based solutions other than saving of water costs in both cities. Increasing financial resources and offering targeted incentives, such as rebates, could encourage low income communities to invest in water-sensitive practices. In the case of informal settlements in Cape Town, the lack of land rights may also be a limiting factor for implementation.

The regulatory framework in the Western Cape Province has evolved to incorporate water conservation and sustainable water management practices. Various regulations and guidelines exist that address water use efficiency, water pollution control, and water resource management. For instance, the City of Cape Town has implemented regulations on water restrictions, water tariffs, and water demand management. These regulations help incentivize water conservation behaviors and promote efficient water use. However, the regulatory framework should continue to evolve more explicitly if the promotion of decentralized, nature-based solutions are expected.

Public awareness and engagement are also key elements for the success of water-sensitive initiatives. The Western Cape Province has made efforts to engage the public

through campaigns, educational programs, and public consultations. However, continuous efforts are required to increase awareness about the benefits of decentralized, nature-based solutions and involve communities in decision-making processes. Public engagement can also help identify barriers and opportunities for the implementation of such solutions. Moreover, educational initiatives and awareness campaigns led by governmental and non-governmental organizations play a vital role in promoting decentralized recycling practices. These programs provide residents with knowledge about the benefits of greywater recycling, guidelines on installation and maintenance, and information on local regulations and processes for implementation[13].

## 5 Conclusions

Policy challenges for stormwater and greywater recycling in Cape Town and Dar es Salaam are multifaceted and crucial for sustainable urban water management. In Cape Town, despite significant strides in stormwater and greywater recycling initiatives, challenges persist in integrating these practices into mainstream urban policies. Issues related to regulatory frameworks, public awareness, and financial incentives need to be addressed comprehensively. Additionally, in Dar es Salaam, while efforts are being made to implement stormwater recycling programs, limited infrastructure, funding constraints, and insufficient policy frameworks pose significant hurdles. Greywater and Stormwater recycling can not only mitigate water security risks but contribute to building social justice, equitable access to water, build local employment opportunities and influence local economic growth. Adequate policy adjustments and strategic investments are vital to overcoming these challenges in both cities, ensuring the efficient adoption and long-term growth into water sensitive cities.

WhiSocial Justice and Equitable Access to Water: In the context of the Western Cape Province, access to clean water can be unequal, with marginalized communities often facing limited access to water resources. Implementing decentralized, nature-based solutions for greywater and stormwater recycling can contribute to social justice by providing equitable access to water resources. These solutions can be implemented at the household or community level, allowing individuals and communities to take control of their water supply and reduce their reliance on centralized systems.

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