Kelvin Gungaparsad

MTRP 2012

The Adaptive Reuse of Lost and Wasted Spaces within the eThekwini Municipality: A Case Study of the Durban Esplanade and The Point

Student Number: 204513529

TABLE OF CONTENTS:

Chapter One - Origins and Methodology

Chapter Two - Theoretical and Conceptual Framework

Chapter Three - Literature Review

Chapter Four - Empirical Analysis of the Adaptive Reuse of Lost and Wasted Spaces in the City of Durban

List of Figures:

Chapter Two

Chapter Three

Chapter Four

List of Plates:

Chapter Two

Chapter Three

Chapter Four

List of Tables:

Chapter Two

Chapter Three

Chapter Four

List of Maps:

Chapter Two

Chapter Three

Chapter Four

List of Appendices

List of Acronyms :

2D - Two Dimensional

AIDS - Acquired Immune Deficiency Syndrome

CBD - Central Business district

COP17 - 17th Conference of the Parties

CO2 - Carbon Dioxide

DMOSS - Durban Metropolitan Open Space System

DNA - Deoxyribo Nucleic Acid

ESKOM - Electricity Supply Commission

GGRP - Green Roof Pilot Project

HIV - Human immunodeficiency virus

MIT - Massachusetts Institute of Technology

NEMA - National Environment Management Act (1998)

PDA - Planning and Development Act (2008)

PV - Photo Voltaic

UNESCO - United Nations Educational, Scientific and Cultural Organization

UKZN - University of Kwa-Zulu Natal

Declaration

I hereby declare that this dissertation is my own, unaided work, except where otherwise acknowledged and that it was carried out exclusively by me under the supervision of Mr C.A. Greenstone. It is being submitted for the degree of Masters in Town and Regional Planning at the University of KwaZulu-Natal. This dissertation has not been submitted before for any examination or degree at any other university.

Signed 14 February 2013

_____

Kelvin Deoduth Gungaparsad

Note:

All the illustrations and images within this document are by the author unless otherwise acknowledged. All photos were taken by, or for the author by Clive Raman during August 2012.

Acknowledgments

I wish to thank Mr Clive Greenstone, my supervisor for being tremendously helpful and supportive throughout this entire process. Thank you for always being accommodating in every way and for the many insightful discussions over the years. I would also like to thank Ms A. J. von Riesen; your guidance, patience and words of wisdom are always greatly appreciated.

To my wonderful fiancée Mithasha, thank you for being my greatest support in every aspect of life. Your love, guidance and incredible support have helped me every step of the way. Your help, time, effort and the sleepless nights that you have endured with me, are greatly appreciated and I thank you from the bottom of my heart. Finally, thank you for always believing in me.

I wish to thank my loving parents; without you, none of this would be possible. Thank you for your unfailing love and support over the years. Words cannot express my gratitude for everything you've done for me; you truly are my pillars of strength. Thank you for always being there for me, pushing me forward and always supporting me and my dreams. I would also like to thank my family; Shelvin, Melvin, Julian, Presheen and Geralene, each of you were instrumental in your own way in helping me achieve my goals.

A special thank you to Frik Lange and Philip Rutkiewicz; your mentoring, support and guidance through the years is greatly appreciated. Thank you for all your time and assistance. Thank you to Osmond Lange Architects for their financial support. I would also like to thank Courtney Hart; your mentoring and guidance is also greatly appreciated.

To all my friends, my deepest and heartfelt thanks for your friendship and support: Tash, Alton, Clive, Melissa, Viren, Samantha, Leticia, Sudeshna, Prathna and Neeresh.

" In life you can change the path, but you can never change the destination."

Abstract

This research study addresses the issues associated with lost and wasted urban spaces. Lost and wasted spaces refer to areas which have no human activity or proper human interaction. They are the leftover unstructured landscape at the base of buildings. They also include abandoned buildings, waterfronts, train yards, vacated military sites, and industrial complexes. The research outlines the causes of lost and wasted urban spaces which occur within the eThekwini Municipality and urbanised spaces in general. Through the use of case studies and precedent studies, the research study investigates the various techniques, technological advances and approaches that could alleviate wasted spaces in the city. The Durban Esplanade and Point Waterfront development constitute the main case study areas; however, to fully understand how and why lost and wasted spaces occur within the urban environment, various other spaces which make up the cityscape were also investigated. For example, the city transport infrastructure and green spaces do not form part of the case studies, but have been included as part of the research into lost and wasted spaces.

The research study seeks to take the issue of lost and wasted urban spaces a step further by combining it with issues related to sustainability. Through the use of the case studies, various possible solutions and alternatives to the alleviation of lost and wasted urban spaces are outlined and investigated. Examples of how lost and wasted urban spaces could be transformed from problem areas to spaces of opportunity are also explored. This was achieved by making use of computer-aided design and graphic illustrations to indicate the possible solutions that could form part of a holistic approach to the issues surrounding lost and wasted spaces in the built environment. The current planning legislation is outlined in order to provide a thorough understanding of the interconnection between environmental and sustainability issues which relate directly to the cause of lost and wasted spaces. Furthermore, the research study highlights the involvement of various built environment disciplines, including planners, architects and urban designers and investigates their role in the alleviation of lost and wasted urban space.

1. Chapter One: Origins and Methodology

1.1. Background to the Research

Lost space is all around us. As urban space designers, every time we create usable positive space; we also create negative lost spaces[1]. In planning, we primarily work in the realm of space and design; however, a number of issues need to be considered. Chief amongst these are; what happens to the left over spaces when the built environment is constructed, for example the creating of buildings, roads and infrastructure. These spaces need to be carefully considered and designed, in order to minimise lost, forgotten and wasted spaces.

The fundamental question that underpins this research study is: How can planning and planning principles be better used and implemented to overcome or alleviate the problem of negative spaces in the urban environment?

A secondary issue relates to the situation where urban space has evolved into negative spaces due to a change in use or neglect by city officials and urban dwellers. Public parks and open spaces in inner city areas where poorer communities reside are often misused and become areas for dumping waste or places of crime. These spaces have become lost and wasted; this problem can be addressed by revising the existing specified use (zoning) and adapting or changing it to better suit the context of the desired urban space.

Professional practice in the field of urban design indicates that a building's footprint usually covers the entire allocated site; in doing so, this unintentionally creates an average of three lost spaces. These are: the back facades of the building, the building's roof spaces and lastly the spaces created around the building's periphery.

Finding Lost Space by Roger Trancik (1986) is a definitive piece of literature as it not only defines the research problems of lost space, but analyses the concept and theory of lost

[1] Positive urban space refers to habitable manmade structures and spaces, such as buildings, parking lots, public squares, parks, gardens and all other structures or space that have been created for use by humans. Negative space refers to the "leftover unstructured landscape" as a result of the urban development of an area (Trancik, 1986).

and wasted space in its entirety. Furthermore, it contributes to understanding how and why lost space occurs in the urban environment. The study also grapples with the problems caused in urban environments as a result of wasted and inadequate use of space.

In his book *Emerging Concepts in Urban Space Design* Geoffrey Broadbent (1996) examines the new theories influencing urban design by analysing what he refers to as today's design problems and the formalisation of space. The study is based largely on planning theory and charts the rise and fall of cities, and addresses successes and failures in all aspects of planning. This study will be used as a historical base as the author cites many international precedents (America, UK, and Italy) which can be drawn from to inform the present case study. Furthermore, the concept of New Urbanism will be investigated, as it contrasts with the historical precedents set in Broadbent's study with regard to city design concepts.

One of the major practical suggestions for utilising lost space is the greening of buildings and the use of wasted facades, concepts which Yeang and Spector (2009) deal with in their writings on architecture and urban design. Their theories and ideologies will form part of the concepts addressed in this dissertation. Yeang and Spector cite various architectural examples showing how green design methods can be incorporated into new and existing buildings. Important aspects relevant to this research include green concepts and principles, which can be used to minimise the impact of constructing buildings. Where these concepts are applicable to this research study, they will be used as reference points. Green design principles are of interest as they can be used as workable solutions with regards to this case study. It is thus the intention to develop a working model which can be implemented by planners, architects and city officials.

Urban ecology deals with the interaction between organisms (people, animals and insects) in an urban environment or urbanised community, and their interaction with that community. As the underlying intention of this research study is to promote the integration of nature and environmental awareness into the existing urban fabric, the concept of urban ecology runs parallel with the subject of lost space; these lost spaces will be largely redefined through the adaptive reuse of space into green or pro-green spaces. These and other concepts of ecosystems and their functionality are outlined and defined in Kevin J.

Gaston's (2010) *Urban Ecology*, an analysis of how people are influenced by the green component of urban environments and the significance of this influence. The book also examines how various species of flora and fauna respond to urbanisation.

Making use of both local and international examples, the current study addresses the issue of lost spaces in current and future urban developments. Furthermore, it will investigate the creation and development of a working model to combat lost space for cities in general. Planning departments could also consider legislation to make it mandatory for buildings to offset the impact of their footprint on the ground. For example, a by-law could state that, if a building takes up 1500m^2 (including parking), the owner responsible for the building should reallocate that footprint space to greening the building, either on the building's roof, facades or through the use of eco-friendly materials. A number of options could be made available to building owners, including roof gardens, vertical planting on facades and even solar panels and geysers to offset or compensate for the space that the building will be occupying. Design aspects which limit the need for electricity, lighting and heating could also be considered to offset the built form footprint.

1.2 Research Problem

The city of Durban has both good and bad examples of urban space usage. General observations have revealed that there are a few buildings in the city which fit very well in their urban context while complementing their surrounding landscape and neighbouring buildings and at the same time impacting positively on the social components of the city. Making use of lost and urban wasted space should have environmental and social benefits. Too often, the combined elements of bad space design, allocation (zoning) and usage can have a negative impact on an area. This study will examine spaces which function in a variety of ways and contrast them with spaces that do not function as they were intended to in the city of Durban. It will also look at the reasons why these spaces do or do not work, by taking into consideration all aspects of social and urban space planning.

The implementation of a planning protocol to achieve the above mentioned goals is governed by the rules and regulations set out by the government. Pivotal to the planning process is the legislation that supports this process and makes it fair and equal for all

citizens. Legislation such as the National Environmental Management Act (NEMA) and the Planning and Development Act (PDA) will be applied to create a holistic approach to the urban planning design process. The research problem is directly dealt with in the case studies; the Durban Esplanade and the Point Waterfront. The case studies are used to illustrate how the problems experienced by urban spaces occur, as well as possible solutions to deal with the problems of lost and wasted spaces in the city of Durban.

Lost and wasted spaces provide a habitat for negative elements, such as crime and pollution (dumping) to grow and fester. In order to positively influence the perceptions held by the general public and the residents of a city, a conscious decision needs to be taken to improve the image of the city, in order to instil a sense of pride in everyone living in and around the city.

There are a number of positive spin-offs from the projects cited as examples in this study. Successful local and international examples will be used as precedents for the case study. The research study will also examine how the city could benefit from the effective use of lost and wasted spaces. Employment opportunities, increased morale, and civic pride are just a few of the potential positive outcomes. There could also be major benefits for the natural environment. Lost and wasted spaces could become beacons/symbols of hope and change for South African cities, fostering the spirit of *Ubuntu* and pride in the spaces within cities.

1.3 Research Objectives

- To understand and define the concept of lost or negative spaces present in urban environments.
- To provide possible solutions to the problem, making use of existing, international and local precedents, in order to understand what works and what does not.
- Using the city of Durban as a case study, to provide key problem areas for analysis.

1.4 Research Questions

1.4.1 Main Research Question

How can planning be used as a tool to create positive outcomes from lost, negative spaces?

1.4.2 Subsidiary Questions

The following subsidiary questions will be addressed:

- What is the definition of lost or negative spaces?
- How does lost space occur?
- What are the possible solutions to redefining the uses of lost spaces?
- Where does the city of Durban stand with regard to lost spaces and how can possible solutions be implemented?

1.5 Contribution of the Research to Knowledge

This study aims to contribute to the creation of awareness of the current problems in the existing urban fabric that is the city of Durban. The study also investigates how, through the application of international theories and examples of space and place usage, the lives of the citizens of the city could be improved. It investigates the creation and development of a working model to combat lost and wasted spaces when designing cities.

With regards to the case study, the research study focuses on examples of how and where lost spaces occur within the study area and their negative impacts, as well as investigating ways in which these problem areas could be rectified.

1.6 Research Methodology

The research study makes use of both primary and secondary research approaches. The primary approach involves the collection of data in the form of hand sketches, maps, photographs and interviews with both professionals in the field of research and persons living in and involved in the area of study. Personal observations will also contribute to the primary research data component. The background research, which involves the collection of information from bodies of literature and studies undertaken in the subject field by other researchers, forms the basis of the secondary research component. This secondary component is drawn from the literature review. The methods which were used to obtain this information are as follows:

- Various libraries on and off university campuses.
- Library resources including books, journals, maps and newspaper articles.
- Digital media including online articles, online journals, e-books and other documents.
- Unpublished theses and magazine articles.

The subject of lost space has been addressed in many cities around the world and is not a new concept. There are many international examples of successes and failures in this field of study. Precedent studies will be cited to help explain the numerous concepts and theories which this study will address. The literature review formed the basis of the study as it informed the decisions taken during the planning process. An open-ended questionnaire was prepared and used to collect data; this was then processed and used to create tables, charts and graphs for analytical purposes. The questionnaire was used to gather information from:

- Academics who work on the subject of the built environment
- Professionals who work on the subject of the built environment: Urban Designers, Architects, Landscapers, Horticulturalists and Engineers.
- The municipality, building owners, body corporates and other stakeholders.
- Persons living in the buildings located within the case study area, including care takers and maintenance personnel.

1.7 Structure of the Dissertation

Chapter one introduces the topic and the research study to be undertaken on lost and wasted spaces in the city of Durban. This chapter includes the background to the research in order to provide insight on why and how the problems being tackled in this study have occurred. The research questions are also presented in this chapter.

Chapter two presents the various theories and concepts which inform the case study. This chapter examines the ideas underpinning both the theory and practise of the alleviation of lost and wasted spaces in cities. Theories which deal specifically with city and urban space design are also outlined in this chapter and the various pros and cons of these theories are explored.

Chapter three addresses the phenomenon of lost urban spaces internationally and locally. Precedent studies are drawn from books, internet research, magazines, journals and even television documentaries. The literature review provides a summation of all these research typologies. The literature review relates directly to the guidelines which have been used in the case study. The various ideas and schools of thought on urban space are analysed in this chapter and are used to formulate guiding principles for the alleviation of lost and wasted spaces in cities. Not all of the literature presented in this chapter is positive; however, it is all relevant as it is part of a bigger picture of how to deal with lost and wasted spaces in an urban environment.

Chapter four focuses on the empirical case studies, which are the Durban Esplanade and the Point Waterfront. Although these have been chosen as case studies for in-depth analysis, other areas inside and outside the city are also discussed, as the research study aims to find a holistic approach to the issues related to lost and wasted space in the city. The issues of housing, urban agriculture and renewable energy are all addressed in this chapter. Various techniques which are identified in previous chapters are also discussed and explored. The case studies are analysed and various ideas, techniques and proposals are explored. The case studies are used to illustrate possible solutions to the problem of lost, wasted urban spaces.

Chapter five provides a summation of key issues leading to lost spaces in cities. This concluding chapter unifies the theories, concepts, the literature and the case studies. It also presents the findings of the research study in relation to the research questions presented in chapter one.

