

# REDEFINING MAPUTO DOWNTOWN

flood management through a sustainable landscape architecture intervention

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2011

**Glória a Deus Somente**

## PROJECT DETAILS

Full dissertation title:	REDEFINING MAPUTO DOWNTOWN Flood management through a sustainable landscape architecture intervention
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Degree:	Masters Degree in Landscape Architecture (Professional)
Department:	Department of Architecture
Faculty:	Faculty of Engineering, Built Environment and Information Technology
University:	University of Pretoria, South Africa

## PROJECT SUMMARY

Program:	Urban water-holding park
Site description:	Maputo downtown ( <i>Baixa</i> ) - creating a site for holding storm water
Client:	City Council
Users:	All users of the <i>Baixa</i> , of which some include commuters, tourists, strollers, business people, students, children, vendors, restaurant users, and so forth.
Site location:	Open site, north of Maputo Central Railway Station
Address:	<i>c/o Avenida 25 de Setembro and Avenida Guerra Popular, Maputo, Mozambique</i>
GPS coordinates:	25°58'11.44" S, 32°33'51.93" E
Landscape architectural theoretical aim:	The relationship between theory and practical implementation
Landscape architectural approach:	Developing a new water-holding park in the <i>Baixa</i> . This will form part of a larger green network of water-retention sites, all functioning on a similar principle
Research fields:	Urban infrastructure as a landscape architecture design determinant. Also environmental potential, cultural and historic landscapes and urban planning

## PLAGIARISM STATEMENT

In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree Master of Landscape Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this thesis is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

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Wessel Martinus Oosthuysen

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Ek haal graag die volgende Bybelvers aan. My insperasie en geloof in my Hemelse Vader:

### **Ecclesiastes 3 (New Century Version)**

"1 There is a time for everything, and everything on earth has its special season. 2 There is a time to be born and a time to die. There is a time to plant and a time to pull up plants. 3 There is a time to kill and a time to heal. There is a time to destroy and a time to build. 4 There is a time to cry and a time to laugh. There is a time to be sad and a time to dance. 5 There is a time to throw away stones and a time to gather them. There is a time to hug and a time not to hug. 6 There is a time to look for something and a time to stop looking for it. There is a time to keep things and a time to throw things away. 7 There is a time to tear apart and a time to sew together. There is a time to be silent and a time to speak. 8 There is a time to love and a time to hate. There is a time for war and a time for peace. 9 Do people really gain anything from their work? 10 I saw the hard work God has given people to do. 11 God has given them a desire to know the future. He does everything just right and on time, but people can never completely understand what he is doing. 12 So I realize that the best thing for them is to be happy and enjoy themselves as long as they live. 13 God wants all people to eat and drink and be happy in their work, which are gifts from God. 14 I know that everything God does will continue forever. People cannot add anything to what God has done, and they cannot take anything away from it. God does it this way to make people respect him. 15 What happens now has happened in the past, and what will happen in the future has happened before. God makes the same things happen again and again (Bible study tools . com, 2011)".

Laat die Byle huil!

## SUMMARY



**The following dissertation investigates the current situation and complexities of flooding in the downtown area of Maputo.**

As a solution to the flooding problem, conservation and reuse strategies are identified. In addition, the dissertation explores a way in which the system emulates the functioning of natural systems. This forms part of how landscape interventions can become the primary guiding force in the development process.

The problem was originally identified through a series of *landing* exercises. This was done through interviews and workshops held in preparation to the Masters dissertation.

The Maputo downtown area (known as the *Baixa*), currently undergoes extensive flooding during rain downpours. The *Baixa* is also an important historical core in the city. The low-lying or flat characteristic of the area, originates from a landfill project done early in the nineteenth century. The aim of the infill project was to connect the original island to the nearby mainland. This due to the requirements of an expanding city. The *Baixa* core as it is today, has its unique character due to the original location of this settlement.

The cause of flooding is due to storm-water accumulation. Additional reasons for flooding are caused by insufficient or blocked infrastructure and large areas covered by hard surface. The overall flatness of the site also plays a role.

Site selection derives from an investigation into the

area generally prone to flooding. The whole street of *Avenida 25 de Setembro* (25 September Avenue), is proposed as a possible storm-water channel to allocate water to new water-holding sites.

Water in these sites, depending on its nature and requirements, will typically be gathered, cleaned and then discharged. This solution is proposed on a city scale.

The author will aim to resolve one of the water-holding sites through detail design and technical investigation. This could serve as an important example for the other future interventions. This water-holding, or water-diversion site is given the general term: urban water park.

The site chosen, for an urban water park pilot project, is located north and adjacent to the Maputo Central Railway Station.

The main reasons being that:

- It is the lowest area in the whole of the *Baixa* (contours measured in 100 mm).
- It is an ideal arrival space for travellers and commuters.
- It is an important location for future development.

A final prerequisite was to develop a number of sustainable principles. This was achieved by studying the *Sustainable Sites Initiative (SSI)* and introducing it within the system.

## ABSTRACT

“All countries are vulnerable to climate change and instability in weather patterns but the poorest countries and the poorest people within them are most vulnerable, being the most exposed and having the least means to adapt” (IMF and World Bank Development Committee, 2006).

African cities, as other cities around the world, are prone to flooding within in urban areas. The increased flooding from climate change, could have seriously destabilising effects for Africa (Commission for Africa, 2005). Climate records shows that most of Africa warmed by approximately 0.7°C during the twentieth century (IPCC Working Group II, 2001). Future changes in rainfall will depend greatly on the influence of global warming.

