

P4 Reflection Report

Sindhuja Janakiraman, MSc Landscape Architecture. 4738063

Studio:

Flowscapes

Mentor Team:

Dr.ing. S. (Steffen) Nijhuis, Dr. DA Sepulveda Carmona

External committee member:

Dr.ir. S. Komossa

Title:

Informal Natures

Landscape Infrastructure design for resilient, equitable and adaptable socio-ecological systems in Cape town

Research Findings

Understanding townships and its relationship with landscape

In order to understand the relationship of townships with the landscape its situated in, systems analysis was done through the scales. Apart from understanding the overall location of townships in the Cape Flats region in the city, the micro scale location of Kuils river and Khayelitsha township was chosen to understand the interaction between natural and social systems to guide the designing of landscape infrastructure. The influence of the river and its implications on the township and vice versa, with relation to social and environmental impacts were mapped, for example, green spaces that are accessible only by the rich social groups or polluted water reaching the downstream where the township is located leading to further pollution before reaching the sea. The analysis of social systems was key in directing the overall study of the green and blue infrastructures. Post-apartheid spatial manifestations such as the N2 highway or Kuils road running along the river as well as the informal pathways in the township created by the locals were further explored to find its relationship in connection to the natural environment to provide framework for design. These challenges and potentials at the river corridor level allowed for further analysis at the township scale and to connect Kuils river vision and local design. In addition, an in-depth understanding of the existing eco-services of the wetlands and sand dunes supporting the local community defined most of the design assignment to spatialize for creating socio-ecological systems.

Counter-acting social-inequity, drought and environmental degradation

To address the three problems together, one of the ways the project approaches is in choosing apt locations for strategizing and for design interventions. Beginning from the Cape flats region to further deliberation of Kuils river and its adjoining environments such as Khayelitsha wetlands and Macassar sand dunes, which not only supports unique biodiversity but also high population density in the very same area, allowing for an integrated development plan. These strategies uphold the main objectives to respond to social equity by promoting activities such as farming by informally organizing water from the recycled sewage water from the nearby WWTP or cultural and religious centres along the green spaces along

the wetlands to acknowledge the existing practices. These spaces are connected to the larger river which acts as a spine in connecting the disconnected neighborhoods and its seasonal nature will create conditions for ecological upgradation, recreation and cultural gathering.

Application of strategies

The envisioned landscape infrastructure design in Khayelitsha allow landscapes to perform different functions such as restorative, capturing, purifying, engineered and productive through three main spatial elements of open lands, mobility networks and school plots. The design strategies require the involvement of both the community and the city officials in activating the existing open spaces to re-purpose it into a new land use to support livelihoods and landscape restoration. By creating these multi-functional spaces that allow stakeholder interaction it serves as an open-ended framework in deploying the design in a phase wise manner. For instance, the Khayelitsha wetlands development in the project propose conditions such as ditches at the periphery of an informal settlement which not only supports the growth of vegetation providing material to the local people or in providing water to their livestock, but also creating inter-dependent socio-ecological systems to harness the temporality of the local landscape. The creation of these systems adds more value to commons and in turn promoting conservation of local ecosystem. Furthermore, these green spaces are flexible to withhold climatic stress by storing water for dry periods and absorbing water during rainy periods. These local scale systemic design feeds back into the Kuils river corridor in maintaining high ecological quality and recreational purposes to connect the different neighborhoods.

Scaling-up and replicability in Cape town

The landscape infrastructure design at Khayelitsha acts as a prototype for other townships in Cape town. Its requirement for Kuils river restoration and revitalization creates a domino effect by further zooming out to the river catchment area by reviving other supporting green and blue infrastructure such as public parks, nature reserves and canals. This way it allows for healthy ecosystems and neighborhoods at the river basin level. Creating such circular systems across the city, will reduce city's dependence on dams thereby changing the existing Berg river basin water management to a micro-watershed management system. However, such landscape-based approaches require a river basin level governance structure that involves the local communities which is currently not existent.

Research Method and Approach

The project's multi-disciplinary nature required research and design both to entail principles from various disciplines which was done through literature study. During the field trip, interviews were directed to capture this very knowledge needed for further analysis and design. Capturing various oral narratives and localized problems in the overall drought mitigation strategy became challenging and required to layer them one by one rather than all together. In the design phase, for technical knowledge, meetings were conducted with practitioners from the field. The systemic understanding across scales from Berg water basin management to neighbourhood pockets within the township became key to better understanding of the complex problem and to arrive at implementable ideas. This set a two-

way informing of systems thinking and theories to arrive at three lenses of *landscape, water and townships*, which allowed the extraction of layers within each lens to an integrated planning. It creates a base to design socio-ecological systems that form the very crux of the project.