1.8 Conclusion

Built environment professionals working in different realms of urban space design (planners, architects, engineers, etc), need to understand that urban space and place design are not static components of the urban planning process, but are components that must evolve over time and with the needs of urban dwellers. Urban space design needs to be constructed with longevity in mind. With global warming changing the way we think, design and live, conscious decision-making which has a positive impact on the socio-economic factors of urban spaces, should be the ultimate goal. This process begins by identifying the lost spaces and improving, adapting and evolving their use to better serve communities and the overall context. By positively changing wasted spaces and incorporating good design interventions the planner of today can make better decisions for future developments. The city of Durban and South Africa as a whole is a unique case due to its apartheid planning legacy, which was used as a tool to separate and segregate people; the time has now come to reconceptualise wasted and lost urban space.

The subsequent chapters of this research study incorporate the theories and concepts outlined in this chapter, while validating the choice of interventions listed in the case study. The interventions and concepts addressed in the case study are backed up by the research cited in the literature review; these studies form the foundation for the present research.

2. Chapter Two - Theoretical and Conceptual Framework

The theoretical and conceptual framework provides the ideas which underlie the concepts put forward in the case study. This chapter will outline the main theories which drove the ideas used in the case study. The theoretical background will build a foundation for the cited projects. As theories are specific rules of thought, in some cases the theoretical research and the theories themselves tend to overlap and interrelate with one another when analysing the strengths and weaknesses surrounding the subject of lost and wasted spaces.

2.1 Urban Renewal

The general premise of the term 'urban renewal'[2] is that it is a process that involves the improvement and rehabilitation of neighborhoods. Furthermore, it is a process which the government or a municipality believes should be administered for the general good of the public. The upgrade usually includes the demolition of existing dilapidated or run down buildings followed by the construction of new ones. It also usually includes the addition of new facilities and features for social interaction such as green spaces, parks, malls, theatres and sometimes sporting facilities. The desired outcome is a better quality of life for all citizens; it does not necessarily specifically target citizens living in the area intended for upgrade.

Urban renewal usually carries positive connotations and is increasingly used by governments and municipalities as a means of upgrading an area. There are various cases where the urban renewal process has been used successfully; however, there are also many instances where urban renewal has failed[3] outright. The failure of urban renewal is evident in the many case studies cited by Trancik 1986. Urban renewal should

---

[2] Urban renewal usually aims to persuade wealthier individuals to come live in the area. Urban renewal is often part of the gentrification process (www.businessdictionary.com).

[3] St. Louis's Pruitt-Igoe housing project is arguably the most infamous public housing project ever built in the United States. A product of the postwar federal public-housing program, this mammoth high-rise development was completed in 1956. Only a few years later, disrepair, vandalism, and crime plagued Pruitt-Igoe. The 33 buildings were torn down in the mid-1970s, and the project has become an icon of urban renewal and public-policy planning failure (www.soc.iastate.edu/sapp/PruittIgoe.html).

not disrupt existing working social and socio-economic patterns; while it has a role to play in the rejuvenation of the city, it should be strategically coordinated and monitored or it risks causing an implosion of the project. Existing social spaces and constructs need to be retained so as to not disrupt the very fragile nature of social interactions within the community the programme is meant to help (Landry, 2006).

Planners and urban space designers prefer to start with a clean slate with regards to the built environment. They have a tendency to want to demolish the existing area and start afresh. Although appealing, this tendency causes many problems with regards to sustainability. Starting from scratch has social, economic and environmental consequences. To further expand on this statement each factor is examined separately.

2.1.1 Social - A community has various social constructs, from culture to age groups, race and the ratio of males to females, to name but a few. These constructs are complex as they develop over time and the circumstances experienced by a community. For example, in some cases, due to economic circumstances or political influences, a community may share common goals and develop a strong sense of camaraderie. Regenerating an existing built environment which has social connections rooted in it is therefore not an easy task. Completely restructuring and redefining a space is also a common mistake in the urban renewal process, as the planners are often out of touch with the current economic trends or genius loci[4] of a space. This has been blamed for the failure of many urban renewal projects.

2.1.2 Economic - Moving on to the economic factor, the overall financial cost (time, labour and materials) as well as the short- and long-term implications of the upgrade with regards to investment of time, finances, material and other such resources combined with the ability of the urban renewal programme to act as an economic generator for the area should be taken into account. The financial investment will more than likely be expected to generate some form of return or financial gain for investors (property developers in both the private and public sector). The cost of demolishing the old and building the new usually runs into millions of rands and many projects tend to run over budget due to internal

[4] Genius loci - The distinctive atmosphere or pervading spirit of a place or a particular environment or surrounding influence (www.thefreedictionary.com).

(construction delays, labour disputes,) and external factors (political, budget cuts, public protests, escalation of cost of materials).

2.1.3 Environmental – The environment constitutes the flora and fauna of an area as well as living aspects in terms of quality of life. Examples include cleanliness (air, water, noise pollution, litter and other solid waste) and safety (dilapidated, unsafe buildings, infrastructure quality and levels of crime within the area). Environmental concerns are perhaps the most important factor; given the current context (concern about global warming) environmental factors have a major role to play in the urban renewal process. Environmental factors start with the embodied energies[5] of materials and run all the way down to the carbon footprint of the users of the space; everything has an environmental cost. For example, the demolition of buildings and infrastructure has its environmental cost in the oil based fuels that the machinery uses for the demolition process (Jackson, 1997). This process also creates air and noise pollution. The authors recommendations for better use of lost and wasted space are primarily based on all environmental impacts of urban space; therefore this factor is of particular relevance to this research study.

Sustainability is key to any urban renewal process. Project leaders should consider leaving as much of the existing area intact as possible, retaining existing positive social constructs and making sure that care is taken that the impact on the environment is minimal. This should apply to every area selected for urban renewal; however this is seldom the case.

Many developers believe that to get the best results, they first need to sanitise the proposed area before they begin. This approach has been adopted in some of the urban renewal projects carried out in Durban. A very controversial example of such an urban renewal project is the Point Waterfront upgrade located along the Durban Beachfront. Launched in 2003, R1.8 billion rand has been committed towards the development of infrastructure and building complexes[6]. The Point Road/ Point Waterfront project is also relevant in this regard, as it is directly linked to Point Road (Mahatma Gandhi Road). Intended as a gentrification measure, the projects (high rise luxury flats aimed at the middle to high income market) are in some places incomplete (refer to Plate 2.1- B) and

[5] Embodied energy is the energy consumed by all of the processes associated with the production of a building, from the mining and processing of natural resources to manufacturing, transport and product delivery (www.yourhome.gov.au/technical/fs52.html-).

[6] www.durbanpoint.co.za

those which are complete are mostly unoccupied (refer to Plate 2.1 - A). This observation was made during a site visit on 7 August 2012. This could be attributed to the economic downturn, but it could also be the result of the genius-loci of the area, as Point Road has always been notorious for its criminal activities (prostitution and drug dealing). This is a prime example of an urban renewal project which has failed to deliver due to the unsustainable manner in which it was carried out. The existing buildings and natural landscape were demolished in order to make space for buildings which remain unoccupied or unfinished, with the carbon cost (materials and natural resources such as flora, fauna and land) of the development being extremely high.

Plate 2.1: Unoccupied and abandoned buildings on the Point Waterfront.

Image source: D.Raman

One shortfall of government processes is insufficient consideration of the needs of the existing and future citizens (people living in the area and potential investors) in the project. A holistic approach requires liaison with the client/users of the space to come up with a coherent and consolidated plan on how to move forward.

Government usually, but not always, has an underlying rationale for an area to undergo urban renewal[7]. This is often linked to gentrification and in some cases is political in nature (for example, prior to an election, in order to generate votes for a particular party). Gentrification involves upgrading an area to encourage investment by the private sector, with the hope that a spinoff will be a cleaner, better-kept area with a decrease in crime. This would increase land values, resulting in an increase in taxes. The hope in this particular case, the Point Waterfront Project, is that the influx of wealthier people and businesses would encourage other potential investors to consider moving to the area, thereby creating a chain reaction.

The gentrification of an area could also have negative outcomes. Since an influx of wealthier people and investment will increase the overall value of an area, this will impact on property prices, which will directly influence the rentals in that particular area. People who were already living in the area will now have to pay higher rents. Many residents of these “renewed areas” will not be able to afford the high rentals, thereby unintentionally forcing them out of their homes. This changes the dynamics and social construct of a particular area (Nedučin *et al*., 2009).

While urban renewal does have its place when it comes to the upliftment of an area/ community, care needs to be taken to ensure that it is done correctly. For example, social justice (equal rights and opportunities) needs to be at the forefront of the renewal process. Urban renewal should not infringe on people’s rights or prejudice any person or group’s belief systems and should be a community-based process, with public input at every step of the way. An upliftment programme should be carried out in a sustainable manner and prevent the disruptions noted above. With regards to the recommendations for the case study area, many of the principles of urban renewal can and will be applied, but not the theory of urban renewal in its entirety, as it has some counterproductive elements.

[7] The five-year project, driven by the eThekwini (Durban) Municipality's economic development department, aims to form smart partnerships between business and communities to prevent further urban decay through quality management of the area. (www.engineeringnews.co.za)

2.2 The Theory of Urban Decay

The theory of urban decay relates to the deterioration of a city space over a short period of time. Many factors influence a city's well-being. Economic influences (local unemployment), abandoned buildings, the crime rate and even political disenfranchisement can all result in a city falling victim to urban decay. Urban decay is also referred to in some cases as urban rot or urban blight. This refers to the process which causes the urban decay (Flom, 2007). On the following page is a simplified example of such a case:

> Due to the economic downturn a company occupying an office block is forced to shut down. For legal reasons as well as the poor economic outlook, the owner cannot rent out or afford to maintain the building. The condition of the building starts to deteriorate. As a result, existing tenants (if any) decide to move out. The now unoccupied building becomes a place for vagrants and criminals to live and interact in. The building gets vandalized (broken doors and windows, graffiti, pollution). This activity adversely affects the lives of people in neighbouring buildings. Out of fear for their lives and fearing that their possessions will be stolen or damaged, they decide to either relocate their homes or businesses or stop maintaining their properties due to the negative activity occurring around them. The rot starts to spread outward, increasing the rate of decay. Just as a decaying tooth would affect the tooth next to it if not extracted, so too, does urban decay directly adversely affect the community and infrastructure within its vicinity.

The above scenario displays the symptoms of urban rot, urban decay and urban blight. This is one, very simplified and basic example, of how urban decay can ruin a city or neighbourhood. However, external and internal factors can trigger this phenomenon. The primary reason for urban decay is when the government (municipality) in a particular area stops maintaining buildings and infrastructure primarily linked to lack of finance; this acts as a generator of urban decay. The neglect of buildings and infrastructure can transform a thriving, well-kept city or neighbourhood into a slum, simply due to municipalities and residents not caring for their surroundings.

The theory of urban decay is interconnected with the theory of broken windows. The broken window theory holds that “relatively minor infractions, if unpunished, lead to greater problems and more serious crime[8]” (Flom, 2007). This is primarily based on the premise that the mere presence of disorder (if left uncontrolled and uncorrected), in this case a broken window, leads to the breakdown of a community. In essence, if one window is left broken, in time many more windows will be broken; similarly if an area is full of graffiti that has not been removed, the area will soon be completely covered in graffiti.

The broken window theory was originally proposed by Dr James Q. Wilson and George Kelling in the early 1980s. In their paper “Broken Windows”, the authors argued that the best way to positively influence a community (lower crime rates and increase morale and community relationships) is to fight the disorder[9] (Pryor, 2005). The paper cites a number of areas in the USA which ran programmes to uplift neighbourhoods which they felt were in need of a “cleanup”. A local example would be Albert Park in Durban. The paper describes how an increased police presence can have a positive psychological influence on a community’s sense of safety, even though crime statistics indicate no drop in crime. This illustrates that the broken window theory is based on a state of mind rather than the condition of one’s surroundings. This somewhat contradicts the theory. The broken window theory is built on social norms and public perceptions and behaviour. While the theory has merit, it is highly controversial[10] and has attracted criticism. This is due to the fact that urban decay is not a simple problem with a singular cause; neither is it context-specific, therefore, in some cases the theory holds, while in others it does not.

Despite the criticism, the broken window theory has been adopted and further expanded upon by relating it to other aspects of urban living. According to Pryor, this theory can be

---

[8] Many theories have attempted to explain urban decay, or rising crime rates and other problems confronting cities. One theory is that relatively minor infractions, if unpunished, lead to greater problems and more serious crime. This is known as the broken windows theory (Flom, 2007)

[9] Political scientist James Wilson and criminologist George Kelling co-authored a March 1982 cover story in *The Atlantic Monthly* titled "Broken Windows". They argued the best way to fight crime is to fight the disorder that precedes it: graffiti panhandling, uncollected trash and unrepaired buildings (Pryor, 2005)

[10] The broken windows theory was controversial from the outset. A major study in Chicago, led by Felton Earls, seems to have largely invalidated the theory. It appears that the major deterrent to crime is not whether or not a window is repaired, but the social network and feeling of power of the people in a neighbourhood, which are known as social efficacy (Flom, 2007)

broken down into ten[11] windows that “need repairs” (Pryor, 2005). For the purposes of this study, only those which can be directly related to South Africa will be used; they are as follows:

2.2.1 Broken Streets -

Unrepaired potholes, damaged road surfaces and other transport infrastructure are like broken windows. If the city does not care for and manage the streets correctly, they will not care if the streets are littered and this will lead to the streets falling into the urban decay category.

2.2.2 Broken Bathrooms -

Dirty public restrooms and other ablution facilities, if not cared for, not only cause pollution, but also pose a health risk. This is especially true in a city located along or near a beachfront. Durban is a good example, as there many public ablution facilities along the beachfront. If uncared for, these facilities are particularly prone to vandalism, theft and graffiti and in some instances crime.

2.2.3 Broken Words -

The way we speak tells a lot about us, where we come from, the way we carry ourselves and even our level of education. Profanity has become somewhat accepted due to the influence of movies and crime on our society (especially children). If left unchecked, broken words could become part of everyday language [12] (ebonics); this is a sign of a breakdown in society. This type of English has a negative influence on a society as its purpose is to insult and offend.

2.2.4 Broken English -

Misspelt words and poor grammar are the broken windows of the education system. Technology (all forms of social networking) has had a negative effect on the education system due to the frequent use of shorthand (abbreviated words) writing. The repetitive use of shorthand negatively affects a person’s ability to write and spell correctly.

---

[11] (1) Broken Streets, (2) Broken Bathrooms, (3) Broken Words, (4) Broken English, (5) Broken Workgroups, (6) Broken Software, (7) Broken Bodies, (8) Broken Families, (9) Broken Standards and (10) Broken Books (Pryor, 2005)

[12] Ebonics is the study of the rules applied to turn English into uneducated-sounding pseudo-language whose purpose for the most part is to insult and denigrate www.urbandictionary.com

2.2.5 Broken Workgroups -

Although this category applies to all dysfunctional work units, from a planning point of view, those which are of interest are broken workgroups from a municipal and government background (particularly in South Africa). Dysfunctional departments are abundantly present in municipal and government units. Government departments work in silos, a process which is transported into how urban environments are built and maintained. Examples include transport infrastructure (grass cutting on road verges, potholes and litter collection). It is not uncommon to find that government departments that should be in constant contact with one another seldom are. In many cases citizens face a losing battle to resolve problems due to this breakdown in communication.

In most instances, local municipalities/government do not communicate with provincial and national government. This relationship is extremely important as local municipalities/government deal with problems at a grass-roots level, while provincial and national government deals with the larger group or the bigger picture. Lack of service delivery due to political influences, corruption, lack of commitment and funding constraints all influence the broken window of workgroups. During the research and information collection process for this study this breakdown and miscommunication was painfully clear. Finding the correct person who could supply the correction information proved to be a real challenge. However, it should be noted that there were instances when the opposite was also true; some government officials and employees were extremely helpful and well informed.

