

LANDSCAPE INFRASTRUCTURE SOLUTIONS FOR RESILIENT, EQUITABLE AND ADAPTABLE SOCIO-ECOLOGICAL SYSTEMS IN CAPETOWN

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1 Introduction

Cape town stands at top of the **most "water stressed cities"** list in the world, like the other global south cities it disregards its natural systems in it's spatial planning and water management. The entire city suffered from the disastrous repercussions of Day Zero; however, the lower income townships were always constantly in 'drought' like environment with limited or no water access (Smith & Hanson, 2003). Most of these **vulnerable townships are situated on landscapes that fall under the biodiversity hotspots** of the city that are inaccessible, abused or undervalued. With such complex problems, the current practice of the water management becomes questionable as it ignores its underlying social and ecological issues. To tackle this, its important to address the local natural and urban systems for an **integrated approach for ecosystems restoration and water resilience through local adaptive measures.**

2 Research Questions

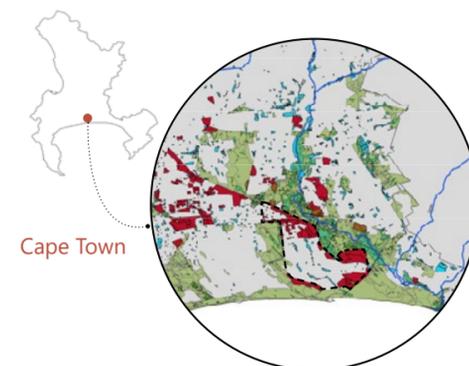
- How can landscape based strategies and design principles mitigate droughts and address social inequity in townships by reinforcing inter-scalar spatial planning toward water resilience & ecosystems restoration in Cape town?
- What are the ways to create spatial conditions and improve eco-services to counteract social-inequity, drought and environmental degradation?
- How to apply spatial strategies and principles to create flexible systems by activating and re-purposing green spaces in and around townships, as public good and conservation mechanisms of local ecosystems?

3 Methodology

Following methods were used for the analysis to support the research-by-design process in the designing of new socio-ecological systems.

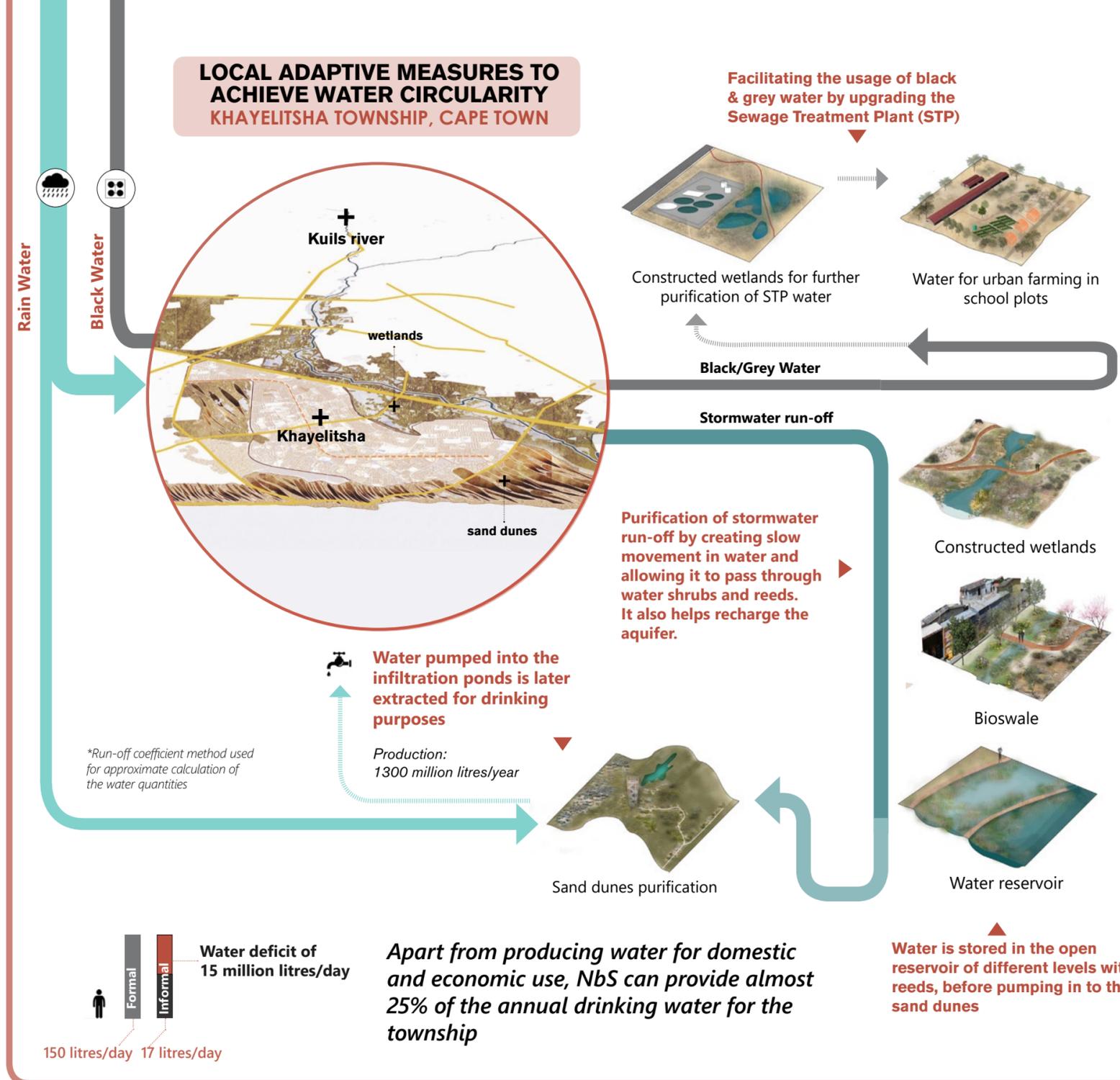
- Extensive literature review of books and papers on the theories of sustainable development, operative landscapes, evolutionary resilience and ethnic enclaves.
- Spatial research conducted on field through interviews, documentation and visiting local archives.
- Spatial analysis of natural and urban systems and water management done on multiple scales by mapping (GIS).
- Existing policy documents and spatial framework on water management, biodiversity and informal settlement upgradation were critically reviewed.