In addition, a United Nations World Water Report states that in the beginning of the twenty-first century, the Earth with its diverse and abundant life forms (including over six billion humans), is facing a serious water crisis. Water needs to be conserved in any way possible. (United Nations World Water Report, n.d.).

This study aims to explore the role in which flooding in urban landscapes can be addressed, but simultaneously stored for future use. It argues that the negative element of flooding can rather be used, i.e the water could be conserved and used in the build environment, rather than inhibiting social, economic and ecological factors. The pilot project in this stage can at the same time, serve as an urban generator.

An innovative solution (urban water park) is analysed and tested and serves as a possible outcome to address flooding problems within an African city (Maputo, Mozambique).

## SAMEVATTING

Stede in Afrika, soos in ander in die wêreld, is onderhewe aan vloedrampe in stedelike areas. Die toenemende vloedgevalle, tesame met die impak van klimaatsverandering, kan uiterse destabilisering vir die Afrika kontinent inhou (Kommissie vir Afrika, 2005). 'n Klimaatsrekord, bewys dat gedurende die twintigste eeu, 'n groot deel van Afrika onderworpe was aan 'n hittetoename van omtrent 0.7°C (IPCC Werkgroep II, 2011). Toekomstige veranderinge in reënval sal grootliks afhang van die invloed van aardsverwarming.

Ter aanvoering van die argument word daar adisioneel toegevoeg dat die Verenigde Nasies se Wêreldswater Verslag die volgende aanlas: dat die aarde, met sy diverse en verskeidenheid van lewende wesens (wat oor die ses miljoen mense insluit), aan die begin van die een-en-twintigste eeu onderworpe sal wees aan ernstige watertekorte. Water moet dus in alle moontlike maniere gespaar word (Verenigde Nasies se Wêreldswater Verslag, geen datum).

Die studie beoog om die rol van vloede in die verstedelike landskap te ondersoek en aan te spreek tot voordeel van die bouomgewing. Die ontwerp poog om die huidige negatiewe element van water eerder te bewaar en die gebruik daarvan te aan te moedig. Hierdeur word word die omswaai in sosiale, ekonomiese en ekologiese faktore inplekgestel. 'n Projek sal dan terselfdertyd as verstedelike genereerder dien.

'n Innoverende oplossing, 'n stedelike water park, is geondersoek en getoets. Hierdie sal moontlik as die oplossing dien van die huidige vloedprobleme in hierdie Afrika stad (Maputo, Mosambiek).

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## LIST OF TERMS

- *Tracing concept*: Four tracing principles introduced by Christophe Girot and the main theory followed. Each concept focuses on particular gradients of discovery, inquiry and resolution. Each concept also designates a specific attitude and action that in turn nurtures a process of design and landscape transformation (Girot, 1990)
- *Landing*: First step in tracing concepts (Explained in Chapter 2).
- *Grounding*: Second step in tracing concepts (Explained in Chapter 4).
- *Finding*: Third step in tracing concepts (Explained in Chapter 5).
- *Founding*: Fourth step in tracing concepts (Explained in Chapter 8).
- *Baixa*: The word in the given context has the meaning of "down". In this instance it literally means "downtown" or the low laying area. From a topographical view, it is the alluvial depository of infill area of the Marginal (wordreference.com).
- *Water-holding site*: Term given to the generic intervention along Avenida 25 de Setembro, as proposed by the author. Forms part of a series of other water-holding sites.
- *Green space*: Planning Policy Guidance 17 (ODPM, 2002) defines green space as parks and gardens; natural and semi-natural green space, including urban woodland; green corridors, outdoor sports facilities, amenity green space, provision for children and young people, allotments, community gardens and urban farms and cemeteries (Millie, A. 2009:100)
- *Urban water-holding park (urban park)*: Proposed intervention and term given due to its main characteristic of retaining storm water.
- *The Framework*: Referenced in the text as, "The Framework". In this instance the framework is a full scope of documentation, which includes research, analysis and proposals for the Baixa, by the a group of UP students (2011).
- *City-wide scale*: The large scale project (within the Baixa) proposal of which the site forms part of.
- *Ramblas*: Often referred in the plural as *Las Ramblas*, the gently wending promenade of strollers, probably the most socially heterogeneous street in the city (Barcelona, Spain) (McNeill, 1999:16)
- *Sustainable Sites Initiative*: Developed by ASLA and entails the design, construction, operations, and maintenance practices that meet the needs of present without compromising the ability of future generations to meet their own needs. It is also the intention of the initiative to produce guidelines that enable built landscapes to support natural ecological functions by protecting existing ecosystems and generating ecological capacity where it has been lost (Van der Zaden, & Cook, 2011: 12).
- *Brownfield Site*: The most commonly accepted definition of "Brownfield" by planners and other stakeholders in the UK is "any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilized. It may be vacant, derelict or contaminated. Therefore a *brownfield* site is not available for immediate use without intervention (Brebba, & Mander, 2006: 40).
- *Parti*: The initial sketch that indicates the overall character of the design, the distribution of rooms, the details of its form, and the specifics of entrance, circulation, light, ventilation, and views (Pai, & Pae, 2002: 250).

## ABBREVIATIONS

The following abbreviations have been used in the document:

AAI:	Action Aid International
CBD:	Central Business District
CFM:	Caminhos de Ferro de Moçambique (Railway Company Mozambique)
OCHA:	Office for the Coordination of Humanitarian Affairs
PEMM:	Unknown meaning, but refers to the previous framework by City Council of 2008
SSI:	Sustainable Sites Initiative
UP:	University of Pretoria
WSSD:	World Summit on Sustainable Development