2.2.6 Broken Families and Broken Homes -

Broken families are becoming an increasing problem in South Africa. Due to apartheid many citizens residing in the rural areas had to leave their homes in order to improve their standard of living, by looking for employment and accessing healthcare facilities and education (mostly tertiary) in the cities. Fathers and mothers left their children for months at a time, causing a breakdown of the family unit. In most cases, the social norm is to leave younger children with their grandparents, while the mother / father (or both) work in the city and send money home. Adultery occurs as a result of the extended periods people spend away from their partners; such behavior eventually ends up causing *broken homes*. Furthermore, many of

those moving from the rural areas ended up residing in informal areas (informal housing) due to their economic circumstances. South Africa also has a high percentage of people infected with the Human immunodeficiency virus (HIV) and Acquired immune deficiency syndrome (AIDS). This has left many children orphaned; the oldest child is often forced to drop out of school to seek employment or to beg on the streets to support themselves and siblings (child-headed households).

Stressful working environments and competition in the work place also put pressure on the family unit. Parents are too tired or stressed to interact with their children in a healthy and meaningful manner. Increased working hours and the stress of trying to keep up with financial commitments are also to blame. The recent financial downturn (recession) has caused increased stress as many families have had to deal with the household's sole provider losing their job. Finally, divorce and out-of-wedlock relationships also lead to broken families. In most cases, one of the parents assumes the sole responsibility of raising the children while the other parent merely provides financial support.

2.2.7 Broken Standards -

"Abandoned values lead to abandoned truth" (Pryor, 2005). Our evolving urban lifestyles have also led to our values and belief systems following suit (consumerism, global capitalism). Social networking, negative media influences (role models, consumerism) and urban lifestyles have compromised our sense of respect, accountability, loyalty and morality. These values are being replaced by convenience, instant gratification and narcissistic[13] behaviour. Broken standards are influenced by and linked to all the other broken window theories as they relate directly to our behaviour when interacting with and encountering the other broken windows mentioned above.

The various broken windows discussed (2.2.1 to 2.2.7) are relevant to lost and wasted spaces as they indirectly and sometimes directly influence how these spaces can and do occur. Broken windows are in some cases the result of space which is incompatible with the social aspects of an area. It is important to note that the broken

[13] Excessive or erotic interest in oneself and one's physical appearance.

• Psychologically, extreme selfishness, with a grandiose view of one's own talents and a craving for admiration, as characterizing a personality type (*New Oxford American Dictionary*, 2nd edition, 2005)

window theory deals with social deficiencies in a community, and therefore, lost spaces in some cases create room for these social ills (for example, crime) to grow.

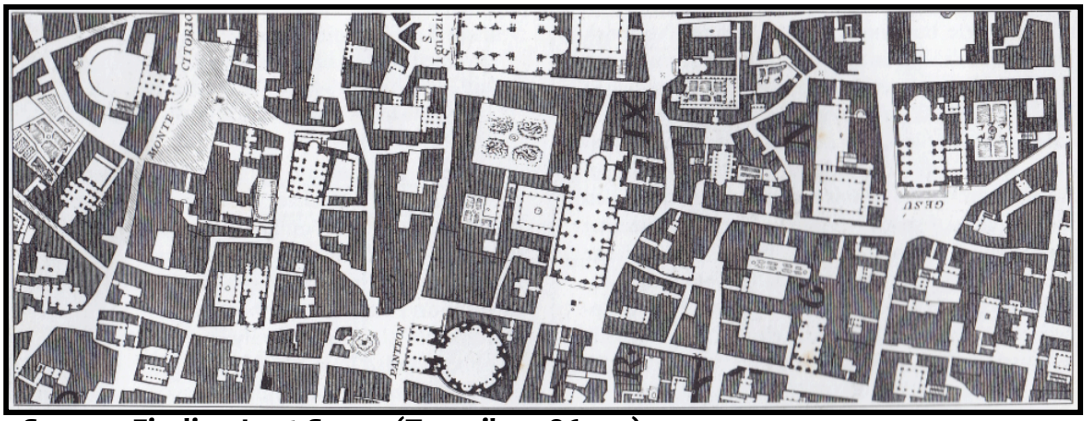
2.3. Three Theories of Urban Spatial Design: Figure Ground Theory, Linkage Theory and Place Theory

Although these three theories (*figure-ground, linkage* and *place theory)* are discussed individually, it is important to note that they are interlinked; together, they can be used as a tool to create a consolidated urban design approach to a project. These theories are referred to collectively as the "three theories of urban spatial design".

2.3.1 Figure Ground Theory

As a starting point for the case study, a figure ground diagram was produced (see Figure Ground Study Map). This involves the creation of solids and voids on a drawing, in order to simplify an area into a two dimensional (2D) form. Trancik refers to buildings as a solid mass which make up the "figure" and the open voids are referred to as the "ground" (1986). By making use of this approach, Trancik believes that one is able to determine the existing patterns present in the urban environment. The rationale is to understand the relationship between solid and void, figure and ground, and public and private space. As explained by Trancik, "The objective of these manipulations is to clarify the structure of urban spaces in a city or district by establishing a hierarchy of space of different sizes that are individually enclosed, but ordered directionally in relation to each other" (Trancik, 1986). According to Trancik, the best illustration of the figure ground theory of urban design is Giambattista Noli's map of Rome (refer to Figure 2.1) drawn in 1748 (Trancik, 1986: 99).

Figure 2.1: Giambattista Noli's Map of Rome



Source: Finding Lost Space (Trancik, 1986: 99)

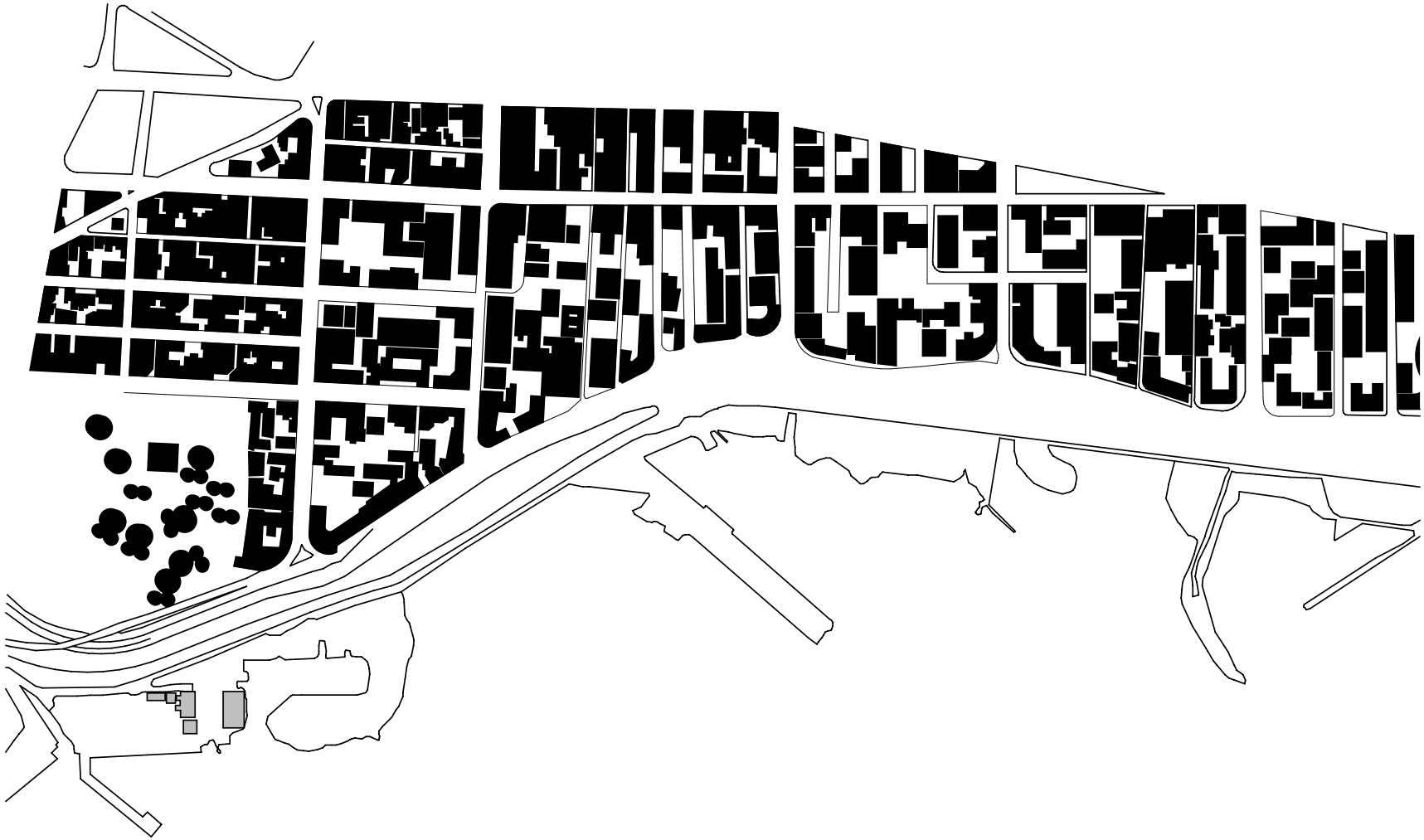


FIGURE GROUND STUDY OF CASE STUDY AREA

Kelvin Gungaparsad
204513529

This pattern of solids and voids reveals what urban designers refer to as the urban fabric. Although this approach to urban design may seem dated, this exercise is still used by space designers to better understand the relationship of space. Cities which are planned do not just start at the centre and grow outwards. The buildings, roads and spaces all create a pattern to which the original city planner worked. Trancik is of the opinion that for a city to work properly, certain elements or positive voids need to be created within the building mass of the city. Of particular importance are public spaces as they give a city a sense of meaning in terms of context and symbolic content. These spaces become important to a city as they serve as spaces for public gatherings, accessibility paths and transitions between public and private domains in the city space.

In any kind of space manipulation, be it architectural, urban design or planning in nature, the experience of that space is of paramount importance. The way a space reads or feels will ultimately determine if people will use it or not. The figure ground exercise attempts to achieve a design that creates spaces that are human in scale and which give people a sense of comfort when they use the area in question. Connecting the form of the building to the structure of the site describes the problem of spatial design, as noted by architect Alvar Aalto[14]. His solution to the problem of spatial design was to twist and turn the building's facade to create positive exterior spaces. Well-articulated space along the perimeter and blocks requires a variation of solids and voids. The idea is to establish outdoor "rooms" which contain corners, pockets, niches and corridors

[14] Alvar Aalto (02/03/1898 – 11/05/1976) was an internationally famous architect and an important exponent of modernism. He created a distinct architectural style, whose aesthetic impact is based on careful consideration of a building's relationship with its natural surroundings, a human scale, the feeling evoked by the materials used, meticulous detail and the skilful placement of light sources. Aalto is valued for having provided an alternative to the technology-dominated impersonality, structural repetitiveness and visual monotony of the international style (Viljo, 1994)

2.3.1.1 Urban Solids and Urban Voids

As noted previously, the urban fabric consists of solids and voids; the differentiation of these solids and voids can be used as a space manipulation tool to assist space designers. The purpose of this exercise is to better understand and design urban environments which are conducive to human activity, in terms of social interaction. A secondary function of solid and void manipulation is to establish the physical sequence and visual orientation between places. Figure ground analysis is especially useful in this regard. Trancik theorises that the solids and voids which are present in all cities can be distinguished in the following way:

Solids are broken up into three distinct categories while voids are broken up into five categories. They are as follows (refer to Figure 2.2 & 2.3):

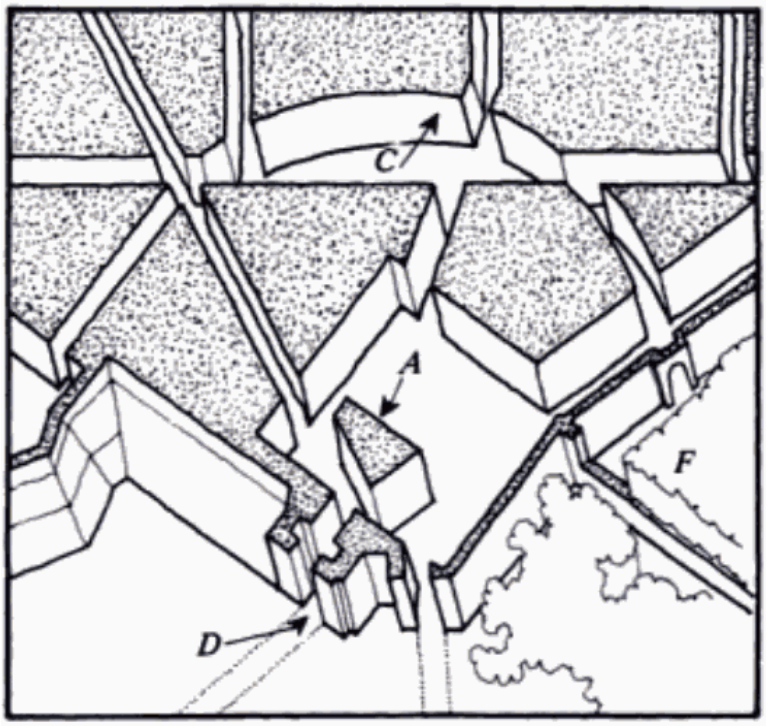
Urban Solids:

- Public monuments and institutions (A)
- Predominant field of urban blocks (B)
- Edge defining buildings (C)

Urban Voids:

- Entry foyers - act as passageways between public and private space (D)
- Inner block voids - semiprivate transition zones (E)
- The network of streets and squares - corresponds to the predominant field of blocks and contains the active public life of the city (F)
- Parks and gardens - nodes that contrast with architectural urban forms (G)
- Linear open space systems - associated with natural features such as rivers, waterfronts and wetlands which cut through urban districts to establish edges and create large-scale connections (H)

Figure 2.2: Diagram of Types of Urban Solids and Voids



Source: Finding lost space (Trancik, 1986: 102)

Figure 2.2

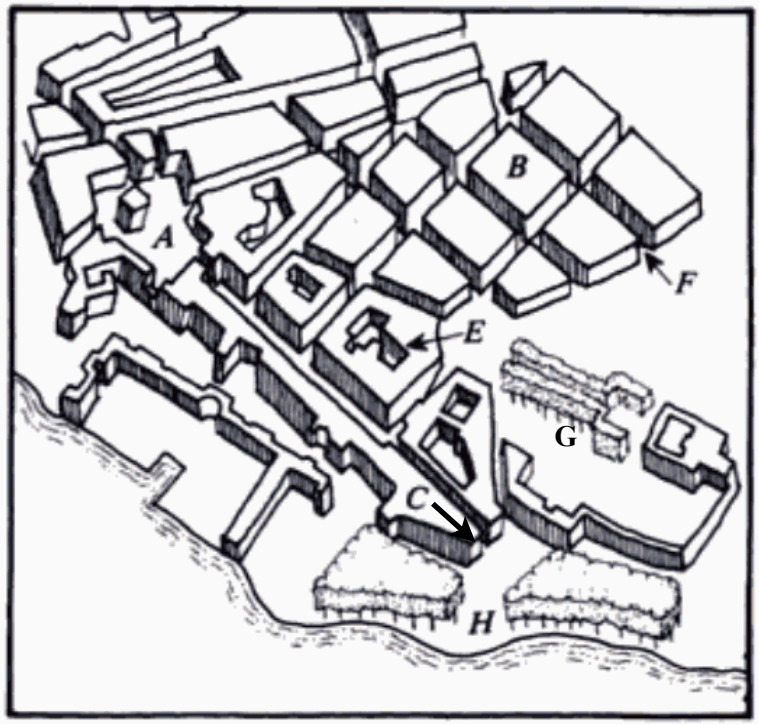
(A) Public monuments and institutions

(C) Edge defining buildings

(D) Entry Foyers

(F) Network of streets and squares.