Location



- Khayelitsha Township
- informal settlements
 - critical biodiversity
 - wetlands
 - indigenous vegetation

LOCAL ADAPTIVE MEASURES TO ACHIEVE WATER CIRCULARITY KHAYELITSHA TOWNSHIP, CAPE TOWN



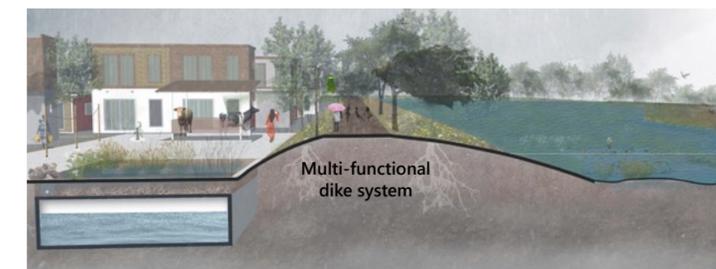
Apart from producing water for domestic and economic use, NbS can provide almost 25% of the annual drinking water for the township

SEASONAL PERFORMANCE OF WETLANDS PROVIDES FOOD & WATER SECURITY AND ECOLOGICAL RESTORATION

Dry season



Wet season



4 Achieving water resilience through landscape infrastructure solutions

Setting up multi-scalar systems

To make it possible to generate water at the local scale, it requires **de-cannelization of river basins to flood** and increase its **seasonal characteristics** and restore its riparian buffer for natural purification of water.

Creation of flexible solutions and promotion of local community stewardship

Design of spatial systems to restore and maintain the wetlands and sand dunes by the community, in a way to support their livelihoods and protect from future disasters. For instance, creation of water ditches can allow the growth of **water plants for livelihood but also clean the wetlands** or the **multi-functional dike system as flood protection** that also helps store water and act as an urban development spline or frequent **removal of invasive species by the community and growing local wild farms which requires less water**

Usage of grey water and black water

After natural purification of black/grey water, it can be **re-used for farming**, domestic use, landscape irrigation, etc. as opposed to discharging it to the ocean

Conclusions

- This project shows the important values of **NbS when used as a spatial planning and water-management tool, it promotes the need to restore and protect urban habitats** that can also produce water and provide other ecosystem services for vulnerable communities.
- By using urban design and planning to shape these landscape-infrastructure, it **increases the quality of living** and becomes of immense importance for the communities for **cultural & social use, sustenance and economic benefits and protection from climate disasters.**
- The creation of different spatial environments also **allow the growth of indigenous plant species** and support critical biodiversity.
- These principles are easily **transferable** to other townships within Cape Town and to other cities across the world.

References

Smith, L., & Hanson, S. (2003). Access to water for the Urban Poor in Cape Town: Where equity meets cost recovery. *Urban Studies*, 40(8), 1517–1548. <https://doi.org/10.1080/0042098032000094414>

Note:

1. The term landscape infrastructure can be categorized as one of the approaches of NbS, representing the field of landscape architecture, urban design and planning. It uses the natural landscapes as the basis to perform as an infrastructure for sustainable urban development.
2. All drawings are produced by the author