Local community for knowledge and as stewards

Apart from the city having its own unique practices and knowledge, each area has its own characteristics and phenomenon brought out from the ethnic groups especially in a post-apartheid city. Therefore, it was key in this project to consider each township/neighborhood as *ethnic enclaves*. By doing so, it was important for me to understand these varying characteristics and behaviors by not just visiting the focused study location but to the other parts of the city too. Especially with the city having several biomes spread across, localized analysis of biota was needed. There required a careful study of the whole city's natural and urban system in order to get to the local scale, limiting the time engaged with the local socio-ecological relationships.

Interviews were conducted that targeted community members, anthropologist, city corporation officials and professors from Stellenbosch University and University of Cape town. Although failure in timely connection with NGOs made it difficult in accessing Khayelitsha due to safety reasons but improvisation upon reaching turned fruitful. The university resources also played a big role in gathering data on the city and township. Apart from interviews, sketching was an important step on site as well after, in bringing out the intricate details and inter-relationships of people with their surroundings. It would've been useful to have hosted a workshop with the community in this project provided its great social relevance for local guidance in informing design decisions and for validation. Therefore, some assumptions have been made in the project in the involvement of actors in the implementation and management process of the design.

Relationship between research and design

The over-arching systems understanding allowed choosing micro-scale location and made clear the functioning of the townships and its ecological and equity issues. The landscape sets the framework in addressing the water, ecology and social problems in providing conditions that can activate and enable future development.

Within the township, the existing public open spaces used by the community became the backbone in designing the infrastructure in addition to the physical possibility of activating such design. Integrating mobility networks in the landscape design became crucial while considering social inclusive spaces for the people of both formal and informal settlements. As a result, creation of flexible systems was possible to absorb risks and in promoting new possibilities for the community by taking into account the principles obtained from operative landscapes and evolutionary resilience. This township level design informed further small-scale design interventions to integrate community's livelihood with ecological functions therefore progressively establishing renewed relationships. Thus, multi-scalar systemic approach and in considering that each township is an ethnic enclave became crucial in the design.

Circular systems

In order to make Khayelitsha independent of the city's water grid, the design inspired to harness the local landscapes in producing its own water. Exploring possibilities at township scale required to intervene at Kuils river scale even though the design does not directly rely on it but needed for stabilizing systems and in better operationalizing of wetlands and dunes. With the goal that this strategy can be applied to areas of similar conditions, it was important to re-evaluate what it was going to create at city scale. In this dialog, it was also required to address black water in the cycle, which can become potential future water source in case of extreme droughts. This line of thinking was inspired by the Dutch way of producing drinking water through dune purification and project from Belgium that adopted black water for the same. However, in the context of Cape town, social acceptance of black water could be challenging. It also has the risk of failing if the local community does not govern and maintain the health of wetlands and dunes including its vegetation and water quality. Therefore, the ethnic study of the location was helpful in establishing solutions unique to the community to avoid the failure. In such projects, its key to allow stakeholder interaction and local stewardship in every step of the design process. It also creates a two-way decision making, where managing water at township scale could potentially make the city to be cut off from dams in the future.

Relevance to wider context

This thesis is an important step in the field of landscape architecture, where social and ecological dimensions are so closely explored to mitigate climate risks and in achieving inclusiveness. It works out ways to include informality in the whole process where it is as relevant as the formal processes to design spaces. Khayelitsha is a good case to bring these together. While this project has a strong socio-ecological value, it brings forward an important line of thinking for future research. Informality and landscape systems are still relatively less adopted as scientific study but are important in current day and time. The formal landscape principles cannot be applied in such complex situations where indigenous knowledge and local biota study becomes a driving force in creating frameworks in addressing such contexts, which are often scattered across different fields. In a way, the utilization of informal pathways such as in the Khayelitsha wetlands for flood protection, future development and in provisioning for new sustenance or economic development provides principles for sustainable development that can be used a guide in other developing countries. Moreover, the designing of landscape infrastructures, in this case for water resilience could be the most relevant angle in upgrading informal settlements rather than traditional built environment techniques. Another key thinking this thesis brings is the local landscape practices such as collecting medicinal plants from dunes or cattle grazing in polluted wetlands are mostly viewed as degrading in formal landscape conservation. While in this design such activities are included, they can be further explored in providing potential solutions through inter-relationships of people and ecology informing larger systems.