Figure 2.3: Diagram of Types of Urban Solids and Voids



Source: Finding lost space (Trancik, 1986: 102)

Figure 2.3

(A) Public monuments and institutions.

(B) Predominant field of urban blocks.

(C) Edge defining buildings.

(E) Inner block voids.

(F) Network of streets and squares.

(H) Linear open systems.

(Diagrams of types of urban solids and voids)

2.3.2 Linkage Theory

In essence, linkage theory involves intangible abstract lines connecting one element to another within the city fabric. These lines are formed by roads, streets, pedestrian walk ways, linear open spaces or other linking elements which physically connect the various parts of the city. Linkage deals with the visual and physical ordering of an urban environment.

Kevin Lynch, a very influential scholar in the field of study of urban design and the linkage theory, observes that if a city environment is visibly organised and sharply defined, then a person can inform it with meanings and connections. “Environmental images are the result of a two-way process between the observer and his environment. The environment suggests distinctions and relations and the observer – with great adaptability and in the light of his own purposes – selects, organizes and endows with meanings what he sees” (Lynch, 1960: 6). Lynch states further that paths, edges, nodes and landmarks are the 'building blocks' that form a defined urban fabric. These building blocks are of utmost importance when it comes to logical city design. Linkage theory creates a means of implementing these theories in the design of the urban landscape.

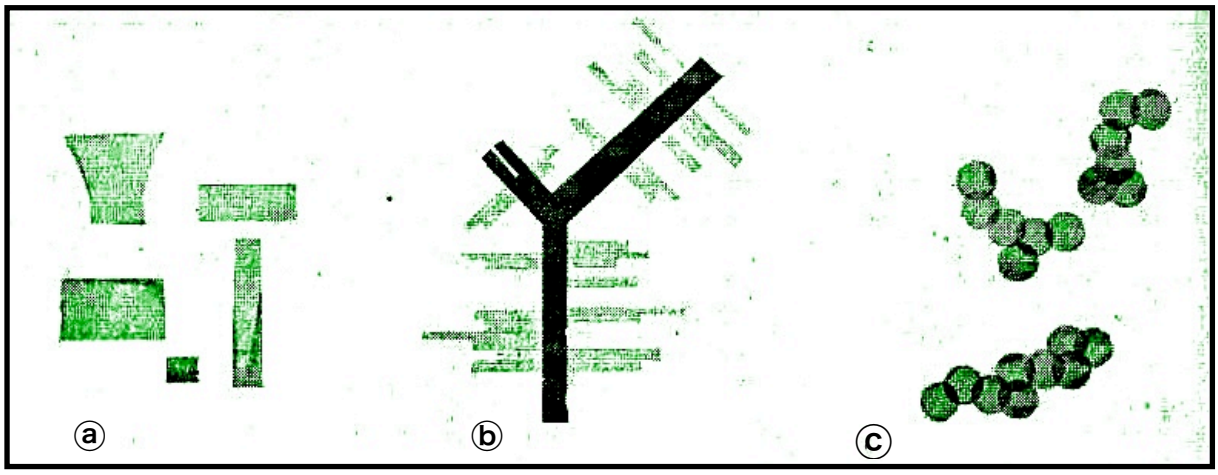
“The linkage theory involves the organization of lines that connect the parts of the city and the design of spatial datum from these lines relate buildings to space” (Trancik, 1986). Trancik explains that a spatial datum could be a sight line, directional flow of movement, an organisational axis and in some cases a building edge. Together, they create coherent urban language which is meant to guide the senses and create context.

Fumihiko Maki’s paper, “*Investigation in collective form”,* discusses what he refers to as the problems of architecture and urban design which together make up the urban fabric. From a planning point of view, he discusses master plan versus master programme. He explains that the master plan refers to planning aspects from a time point of view. “Given a set of goals, the master program suggests several alternatives for achieving them, the use of one or another which is decided by the passage of time and its effect on the ordering concept” (Maki, 1964). Maki is of the opinion that the cities of today tend to be visually and physically confused. He also feels that the patterns which exist in the urban form are monotonous and are made up of static elements, in that they lack visual and physical

character. Maki goes on to explain that the cities of today lack elasticity and flexibility, key elements of good urban design (Maki, 1964). This argument is based on the belief that cities must change as social and economic use dictate and yet they must not be temporary in a visual sense; that is, made up of temporary structures which speak a totally different language.

In his paper, Maki introduces and discusses three main concepts/approaches: (a) compositional form, (b) mega-structure form and (c) group form (refer to Figure 2.4 - a, b and c) which he believes define the formal types of urban space. Compositional form consists of individually placed buildings (Maki, 1964). From an architectural point of view, he points out that buildings are seen as separate entities creating an inadequate spatial language to create meaningful environments. Although quite dated, the comments made by Maki are still relevant to the cities of today. This inadequacy occurs when building designers conceptualise a building design without taking its context into consideration. The context referred to is not only the physical space and form in which the new building will sit, but also the social fabric which forms part of the context. Space designers often restrict their thinking to the space they have been allocated and each designer tends to impose his/her ideas on the space to create a composition which both fulfills the client's requirements and allows the designer some sort of input. This is an area that needs more attention

Figure 2.4: Illustrates the three approaches of urban space design as set out by Fumihiko Maki.



Source: ***Investigation in collective form*** **(Maki, 1964: 6)**

2.3.2.1 The Three Approaches to Urban Spaces

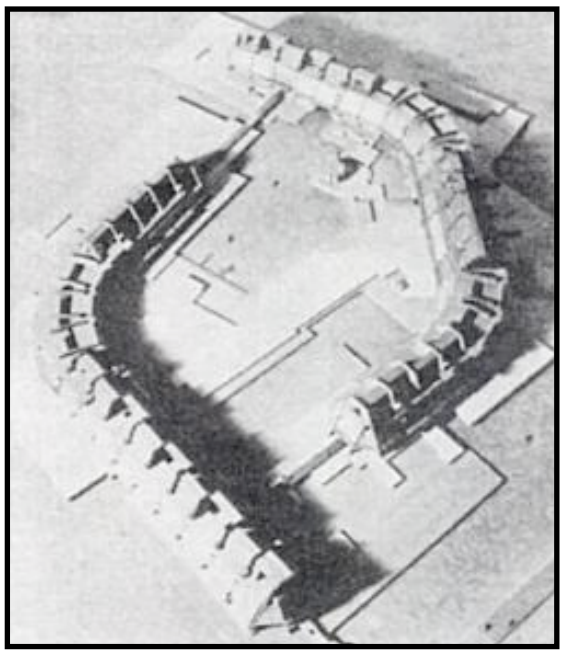
Table 2.1 - The three approaches formulated by F.Maki (1964)

Urban Space	
(a) Compositional Form	Composition Approach
(b) Mega-Structure Form	Structural Approach
(c) Group-Form	Sequential Approach

The first approach is what Maki refers to as the compositional form. This consists of abstract forms of individual buildings which create a two dimensional composition. The problem with this concept is that the linkages are implied rather than being obvious. This creates an unbalanced context which is difficult to read. The underlying thinking behind this type of architectural combination is that perimeter edges to open space are not considered to be as important as the object buildings themselves.

The second approach to urban space design is the mega-structure form (refer to Figure 2.5). This involves a large framework which consists of individual buildings that are integrated to create an interconnected entity. In this arrangement there also exists a sense of hierarchy and openhandedness. “In megaform, linkage is physically imposed to make a structure” (Trancik, 1986). According to Maki, this approach to space design has several inherent advantages. Foremost among these is administration and engineering. This form offers efficiency in the ordering of the various functions, namely, investment within a single, simple infrastructure. Maki cites the example of the work undertaken by Kenzo Tange and Noriaki Kurokawa for the new community design at the Massachusetts Institute of Technology (MIT) in the 1960s.

Figure 2.5: A community for 25 000 at M.I.T Tange and Kurokawa.



Source: Finding lost Space (Trancik, 1986: 108)

The third urban format approach discussed in Maki's paper is the group form. This seems to represent organic growth rather than planned space. This type of urban growth is typical of historic towns. There is no particular formality to the growth pattern. "This is the result of incremental accumulation of elements in space along an armature" (Trancik, 1986). Since the group form is more organic in nature, the linkages in this urban form seem to develop naturally. The linkages are not imposed or implied; rather, the structures, spaces and informal growth determine them.

Linkage theory is relevant to the subject of lost and wasted spaces as it illustrates the components and thinking/mindset which need to be undertaken when grappling with the issues of city design. It illustrates the difficulty that space designers face, with regards to the creation of spaces for human dwelling and interaction within cities. Although space creation is not merely about creating linkages, it is an important aspect of successful city design. The relevance of linkage theory to the case study is also evident in its impact on urban design. The ability of space designers to create meaning for a space by manipulating its form, creating edges, paths, nodes and spaces for human interaction is what good space design is all about. Durban is a city with a rich history, both positive and negative. The ability of urban designers to guide the users of the city and its spaces, by making sound spatial decisions will ultimately help combat the problem of lost and wasted space.

2.3.3 Place theory

Place theory deals with the understanding of spaces from a social point of view. It is concerned with abstracts and not merely the physical structure or defined boundary. Place theory deals with the essence of space and the characteristics of that space, both physical and meaningful. It is concerned with the human perception of space. As defined by Trancik, the essence of place theory in spatial design lies in understanding the cultural and human characteristics of physical space. “If in abstract physical terms, space is bounded or purposeful void with the potential of linking things, it becomes *“*place*”* when it is given contextual meaning derived from cultural or regional context” (Trancik, 1986).

In an attempt to better understand the concept of place theory this discussion will draw on four major facets of city design:

1) What are the major components of good place design?
2) What makes one place better than another?
3) What is it that makes one environment more conducive to social activity than another?
4) What are the underlying elements and components which make up good city design?

The genius loci within “urban renewal”, has already been discussed; however this concept is also present in place theory. It supports the need for a better understanding of the link between these two theories (urban renewal and place theory). The genius loci or spirit of place concept forms the basis for the theoretical argument of place theory and allows for the conceptualisation of urban spaces to which planners must respond. Through good space design, planners will be able to enhance urban spaces’ sense of identity and sense of place. The following statement by Norberg-Schulz provides a better understanding of the concept of place: “A place is a space which has since ancient times, the genius loci, has been recognized as the concrete reality man has to face and come to terms with in his daily life. Architecture means to visualize the genius loci and the task of the architect is to create meaningful places where he helps man to dwell” (Norberg-Schulz, 1979).

With regards to the creation of place, it is not the role of the designer to merely manipulate space and form; rather, it is to create place through a unification of the various components present in the environment that the space designer is attempting to manipulate. A large part of that environment exists in the social realm. Trancik makes mention of the concept of “over-designing”. He explains that just as a space needs to be correctly designed taking all of the design elements into consideration, there is also the risk of over-designing. This phenomenon occurs when there is too much planning and zoning. Over-design denies historical continuity and inhibits future change. The opposite situation is a fear of space design; under-design occurs when there is no cohesion between buildings and their context. This usually occurs when all the design decisions are put into the hands of developers rather than city planners and urban dwellers or residents of that space. Therefore, when considering the decisions which need to be made during city design, finding a balance is of utmost importance.

In his book *Finding Lost Space*, Trancik explains the importance of space designers’ perceptions. Trancik postulates that the most destructive aspect of the modern movement and recent trends in planning has been the self-aggrandisement of designers and a tendency to make simplistic assumptions about human needs. The danger lies in self-perceived desires for a community. This approach lacks humility and overlooks the need for communities, both in the present and the future, to be allowed a measure of flexibility and the ability to alter their own environment.

The creation of place rather than space needs to be achieved to create good city design. Urban designer, planning scholar and author, Kevin Lynch is of the opinion that in order for a city design to be successful, it has to meet with the following requirements:

- **Legibility** - The mental picture of the city held by the users of the streets.
- **Structure and Identity** - The recognisable coherent pattern of urban blocks, buildings and spaces
- **Imageability** - User perception in motion and how people experience the space of the city.

According to Lynch, the elements which make up a city should also be designed around the above-listed requirements (Lynch, 1960). The elements of city design which Lynch refers to are landmarks, edges, districts, paths and nodes. Lynch postulates that every city

can be broken down into these five parts in order to analyse and understand its spatial structure. This information can then be used as the basis for good city design.

Other scholars have attempted to understand and rationalise place theory by taking vastly differing approaches[15]. Although there are some consistencies in their values, these theorists express their approach in a highly varied manner. Such approaches include projects (housing communities, shopping complexes and work places) which take into consideration the history of a site, coupled with the human meaning of place. An informal, organic arrangement of formal structures has also been used; this seems to germinate out of the local vernacular. In contrast to this approach, other designers have made use of classic compositional devices such as symmetry, perspective and other formal architectural and urban planning interventions. What constitutes good city design can be explored through the work of these various scholars; however, for the purposes of this study, the common ground in their work is important, as the study seeks to understand place theory and its role in good place design (Trancik, 1986).

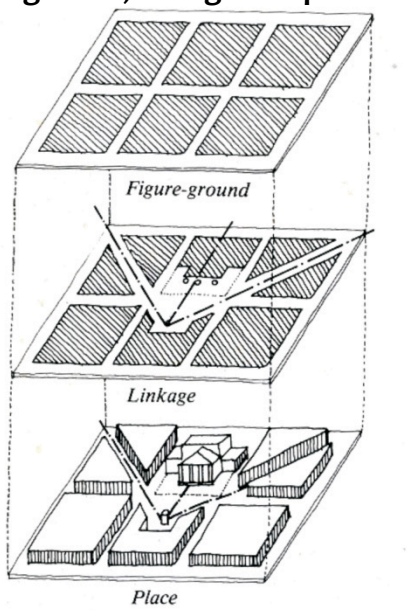
2.4 Summary of the Three Theories of Urban Spatial Design Figure Ground Theory, Linkage Theory and Place Theory

Although the three theories of urban spatial design have been discussed as separate entities, on their own they do not provide an overall solution to any urban design problem (refer to Figure 2.6). The problem in the past has been that urban designers have become fixated on one of these three theories and neglected the other two in their urban design pursuits. This has been shown to be a grave mistake; good planning and city design should encompass all three of the urban design theories. They cannot function in isolation as a city is a living entity which is constantly evolving. For example, if one only used the linkage theory as an urban design solution, the outcome would be a solution that is non-spatial and non-experiential. If place theory were to be applied in isolation, the product

[15] Ralph Erskine represents an attempt to respond to the vernacular organic systems of the classicists by looking at formal devices to connect the new and the existing. The French conceptualists created nostalgic collages to emulate the evolution of the city. Kevin Lynch has studied the mental mapping process of individuals in a city, while Sanford Anderson has studied the ecology of the street. Gordon Cullen explored the experience of sequence through space, whereas Lucien Kroll allowed clients to create their own designs (Trancik, 1986).

would be a solution that would lack important connections, which exist outside the design area and it may also miss out on new spatial opportunities. Finally, if figure ground theory were to be exclusively used as an option for an urban design solution, the outcome might be a product which is purely spatial in nature and unrealistic in terms of implementation and city users' needs. Therefore, an approach is needed which uses the three theories collectively for each design project and a finely tuned balance needs to be reached to achieve the best results.

Figure 2.6: Diagram of the relationship between figure-ground, linkage and place theory



Source - Trancik 1986: 98

2.7 Conclusion

This chapter has explored theoretical frameworks in order to offer some understanding of the thinking behind the theories which will be used to address the case study. The insight gained from the theoretical research will inform the recommendations that will be put forward in the case study chapter. However, it is important to understand that the theories outlined in this chapter are not random theoretical approaches to city design. They are all relevant and will be used to formulate an approach to combat the problem of lost and wasted space. Furthermore, as noted above, all the theories which were researched are interlinked and will be used to create a conclusive argument as to how planners could approach the problem of lost and wasted spaces.

3. Chapter Three - Literature Review

This chapter reviews the literature that was consulted to analyse the issues linked to lost and wasted space. The literature review forms part of the supplementary information which feeds into the theoretical framework. It complements the various theories presented in the theoretical framework and forms the backbone of the argument of why lost and wasted spaces in the city need to be addressed. Furthermore, the literature review will inform the various strategies and suggestions made for the case study (the Durban Esplanade). This chapter therefore provides the foundation for the final chapter of this study. The various, problems, solutions and precedent studies are also introduced in this chapter. The success and failure of various strategies are tested and the lessons learnt will be used to create a framework for the case study area.

It is important to note that Roger Trancik is one of the pioneers in the study of lost space; his work underpins and inspired this research study. His book, Lost Space*, is the key piece of literature which has been instrumental in this research study; most of the ideas and concepts presented here were extracted, derived from or influenced by his work.*

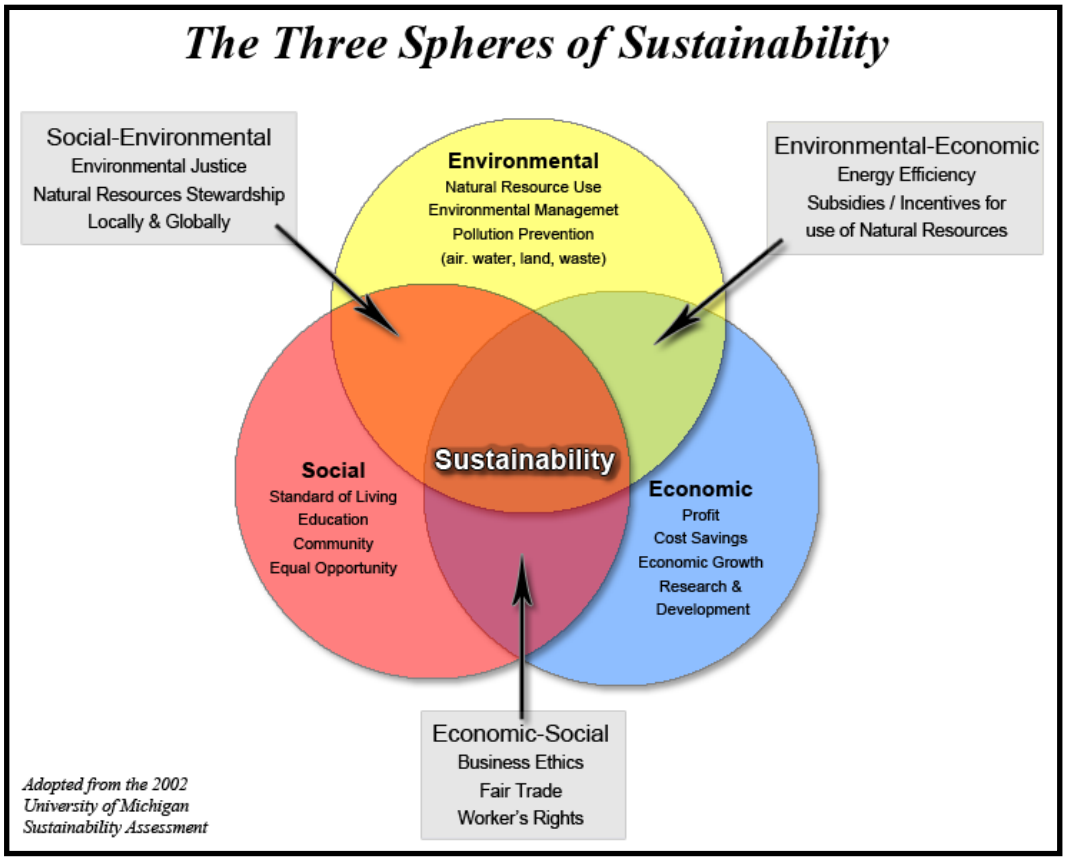
3.1 Sustainability

Sustainability is the buzz word of the 21st century. The concept of sustainability has swept across the globe and every day people are trying to find more sustainable ways of living. However, while many people speak the word, they tend to have a very vague idea as to what it truly means to be sustainable. The concept of sustainability exists in three main spheres (refer to Figure 3.1), namely, environmental, social and economic. These spheres are commonly referred to as the three main pillars of sustainability.

Definition:

- **Environmental Sustainability**: capable of being maintained at a steady level without exhausting natural resources or causing severe ecological damage.
- **Social Sustainability:** The ability of a community to develop processes and structures which not only meet the needs of its current members but also support the ability of future generations to maintain a healthy community.
- **Economic Sustainability**: capable of being sustained, of economic growth, non-inflationary (*New Oxford American Dictionary* 2nd edition).

Figure 3.1



Source: www.generation-europe.eu

The primary reason for understanding lost and wasted space is to create awareness of the current wasteful nature of city design. Wastefulness seems to be a trend in cities around the world in one way or another. Consequently, cities become unsustainable, both in their physical and social form. The physical form is broken down further into two sub categories; firstly it refers to the monetary costs of running the city (services - electricity, sanitation, water) and secondly it refers to the environmental costs, that is, the amount of fertile land that the growing / expanding city occupies, the amount of waste a city generates and the amount of pollution that is emitted or created due to city life. The social factors which cities impact on are; the rate of unemployment, crime, drugs and other social ills which have the tendency to spread through cities. Of the two physical forms listed, the latter (environmental) has become increasingly important. Environmental awareness has been sweeping the globe, mainly due to negative physical changes in the environment, which are affecting the entire world [16]. Human beings have realised that their neglect of nature in their drive for profits [17] has taken its toll on the planet, primarily manifesting itself in climatic change. Global warming, erratic weather patterns, droughts, hurricanes, floods and other natural disasters have all been attributed to human's neglect of the earth's resources (DiCapario, 2007).

The negative impacts that humans have had on the earth's natural cycles have led to one conclusion; humans have to start looking at living in a sustainable way. This move towards sustainability has to start with the environment (UNESCO, 1997). Environmental sustainability has many positive outcomes; clean energy, recycled goods and efficient technologies (vehicles, appliances) to name a few. As humans start to move towards a better way of performing everyday processes, the ultimate outcome will be a better and more sustainable way of life which should help to prolong the earth's ability to sustain life as we know it. "Sustainable development means the sharing and caring for a humanity that has to tend for the planet as well as itself" (Riordan, 1997).

---

[16] When it comes to connecting the dots between climate change, extreme weather and health, the lines are clear. The earth is telling us something with record heat, drought, storms and fire. Scientists are telling us this is what global warming looks like. Carbon pollution is the main reason our planet is getting hotter, increasing the chances of weather disasters, droughts and floods and damaging our health. (Natural Resources Defense Council -www.nrdc.org/globalwarming)

[17] The paradox is that the greater the accumulation of wealth, despite its hugely damaging repercussions, the greater the avarice and the less happy or generous are the accumulators (O'Riordan, 1997)

The burning question is, after witnessing the destruction that the neglect of the natural environment has caused, why is so little effort being made to remedy this situation? The answer is quite straightforward and simple; there is no profit in this undertaking. This is a well known truth among all economic sectors. In his paper “Sustainable development: A Southeast Asian Perspective”, K.B Heang discuss this very concept. He states that “Under the current accounting system, environmental sustainability is meaningless without profit in the financial world which governs the world’s economy” (Heang, 1997).

Heang explains that the concept of development and more specifically the concept of sustainable development are somewhat of an oxymoron. Heang observes that the concept of sustainable development is ultimately flawed due to the fact that sustainability calls for something to be kept in existence, kept up, maintained, withstood or prolonged whereas the concept of development is defined as: to cause to grow gradually in some way, become gradually fuller, larger, better and finally to build and expand. Heang calls this concept “The Terminology Trap”. In contrast, Smith refers to sustainable development as “*development that meets the needs of the current generation without compromising the needs of future generations*” (Smith, 1997). It is clear, therefore that sustainable development is perceived by different people and groups / bodies in different ways. What one person sees as development or developed may not seem the same to others; ultimately, it is our perception of what we think development should be or look like that governs our actions. To take this a step further, Heang cited the example of the Penan people in Borneo. He explains that they are developed for life in the rainforest environment, but when compared with city life, they are considered to be undeveloped, simply because they do not possess the technology of city dwellers.

The literature illustrates that third world countries are less likely to invest as much as developed countries in sustainable technologies and a sustainable approach to manufacturing. This is mainly attributed to the level of financial investment, which is required by the public and private sectors alike. In his paper, “Sustainable development at the village community level”, Toledo indicates that half of the world’s population is agricultural, and of this half, 95 per cent live in third world countries. His examples include people living in the rural areas of Mexico, India and China (Toledo, 1997). The key to addressing this situation is for countries to adopt policies on sustainability. Although there are laws in most countries which control and restrict carbon emissions and promote sustainability, sustainability should be at the forefront of all development strategies.

More countries need to reward companies which move toward sustainable practice and burden (through taxes and restrictions) those companies and organisations which do not follow the path of sustainable development. A simple example can be drawn from the manufacturing sector: a company making use of recycled goods and renewable energy should get a rebate (financial incentive) as a means of encouraging other companies to follow suit.

Despite the fact that South Africa has only recently (within the last ten years or so) become highly environmentally conscious aware, some first world countries have been looking towards building a more sustainable and environmentally friendly world for many years now. This shift towards countries becoming more sustainable was first surfaced in mid 1990's with the Kyoto Protocol[18].

South Africa has begun to embrace the concept of sustainability and sustainable development in all spheres of government. Although still in its early stages, many companies are trying to move towards more environmentally friendly practices. Companies such as electricity provider, ESKOM (although they themselves are not very sustainable due to their coal-powered plants) encourage positive environmental practices. One example is the rebate programme[19] which subsidises solar water heaters thereby encouraging individuals and companies to become more energy conscious as it impacts them financially. ESKOM has had great success through dangling the financial gain carrot

[18] The Kyoto Protocol (first adopted in 1997) is an international agreement linked to the United Nations Framework Convention on Climate Change, which **commits** its Parties by setting internationally binding emission reduction targets.Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

[19] Since 2008, Eskom has subsidised the purchase of registered solar water heaters; 156 000 claims had been received for systems installed as at the end of September 2011. More than 38 000 high pressure and 84 000 low pressure systems have been rolled out nationally resulting in energy savings of approximately 60GWh/annum. Furthermore, South Africa's solar water heating market expanded from a mere 20 suppliers in 1997 to more than 400 suppliers in 2011. This demonstrates the growth and success of this implementation (www.eskom.co.za/content/The%20Solar%20Water%20Heating%20(SWH)%20Programme)

in front of businesses and individuals. South Africa was also fortunate to host COP 17[20] in Durban in 2011 (28 November - 9 December); this promoted environmental awareness[21].

In the built environment, South Africa has taken steps to promote energy conscious and/or energy efficient building design. The South African Bureau of Standards (SABS) which sets standards for all built environment practitioners, including architects and engineers has recently (2011) implemented the SANS 1400-XA[22] which essentially compels building designers to create more energy efficient buildings. Chapter four will focus on the effort to create more efficient buildings. Policies have also been put in place to protect the natural environment. Two such policies, the National Environmental Management Act (NEMA) of 1998 and the provincial Planning and Development Act (PDA) of 2008 are discussed below.

National Environmental Management Act of 1998 (NEMA). The preamble of the NEMA states:

"WHEREAS many inhabitants of South Africa live in an environment that is harmful to their health and well-being: everyone has the right to an environment that is not harmful to his or her health or well-being; the State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities; inequality in the distribution of wealth and resources, and the resultant poverty, are among the important causes as well as the results of environmentally harmful practices; sustainable development requires the integration of social, economic and environmental factors in the planning, implementation

[20] Since the UNFCCC entered into force in 1995, the Conference of the Parties (COP) to the UNFCCC have been meeting annually to assess progress in dealing with climate change. The COP adopts decisions and resolutions, published in COP reports. Successive decisions taken by the COP make up a detailed set of rules for the practical and effective implementation of the Convention (www.cop17-cmp7durban.com/)

[21] Partnering with the United Nations Industrial Development Organization (UNIDO), Global Environment Facility (GEF) has funded the project "Greening the COP17" to demonstrate South Africa's commitment to addressing GHG emissions by promoting clean energy sources and supporting targeted climate change awareness activities by decision-makers and the general public (www.thegef.org/gef/greenline/september-2011/greening-cop17)

[22] Covers the deemed-to-satisfy requirements for compliance with Part XA (Energy Usage in Buildings) of the National Building Regulations https://www.sabs.co.za/webstore/standards/product.php?id=1400025021 Accessed 09/09/2012

and evaluation of decisions to ensure that development serves present and future generations; everyone has the right to have the environment protected, for the benefit of present and future generations. through reasonable legislative and other measures that: prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development: the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must co-operate with, consult and support one another" (Government Gazette, 1999).

The Planning and Development Act 2008. The act states:

"To provide for the adoption, replacement and amendment of schemes, to provide for the subdivision and consolidation of land; to provide for the development of land outside schemes; to provide for the phasing or cancellation of approved layout plans for the subdivision or development of land; to provide for the alteration, suspension and deletion of restrictions relating to land; to establish general principles for the permanent closure of municipal roads or public places; to provide for the adoption and recognition of schemes, to provide for compensation in respect of matters regulated by the Act; to establish the KwaZulu-Natal Planning and Development Appeal Tribunal; to provide for provincial planning and development norms and standards; and to provide for matters connected therewith.

WHEREAS the law must –

(a) promote a uniform planning and development system that treats all citizens of the Province equitably;
(b) provide a fair and equitable standard of planning and development to everyone in the Province, while accommodating diversity such as urban and rural needs;
(c) incorporate and build on good practices and approaches to planning and development which have evolved outside of the formal planning and development system;
(d) promote a planning and development system that redresses the historic injustices perpetuated by a fragmented planning and development system;
(e) favour lawful development;
(f) be clear, including the relationship between different laws;
(g) be practical;

(h) promote certainty;
(i) require timeous action by decision makers;
(j) guide decision makers;
(k) require decision makers to obtain expert advice before making a decision; and
(l) be enforceable" (The KwaZulu-Natal Planning and Development Act, 2008)

These laws have been adopted not only to protect the natural environment but also the constitutional rights of the citizens of the country. While the intention might be to protect the environment, in many cases, human needs for land and resources trump the preservation of the natural environment. More needs to be done to ensure that legislation such as the NEMA and the PDA is applied in a manner which puts the needs of nature at the same level as the needs of human beings.

Although the concept of sustainability has been briefly outlined here, it is not confined to this chapter. The idea of sustainability and sustainable development runs throughout this study as it is a fundamental means of alleviating the problem of lost and wasted space. The concept of sustainability will be repeatedly drawn from in order to create a positive outcome. These ideas will be further built on in chapter four. Examples, using the case study, will focus on creating sustainable building designs, as well as greening buildings and lost spaces. All of these suggestions are made in order to create a sustainable way of life for city dwellers. Sustainable technologies and ideas will be explored, with the outcome hopefully being a self-sustaining city where citizens will be able to care for and feed themselves without depending on imported goods.

3.2 Urban Sprawl and the Ecology of Place

3.2.1 Urban Sprawl

In order to understand the current and future growth patterns of cities and in order to make them more socially, environmentally and economically sustainable, one will have to address the changes required. The first issue is the high cost of the current approach to city design. In most cases, cities are the result of expanding cores which evolve in line with the economic and social environment of that city / country. This approach results in many gaps at all levels of human existence, from economic to social exclusion. The current growth patterns of cities are highly influenced by accessibility, primarily for the automobile. Investment in new infrastructure and the maintenance of existing infrastructure for automobiles is exponential[23]. Dependence on automobiles is a major concern for the future of our cities as roads and parking lots constitute a large percentage of the existing available land. The primary reason for this is "urban sprawl" (Beatley and Manning, 1997).

South Africa is a prime example of a country with sprawling cities. The remnants of apartheid planning plague the city of Durban, eThekwini, with its poorly designed infrastructure and sprawled and fragmented city planning (Maylam, 1995). A starting point in unpacking and analysing the problems is to define the term urban sprawl. "*Urban Sprawl - noun: the uncontrolled spread of urban development into neighboring region*" (*New Oxford American Dictionary* 2nd edition) It is also described as the outward spreading of a city and its suburbs to low density rural land. South Africa has a highly segregated and varied use of land, and the primary design features depend highly on motorised transportation on tarred roads which allow for movement between the city centre and the sprawling outskirts (Dewar and Todeschini, 2004).

[23] Beginning with a groundbreaking 1974 study by the Real Estate Research Corporation entitled " *The Costs of Sprawl*" some 20 years of research yields a constant message: that low-density, sprawling development patterns are very expensive, particularly in terms of the costs of such public infrastructure as roads, water and sewer systems (Beatley, Manning. 1997 :10)

Apartheid planning led to urban sprawl in Durban, eThekwini[24]; in an effort to separate / segregate people, various pockets of residential land use were established on the outskirts of the city (Beatley and Manning, 1997). This led to Durban becoming increasingly dependent on motor vehicles as the primary mode of transport to and from the city. Currently (2012) Durban, and South Africa as a whole has not yet caught up with first world standards of public transportation; this poses many problems for the city in the future. Another problem is that the city was not designed with mixed use in mind. The zoning of the city was based largely on a commercial environment. The city "shuts down" after office hours as most of its daytime inhabitants commute back home to the sprawling residential areas on the outskirts of the city. This is not to say that there is no available accommodation in the city; the demand simply outweighs the availability. A few places close to the CBD, such as Albert Park, Grey Street (Dr Yusuf Dadoo Street) and others along the esplanade, have been used primarily as high rise residential areas; apart from these exceptions, there is very little other residential element in the Durban CBD; although not all of the city's workforce live in outlying areas, there are not sufficient numbers to keep the city "awake" and functioning at night. This is also due to the lack of twenty-four hour public transport.

The citizens of Durban who work as unskilled and manual labour (who earn among the lowest wages in the city) have no alternative but to live in informal settlements within the city limits or close to them. Informal trading and housing is the only means of living for a large number of Durban's residents. While it is the intention of this study to analyse and make suggestions to improve the city, it is also important to acknowledge the fact that the city has evolved in this way due to the mistakes and bad planning decisions of the past. In *Good City Form*, Kevin Lynch refers to a city that evolves in this way as being organic. As the city grows and reshapes itself, even more so since the end of apartheid, it evolves to meet a set of diverse economic and social needs, but for a good city form, there needs to be a balance. Lynch states that a settlement that is too large causes oppression and confusion, while too small a settlement causes insufficiency (Lynch, 1984)

[24] "Causes of Urban Sprawl - Government policy features heavily in this equation. A host of government programmes and subsidies have facilitated and even actively encouraged automobile dependence and population decentralisation" (Beatley and Manning. 1997 : 40)

The urban sprawl which occurs in Durban has many negative impacts on both the city and the environment, due to the increased distance between commercial, social and residential zones (Dewar, 1992). This puts pressure on the environment in the form of air and water pollution as the dependence on motorised transport increases. Motor transport releases large volumes of carbon monoxide and other harmful gasses into the atmosphere, which causes acid rain and damage to the ozone layer. Most vehicles have a lifespan of 10-15 years by which time they are polluting machines as they leak oil, fuel, brake fluid etc, which are washed down into the storm-water systems and end up in the rivers and sea. Sprawled cities also place huge demands on the infrastructure as greater quantities of material are required to service these areas (water, sewer-pipes and electricity cables). There is also a huge demand on the transportation infrastructure; as the population in these areas increases, the number of vehicles in use increases, creating a need for larger roads to accommodate the increased traffic volume. The overall result of urban sprawl is a high per-capita use of energy, land and water, high per person infrastructure costs, lost time and productivity due to commuting time and the destruction of the natural environment (Tilford, 2000).

The study of lost and wasted urban space falls directly in the realm of urban sprawl. One of the possible solutions to this ongoing problem, is to compact the city. The various means and methods by which the city can be made more productive and compact will be investigated and discussed in the case study. Furthermore, possible solutions could help curb the problem of urban sprawl.

3.2.2 The Ecology of Place

Ecology: the branch of biology dealing with the relations and interactions between organisms and their environment, including other organisms.
Also called “Human Ecology” the branch of sociology concerned with the spacing and interdependence of people and institutions (*New Oxford American Dictionary* 2nd edition).
In relation to the above mentioned definition, when we look at the ecology of place, we are examining the relationship that people have within their living environment in all spheres of human life, be it biological, social or economic. Echoing through this research study is the concept of sustainable design and sustainable design measures. The ecology of place looks at the methods that have been put in place to achieve this goal. Beatley and

Manning cite a number of international (primarily American) examples of city communities on the move towards city greening and sustainable design [25](Beatley and Manning, 1997). One of the more familiar approaches is that taken by South Africa through ESKOM, as discussed previously (see footnote 17). We live in an age where technology has become so advanced, that human beings are now able to work at the nano [26] level. Humans are able to manipulate cells and Deoxyribonucleic acid (DNA), which places us at the best possible advantage to understand how nature works. Computers have the power and technology to run simulations where we do not need to physically do anything to determine the outcome. We simply need to input the variables and the computer will give us the outcome of the scenario. Yet with all this technology and power at our fingertips, humans are still failing dismally with regards to ensuring sustainability and preserving/protecting the natural environment. Primarily due to arrogance and the stubborn nature of humans it is still believed by some that their consumerist lifestyle has no major impact on the natural environment. It is also believed that the damage being done to the environment does not have any major consequences. By continuously depending on fossil fuels, polluting the environment and abusing our food sources (ocean and land) we are literally signing our own death warrants.

Global warming is on the increase and the planet is struggling to support the current human population. Simulations run by analysts indicate that all living organisms (including human beings) are at threat due to the damage being done to nature by human beings. Statistics indicate that the average American citizen has a carbon footprint which is far larger than expected; the land required to sustain the lifestyle of the average American is close to 20 times more than the average for someone living a subsistence lifestyle.

---

[25] "The Appliance Energy Programme grants customers a rebate when they choose to purchase high efficiency air conditioners and heat pumps, as well as solar water heaters, with the amount of the rebate depending on the specific appliance and their efficiency rating" (Beatley and Manning. 1997: 90)

[26] Nano- noun: the branch of technology that deals with dimensions and tolerances of less than 100 nanometers, esp. the manipulation of individual atoms and molecules (New Oxford American Dictionary).

In terms of understanding the ecology of place, the following ecological concepts will be discussed:

- Natural cycles and ecological footprints
- Waste and waste control
- Minimising urban resource needs
- The greening of cities and towns
- Ecological infrastructure and natural capital
- Natural hazards and community reliance

Although these concepts have been listed as separate points, they are part of a combined argument; there is overlap and in some cases there may be some repetition of basic ideas.

3.2.2.1 Natural Cycles and Ecological Footprints

Development of any kind; be it housing or commercial all has some sort of ecological footprint. The first step towards mitigating urban sprawl and wasted space would be to work with the land that is already in use. The best way to curb the negative impacts that developments have on nature is to stay away from environmentally sensitive areas such as forests, wetlands and other biologically diverse and rich natural environments. While it is unfortunately not always possible to pursue this method of development, failing to keep development out of sensitive areas should carry some form of mandatory mitigation on the part of the developer or stakeholders. Beatley and Manning (1997) state that planners must concern themselves with the impact of the materials and the design of the resulting structure itself, as well as the source and impacts of the energy used to construct and operate the structure. This point is reinforced in the latter part of this thesis. One of the suggestions is that government should formulate policy which requires that developers offset the environmental footprint of their development by making use of green roofs, solar panels and other green measures to make up for the negative impacts that the development will have on the land and its surroundings. Development needs to take place in harmony with nature and not be hostile to it, in order to thrive and be sustainable. “In the same way, while the operation and management of cities create environmental stresses,

they also hold a significant piece of the solution to environmental and ecological sustainability" (Hawken, 1993).

Furthermore, we need to look at the way we currently view nature. In doing so, developers need to understand that nature is part and parcel of the overall environment. The ecological view (that the city and nature are one entity) of cities needs to be adopted; this view rejects the proclivity to view nature as external or "somewhere else". Nature should not be seen as separate from where people live and work. The notion that nature resides exclusively in national parks and other protected environments should be debunked. If we are able to develop an appreciation for nature, the outcome could be a sense of the ecological significance and aesthetic importance of many different types of land and landscapes. Human settlements need to strive to generate only substances or by-products that will form part of the natural cycle of nature, which can be broken down and form part of "food for nature". Essentially the endpoint should be human settlements which strive to mimic nature and function as ecosystems do (Fersco, 2012).

3.2.2.2 Waste and Waste Control

In order to be sustainable, human beings need to rethink the concept of waste. Following on from the idea of "food for nature" it is clear that we need to firstly reduce the amount of waste that we produce and secondly, we need to endeavour to produce waste that is as far as possible, non toxic to the environment, or better still we should endeavour to create a "zero waste[27]" society. By using recycled materials and creating mostly natural or organic waste that can be broken down naturally through composting and other natural cycles, we will be able to manage our waste better and at the same time, reduce the adverse effects that we have on the environment. Landfills and toxic waste facilities will not be required and consequently, toxic spills and pollution could become a thing of the past if production could be localised.

[27] "Zero Waste is a goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. Zero Waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that may be a threat to planetary, human, animal or plant health" (www.izwa.org.za)

Governments and municipalities need to involve themselves more in educating the public. They could also help by taking it upon themselves to envisage strategies that ensure that "throw away items" such as packaging are only produced from recycled materials. Programmes could be put into place to incentivise reduced household waste[28]. Community recycling programmes could be introduced to bring the importance of waste to people's attention. Better technology and methods of waste management have to be put into place as the first step in the move towards sustainability.

Author of *Cities and Natural Process,* Michael Hough, describes the alternate waste reduction strategies used internationally. These include constructed wetlands (wetland treatment systems), solar aquatic systems and land treatment of waste water. To clean urban waste water, solar aquatic systems, which are an advanced form of wetland systems, make use of a combination of plants and animals combined with sunlight to purify and break down waste materials naturally. This process creates ecosystems where waste becomes food. Land treatment of waste water utilises the natural capabilities of fields and forests to break down the waste as the vegetation makes use of the nutrients found in the waste (compost) . Here, waste water is used for irrigation (Hough, 1995).

Pollution caused by human activities such as commuting, food production and industry is the main cause of the reduced quality of life of all living animals and organisms. If we are able to manage our waste efficiently and reduce the adverse impact that waste has on the environment, then we will be well on our way to a sustainable, low carbon lifestyle.

3.2.2.3 Minimising Urban Resource Needs

As stated by Beatley and Manning, Urban populations create tremendous resource needs - basic needs for energy, food and water. How these resources are provided to urban populations will of course influence the environmental impacts generated (Beatley and Manning, 1997).

[28] Cities like Seattle and San Jose, for example give residents an incentive to reduce their household waste by charging for collection according to the volume generated (Public Technology Inc. 1993)

Once again the issue of efficiency and reduction of the adverse affects on the environment are paramount. A primary starting point could be the reduction of the need for energy (electricity). Solar, wind and naturally available sources of energy would be the best solution to reduce the need for mass produced / distributed energy. Energy efficient technologies and practice will also reduce resource needs. Reducing the need for water and reducing our waste output will also go a long way to help reduce urban resource needs. The ensuing paragraphs provide national and international precedents as well as illustrate how these problems can and have been dealt with in the past.

Energy:

Energy production and consumption (electricity and fuel) is the leading cause of pollution in the world. “Large urban areas with their concentrations of human activities represent both the most frequent sources of air pollution and the area of greatest concern is its detrimental effects” (Crossible, 1976). The problem with air pollution is that it is not confined to the air; it also mixes with water vapour and is introduced to water sources as acid rain[29]. Air pollution has also caused major damage to the ozone layer. Consequently major steps have been and continue to be taken to reduce the amount of air pollution that is generated as a result of human activity. One such step and success story is the curtailment of CFC’s which damage the ozone (Montreal Protocol of 1987). As further possible solutions to this problem, we need to look to naturally occurring means of energy production. The sun for example is a clean, renewable form of energy and we need to take full advantage of this opportunity. Solar panels for water heating and solar photovoltaic cells for electricity are becoming increasingly efficient in harnessing the sun’s energy, yet this technology is not readily available. This is only one example; wind power, wave power, biomass and hydrogen energy technology have existed for many years and yet these technologies have remained mainly in the experimental stage. These should be the starting point to reduce our urban resource needs.

Countries such as South Africa and other second and third world countries need to make the leap from dated means of energy production such as coal and oil to the more efficient

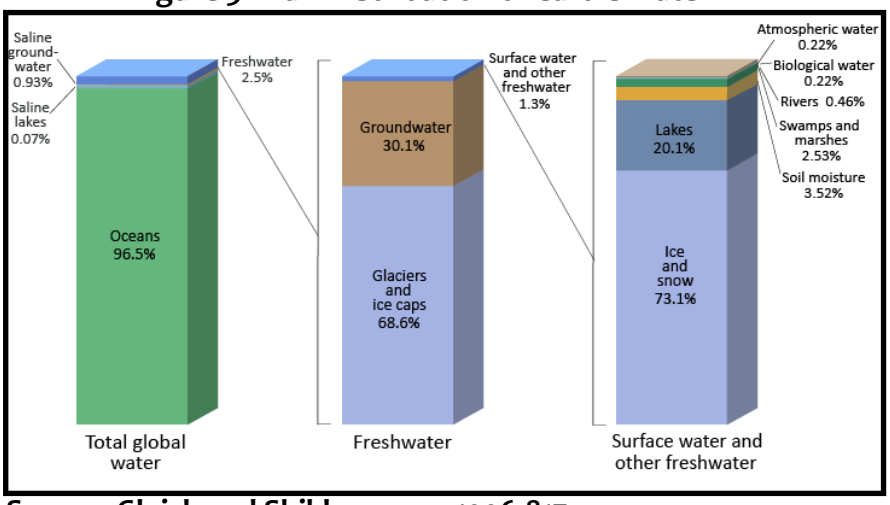
[29] "Acid rain" is a broad term referring to a mixture of wet and dry deposition (deposited material) from the atmosphere containing higher than normal amounts of nitric and sulfuric acids. The precursors, or chemical forerunners, of acid rain formation result from both natural sources, such as volcanoes and decaying vegetation, and man-made sources, primarily emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) resulting from fossil fuel combustion (www.epa.gov/acidrain/)

means of energy production discussed previously. The wheels have already begun to turn, as the incentive programmes previously mentioned are already being put in place. However, if we are to become a truly sustainable society, more needs to be done and at a faster rate. Governments need to get more involved in this process. More efficient public transport, walking and cycling would reduce the cost of living and protect the environment.

Water:

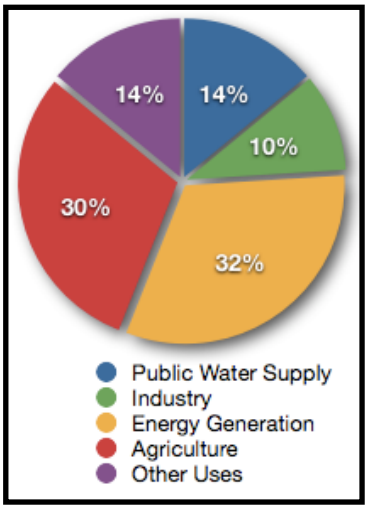
Water is the most abundant and important element on the planet; however usable fresh water makes up only about two per cent of the total volume (refer to Figure 3.2.1a) and of this 2% most of it is used in energy generation and irrigation of crops (refer to Figure 3.2.1b). It has been said that the next world war will not be fought over oil or land, but over water (Solomon and Myers, 2010). In the past, the availability of fresh water was taken for granted; however, this resource is dwindling. With global warming, erratic weather patterns and water pollution on the rise, steps need to be taken to ensure that this life giving resource is not taken for granted anymore. Numerous strategies have been implemented nationally and internationally to reduce water wastage, but more needs to be done as the human population grows. Soon the need (demand) will outweigh the availability (supply) and we will be experiencing massive water shortages. Some of the strategies that have been implemented to address water wastage are discussed below.

Figure 3.2.1a : Distribution of earths water



Source: Gleick and Shiklomanov, 1996:817

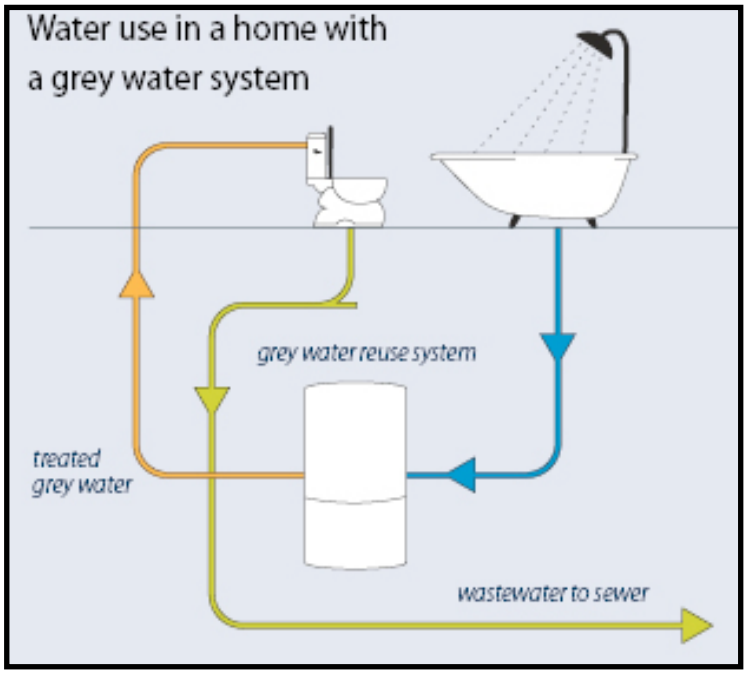
Figure 3.2.1b: Water Consumption by Sector



Source: www.eea.europa.eu

In many parts of South Africa, rain water harvesting has been adopted in the form of roof water collection into tanks, and where possible, water borne sewage has not been used. Locally and internationally, waste recycling has been implemented to address the problem of waste water treatment for reuse and consumption. Municipalities internationally have been running education programmes[30] in schools and though various media to raise awareness of the problem. This strategy needs to be introduced and implemented in South African Municipalities as it is a proven method of combatting the problem of wastage of usable / reusable water. Water restrictions have been implemented in certain areas where the resource has become scarce. Programmes to make use of grey water (refer to Figure 3.2.2) from bathing, washing of dishes and clothes have been made available. Grey water is collected and used to flush toilets and water gardens. This strategy has also been used to create wetland treatment systems, as previously discussed. Other technologies such as water efficient shower heads and taps can also be used to reduce the water usage. These initiatives and programmes will go a long way in minimising urban water resource needs.

Figure 3.2.2 : Grey water reuse

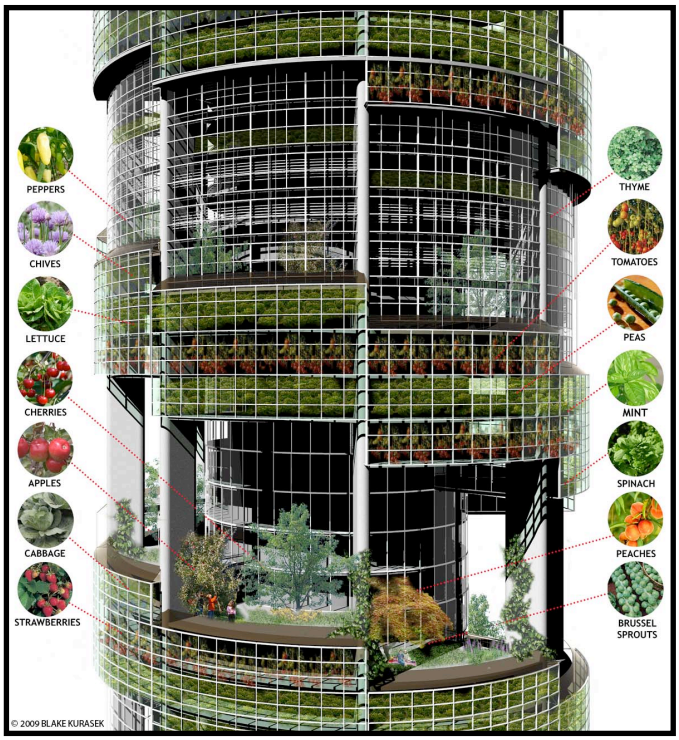


Source: http://guelph.ca/living

[30] Home grey water reuse systems collect grey water from household showers and baths, purify the grey water collected using chlorine, and utilise the treated grey water to flush toilets within the home. Toilet flushing represents about 30 per cent of daily water use in the home. Using reclaimed grey water from showers and baths eliminates the use of potable water for toilet flushing, resulting in significant annual water and wastewater cost savings (City of Guelph Residential Greywater Reuse Rebate Program- http:// guelph.ca/living)

There is also a need to look at food production, as this takes up a vast amount of land and water. Cities need to look at making better use of their lost and wasted spaces and use some of these spaces for food production. Wasted land around roads and railways could easily be used for community gardens. Buildings in the city which have flat roofs can easily be converted for use as rooftop gardens. Hydroponic and vertical gardening methods can be implemented to supplement existing means of food production. Another bold idea is a vertical / high-rise farm. Dr Dickson Despommier, author of the book *The Vertical farm: Feeding the world in the 21st century,* is of the opinion that the only way forward is creating high rise buildings that will be built to farm [31] (refer to Plate 3.1) These "farms" will be located within the cityscape at various points, thus creating an environment that is ecologically balanced. The ideas researched and discussed in this chapter will be used as a starting point for the suggestions made in chapter four. Many of these energy generation techniques and renewable energy typologies for food production and water conservation methods will feature in the case study.

Plate 3.1: Artist impression of a vertical farm



Source: Despommier , 2010:80

[31] By the year 2050, nearly 80 per cent of the earth's population will reside in urban centers. Applying the most conservative estimates to current demographic trends, the human population will increase by about 3 billion people in the interim. An estimated 10^9 hectares of new land (about 20 per cent more land than is represented by the country of Brazil) will be needed to grow enough food to feed them. At present, throughout the world, over 80 per cent of the land that is suitable for raising crops is in use (www.verticalfarm.com)

3.2.2.4 The Greening of Cities and Towns

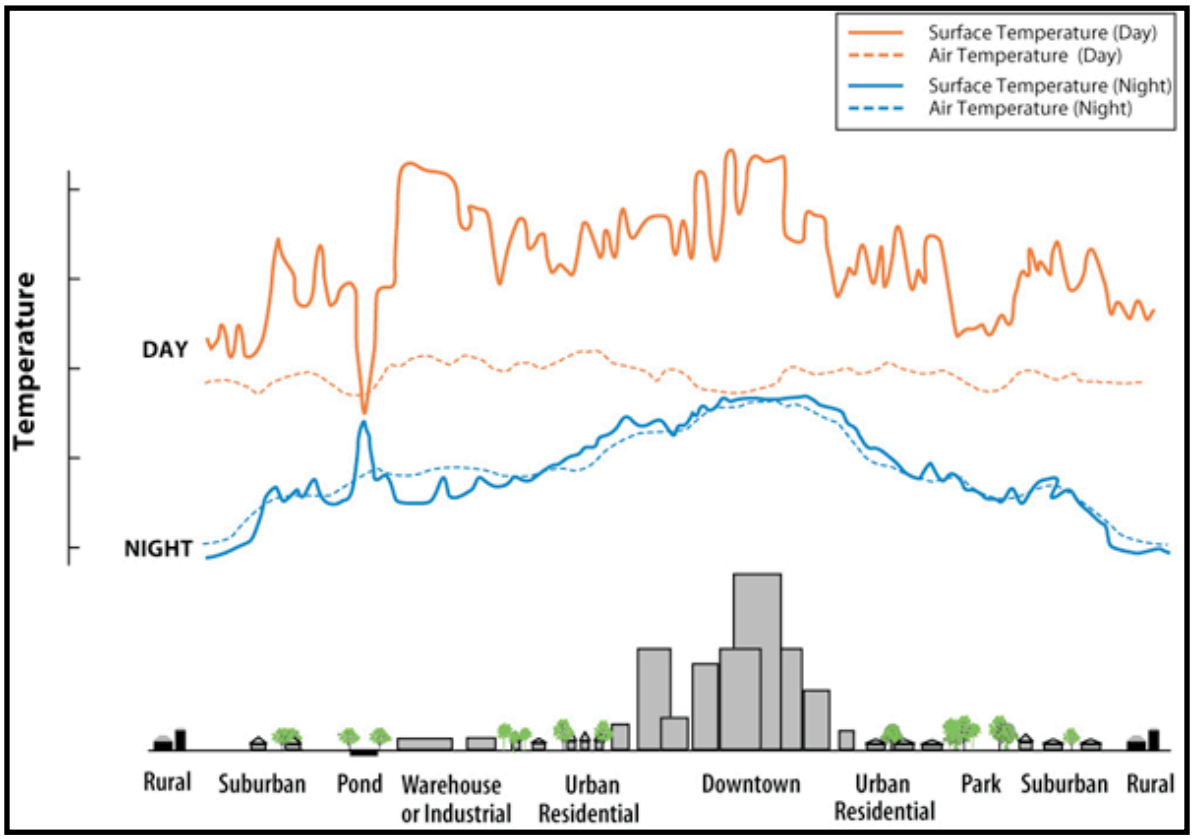
The greening of urban space is not merely for aesthetic appeal, but also offers benefits such as natural air filtration systems and noise and wind reduction. Trees and plants also provide biodiversity as they form a major part of the ecosystems wherever they occur. Going beyond the psychological experiences which vegetation can have on the human psyche, we will briefly discuss the symbolic, emotional and spiritual ties that human beings have to trees. Dwyer, Schroeder, and Gobster argue that humans have very deep ties to trees. They state that trees and vegetation evoke positive physiological reactions in human beings that can have many health benefits (Dwyer *et al,* 1994). These benefits include lowering of blood pressure. They also produce a calming effect which reduces stress levels. “Trees can induce feelings of serenity that can be measured physiologically. The greening of the urban environment then is clearly critical to our physiological and emotional well being, as well as our general health” (Beatley and Manning, 1997). Therefore green areas and parks within cities for recreation are an extremely important component of a healthy urban community. These green spaces connect us to nature. Ideally, urban designers and planners should not merely create green spaces simply for the sake of greening the city, but a more practical use could also be made of these green spaces. In some European cities, parks have been developed as city farms. These provide a multitude of different experiences and opportunities, by including livestock, craft markets and community gardens, to name but a few. City farms also serve an educational function for children and adults alike (Kaplan, 2001).

In a city such as Durban, where the motor vehicle is the primary means of transport, plants and trees play a critical role in decreasing the levels of air (carbon monoxide) and noise pollution. Trees and plants also have a secondary function in urban landscapes, in the sense that they provide shade. The heat island effect[32] that is caused by large expanses of concrete, glass and asphalt can be greatly reduced by adding vegetation. For example, parking lots which have a large number of trees have been found to have lower temperatures than an equivalent sized parking lot with no trees (refer to Figure 3.3).

---

[32] As urban areas develop, changes occur in their landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes cause urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape (United States Environmental Protection Agency- www.epa.gov/heatisld/about/index.htm)

Figure 3.3: Illustrates the temperature variances due to the "Heat Island Effect".



Source: www.epa.gov/heatisld/about/index.htm

To reiterate, trees lower stress levels and produce a calming effect; they will more than likely have this positive effect on people on an extremely hot and humid day. By decreasing the overall temperature of a building's envelope (external and internal), trees help save money in terms of air conditioning costs. The lower the temperature, the lower the demand for the mechanical cooling of the building; therefore, the lower the demand for electricity. This not only saves the stakeholders money, but it also helps them become more environmentally friendly by making use of passive cooling. Passive cooling could work by making use of vegetation to shield walls, windows and roofs. By blocking / filtering sunlight they provide cooling shade, some moisture and channel air movement /breezes. In addition to shading buildings on hotter days, trees and shrubs release water vapour, which makes for a moist and fresh environment around buildings.

In terms of passive cooling, Durban has the added benefit of being a coastal city, which means that the constant sea breeze and cooling effect of the sea should be taken full advantage of. However observations reveal that building designers have made very little attempt to take advantage of this feature of Durban. Buildings along the study area (Durban Esplanade) still rely primarily on mechanical air-conditioning to cool buildings. In

Most coastal cities in South Africa and in particular Durban, tends to have generally warm weather all year round and consequently, cooling buildings tends to be the largest cost factor in terms of building comfort and electricity usage. Passive cooling and using nature to help cool buildings and the city in general will be one of the recommendations that will be made under the case study argument.

3.2.2.5 Ecological Infrastructure and Natural Capital

Ecological infrastructure refers to the naturally occurring features present within an area; these include shorelines, flood plains, riparian areas, wetlands, hillsides and habitats. These elements are also referred to as the ecological wealth of an area. “Natural capital is the land, air, water, living organisms and all formations of the earth's biosphere that provide us with ecosystem goods and services imperative for survival and well-being. Furthermore, it is the basis for all human economic activity” (Voora and Venema, 2008). In order to build environmentally conscious urban spaces, developers and planners need to take account of the ecological infrastructure and work to preserve as much of it as possible and where this is not possible, put plans in place to mitigate the damage.

Government and investors are only now realising that the environmental costs of damaging these natural capitals outweighs the monetary gain that is made when exploiting areas which have a high natural capital value. With the recent increase in global warming and awareness programmes on natural environments, more cities for example Barcelona and London are investing in the mitigation of damaged natural areas, in order to combat the threat of global warming and the degradation of the environment. Some studies [33] indicate that the monetary costs of the mitigation of the damage to natural environments caused by poor management, neglect or development are ultimately much higher than the monetary gain (Brown, 2007).

---

[33] Despite the tremendous economic value of healthy and resilient ecosystems, investment in our ecological infrastructure remains far too low and we are approaching critical thresholds where we may no longer be able to recover our natural capital. Lester Brown (2007) conservatively estimates that investments of around US$100 billion per year are needed to restore Earth’s basic life support systems, a relatively modest sum when compared to the high costs associated with ecosystem degradation and the financial incentives that result in environmentally-damaging activities. Of course, it is cheaper to maintain, conserve and sustainably use biodiversity and ecosystems than to restore them; however, given the present state of ecosystem degradation, restoration is now an imperative. Society for Ecological Restoration. *Investing in our Ecological Infrastructure,* Washington USA (www.ser.org)

Linking back to *the greening of cities and towns*, we are able to see the value of preserving as much of the natural environment as possible. Furthermore, market research indicates that property values adjacent to parks, greenways and hydrological features are considerably higher as they are more desired for their natural beauty (views) and social / recreational activities such as picnicking, jogging and cycling (www.nps.gov).

3.2.2.6 Natural Hazards and Community Reliance

South African cities have not experienced as many natural disasters as countries such as the USA (although it does fall victim to heat waves and occasional flooding); however the concept of natural hazards is still worth mentioning in a discussion of sustainable city design in general. Good city design cannot ignore the importance of respecting the power of nature. In recent years, many cities have fallen victim to natural disasters such as hurricanes, tsunamis and earthquakes. It goes without saying that prevention is better than cure, therefore it is better to avoid development in areas which are prone to natural disasters, rather than to develop these areas and prepare for the inevitable.

This approach has not been very popular. For example, many American cities fall victim to hurricanes, floods and earthquakes every year as they are directly in the path of these natural disasters. Historically, the approach to developing and populating areas which have been flagged as high risk zones has been resisting and arming ourselves against them. Some cities make use of sea walls, jetties and other such structures to help resist the forces of nature. The key to living within high risk areas is to understand the threats and live within their limits. Although most first world countries have early warning systems (technology to predict hurricanes, tornados and tsunamis) in place, these technologies have their limits. They may be employed to save lives; however, in some cases the warnings are simply ignored and in most cases, there is always some sort of damage to property after these events have occurred. A built-up area becomes a hazard when it is placed in the path of danger. There should be development limitations and restrictions to areas which fall within these zones, such as areas which have a steep slope, flood plains or areas in high erosion coastal zones which have the potential for landslides.

South African planning bodies have recognised the benefit of preventing development in high significance areas and in most cases have designated these zones “no build areas”; they are usually marked off in a zoning plan, such as the areas referred to as the Durban Metropolitan Open Space System (DMOSS)[34]. The municipal planning departments in South Africa have realised the importance of these areas and therefore do not allow development in them under normal circumstances. In cases where special permission has been granted, very stringent rules and regulations have to be adhered to. Areas such as wetlands now have special protection as planners have realised their importance as both underground water sources and natural sponges in times of excessively high rainfall. Flood plains also form part of the areas that can no longer be developed and are set aside as public open spaces. Unfortunately, this strategy has not worked very well in South Africa as many of these areas in and around the city have been taken over by informal housing. Due to the lack of housing and apartheid planning many areas set aside for conservation and flagged as high risk areas (flood plains) located on the urban periphery become home to those seeking employment within the city. In terms of community reliance, there is often no strategy in place to help people when they become victims of natural disasters; these communities have to rely on government for help.

The ecology of place deals with all the above mentioned concepts and incorporates a much larger spectrum of ideas than the basic concepts which have been discussed. However this research study is based on the concept of lost and wasted space and the concept of ecology is merely used to build a theoretical basis for this subject. The issues and concepts which have been discussed with regards to “the ecology of space” will serve to outline the problems associated with lost and wasted space. The ecology of space was also used to outline the importance of living in harmony with nature and making conscious and informed decisions when it comes to living and developing urban environments. The lessons learned from research on the ecology of space will feed directly into the recommendations made for the case study area.

---

[34] DMOSS includes areas of high biodiversity value linked together in a viable network of open spaces. Examples of areas included in DMOSS are nature reserves, large rural landscapes in the upper catchment areas and riverine and coastal corridors (www.durban.gov.za Accessed 20/10/2012)

3.3 Ecocities

The Industrial Revolution spawned the first truly unsustainable/modern cities; people abandoned their rural lifestyles and moved into industrialised, tightly packed areas in order to create / earn an income. The cities of today have evolved from the typical organic growth of the industrialised city. Today cities are planned using zones for each aspect of the city. These zones incorporate all uses, from industrialised use to public open spaces. However, this evolution is not sufficiently progressive, as city planners need to implement some basic ecocity design principles in order to make cities sustainable.

The industrial activities which make today's lifestyle possible are adversely affecting the planet. The pollution that industry emits into the air and water sources is causing irreversible damage to the planet. Furthermore, global warming and climate change is a reality and human beings are the main cause of this global problem. Many believe that it is far too late and that the damage has been done. The truth of the matter is that we do not know for sure and we need to try our best to stop the adverse effects that human civilization has had on the planet thus far. It starts with living with and learning from nature. Gardels explains that all creatures on the planet, apart from human beings, make use of only "current sunlight" which is the method that they have used in order to live in harmony with nature[35]. This is the basic concept of sustainability which is ultimately what is referred to as an ecocity (Gardels, 2007).

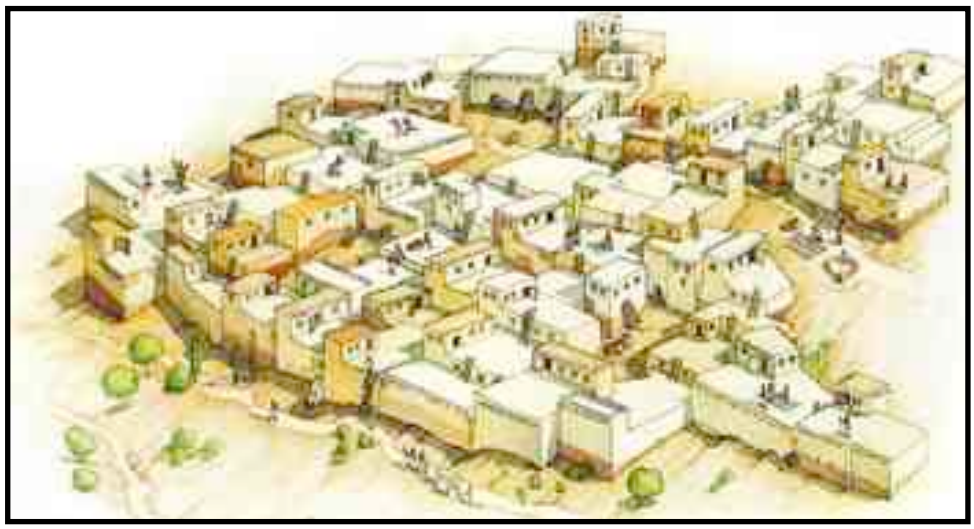
The ecocity makes use of existing structures within the city and through a few basic design principles makes it possible for human beings to start to live in harmony with nature. We will discuss these principles in the latter part of this discussion, but it is first necessary to establish why / where we have gone wrong. Author of *Ecocities, Rebuilding cities in balance with nature,* Richard Register, explains that the cities of today are an extension of our egos. "In recent times, architects have often designed their buildings for the clients egos as well as their own, usually in an attempt to make a unique aesthetic statement while creating solutions for buildings functional problems and clients needs" (Register, 2006: 18). It is this mindset that has created the excessively wasteful and environmentally damaging societies and cities of today. Buildings that have singular uses and that do not

[35] For the vast majority of human history we lived on current sunlight. Sun fell on the fields, the fields grew plants, the plants made cellulose, animals ate the cellulose, we ate the plants, we ate the animals, and we wore clothing made out of the plants and animals. So, the sunlight that fell on the Earth in a year was the maximum amount of energy that we could use (Gardels, 2007)

conform to their context are at the heart of the problems experienced in cities today. In order to become a sustainable city, we have to begin with the way in which we plan and design buildings. Mixed use buildings and compacting the city are key to designing sustainable cities.

The concept of living in balance with nature is not a new one; in fact it existed thousands of years ago. Neolithic villages were able to achieve this balance. Brian Swimme and Thomas Berry state that "the neolithic villages of some eleven thousand years ago represent humanities greatest flowering of creativity" (Swimme and Berry, 1992: 175). Register cites the city / village of Çatal Höyük (refer to Figure 3.4) as a place which was able to live in balance with nature. The villages / cities were created using sun-dried bricks and the streets were made for walking and transport by animal[36]. The ancient cities are on a human scale and the activities / commerce contained within them mainly targeted basic human needs (food, clothes and items of daily human activity).

Figure 3.4: village of Çatal Höyük - Turkey



Source: Baird, 2007:3

[36] After 8000 B.C. Asikli Höyük became a real town surrounded by a city wall with a large obsidian industry. Over the next 2000 years these trends toward urbanisation culminated in the settlements of Çatal Höyük and Can Hasan in Anatolia. While maintaining the Mesolithic practices of hunting, fishing, and gathering they began to systematically cultivate crops of wheat, barley, rye, flax, legumes, peas, and vetch (Faba beans). They domesticated sheep, goats, pigs, and dogs and began the process of domesticating cattle (Bos Taurus) which provided them with a stable and reliable source of food, raw materials, and labour for the fields (Baird 2007)

These examples illustrate that the concept of living in harmony with nature is not only achievable, but has been done in the past. Steps need to be taken to evolve these systems and make them relevant to current times and lifestyles.

The concept of the ecocity ties directly in with the issues of lost and wasted spaces as it cuts across issues of urban sprawl and incompatible space usage and most importantly, the use of the private motor vehicle. No other aspect of current city design is more wasteful than the automobile. Hundreds and in some cases thousands of hectares of useful land within the city are given over to parking lots, garages and multilane roads to accommodate motor vehicles. Register argues that this is the first and biggest mistake that city planners are making; he explains that we should be planning cities for people, not for cars. Streets should be dedicated to and designed for walking and cycling, not the movement of motor vehicles. Buildings should be mixed use in order to reduce the need for transport within the city centre and more time, money, effort and emphasis need to be placed on mass / public transportation rather than the private motor vehicle.

Although we have already discussed the use of fossil fuels and urban sprawl in some detail, they are major contributors to the problems associated with the cities of today and one of the main contributors to certain aspects of lost and wasted spaces. Sprawling cities require movement, movement requires cars and cars require oil and other fossil fuels. The issue of oil will be briefly discussed as it is a major contributor to the economy, and it is the economy that has created the city of today. It goes without saying that countries with control of oil reserves have booming economies and this is because almost every aspect of human life is dependent on oil. We depend on it for transportation and machinery which works on the farms to feed our population; we also depend on oil to power (electricity) the factories which produce our everyday items, from food and clothing, to items of recreation and entertainment. For our cities to become truly sustainable, we therefore need to confront our fossil fuel addiction as well as our consumerist culture.

True ecocities have to be cities that do not depend on fossil fuels. They need to become smart cities; cities that produce their own food locally, in the area in which it is consumed and not hundreds or thousands of kilometres away, only to be transported to the city in vehicles using fossil fuels. Alternative energies need to be implemented in buildings and in transportation (refer to Figure 3.5). City designers and planners will have to make better

use of lost and wasted spaces in order to ensure as little waste of resources (land) as possible.

Figure 3.5 - Artistic impression of New Orleans by R Register

Source: Register, 2006: 102

" Imagine an entity shedding its drab fossil fuel suit, reappearing energized by the sun, clad in solar panels and rooftop gardens. It might look like this " (Register, 2006)

Growing food locally, within the city limits is integral to lowering the carbon footprint of items of necessity, such as fruit and vegetables. This is required in order to become more sustainable. One way is for city dwellers to grow their own food; however, this is a false reality as many city dwellers do not have the time or in some cases the space in which to grow food for themselves. Therefore, we need to look at more feasible ways of achieving this goal. Furthermore, we also have to consider the fact that we cannot start from scratch in terms of designing the city. Hence, we will have to make use of the buildings, infrastructure and space that are already available to us. How we make use of these existing elements will determine the success or failure of the sustainability of the city. Technology and technological advances have to be constantly pushed to ensure that we have the most efficient systems in place.

These aspects, concepts and ideas will be briefly mentioned here and will be discussed in greater detail with the use of illustrations in the study's recommendations.

- In ecocities, buildings will have solar voltaic panels retrofitted to them so that the buildings' facades can be used to generate electricity.
- In ecocities, buildings will have roof gardens and roof top greenhouses which will be used to grow food.
- Buildings will have rain water collection facilities in order to collect free fresh water to be used for irrigation purposes or filtered and used for consumption.
- Grey water (water used for bathing and washing of clothes) will be collected, cleaned and used for flushing toilets and cleaning.
- Buildings will make use of vertical gardens in order to provide seasonal passive cooling.
- In ecocities, buildings will become mixed use, for example, retail on the ground and first floors, offices on the second and third floors and residential from floor four upwards.
- In new buildings, some floors will be dedicated to city farming, with building facades serving a multitude of functions, including capturing solar and wind energy to be used to power the building.
- Cities will have dedicated buildings (vertical farms) to grow fruit, vegetables and livestock. These will be strategically located in order to maximise their feeding capacity in the city.
- In ecocities, streets built for cars will become a thing of the past. Newer eco-friendly public transport systems will be put in place. Walking and cycling will be promoted and with the use of densified mixed use buildings, the pressure on public transport will be greatly reduced as the environment created will be one in which people can live, work and play.
- To become sustainable, ecocities will have a lot more greenery and green spaces, islands on roads and sidewalks will be used to plant trees.
- Ecocities will have smart streets which will generate electricity from the kinetic energy that people put out by walking on them.

The points listed above were extrapolated making use of the "Ecopolis development principles" listed by Register (Register, 2006:18). All of the above mentioned points are achievable and use technologies that are currently available; all that is required is

commitment from government and a mind shift among urban dwellers. The commitment needs to be twofold; it firstly needs to be financial, which means that major commitment needs to be made by government to retrofit buildings with the technologies discussed above and secondly, there also needs to be commitment from government to pass legislation which makes ecocity principles part of the law. For example, if a new building is being constructed and the footprint is 2 500m², then owners need to provide a green space that is equal to that footprint anywhere (roof or balconies) on that building.

To fit the current context of South Africa and in particular Durban, government needs to discourage the sprawl that is occurring in KwaZulu-Natal at the moment. Too many people who work within the city waste time and money commuting to and from work daily simply because they do not live within the city. Consideration should also be given to use of fossil fuels and pollution. Provision needs to be made to densify the city and make an environmentally friendly, economical and more efficient means of transportation available to the public, in order to discourage the use of private motor vehicles. In fact, policies could be put into place to ban personal vehicles from entering the city centre altogether, as long as it this is done in conjunction with providing park and ride facilities. Well informed strategies could transform the city of Durban into an ecocity. The primary reason for the emphasis on ecocities and their design principles is due to the fact that the lost and wasted spaces located within cities hold the key to converting the wasteful cities of today into the sustainable ecocities of tomorrow.

3.4 Urban Agriculture and Food Security in the City

Urban agriculture can be defined as the various farming procedures that take place in the urban and peri-urban areas. as stated by Mougoet “The lead feature of urban agriculture which distinguishes it from rural agriculture is its integration into the urban economic and ecological systems” (Mougeot, 2008: 9).

We have already briefly discussed urban farming under the previous heading; however, this concept needs to be further explored as it is the key to solving the problems experienced by cities today. It is also a way to combat lost and wasted spaces in the city, as urban agriculture is a perfect fit for neglected and wasted space. The key to

sustainability is recycling and turning waste into food; what better way to do this than to start with the wasted spaces within our city?

Durban has many green spaces and public parks, most of which are never used due to the negative activities occurring within them (proven by observations and interviews, see appendix A (questionnaire) and tables 4.1 and 4.2). Crimes such as drug and alcohol abuse, drug sales, or vagrants and homeless people monopolising these areas are common. Albert Park (see study area map) which is located within the study area is one such place. This large green open space is hardly ever used for its intended purpose, simply because people living in the area are too afraid to use this space for recreation. While conducting interviews in the area, one interviewee revealed that there has been more than one occasion when passersby have become victims of violent crimes (robbed, stabbed, etc) in this park. Places such as these have the potential to provide food security for the city. In the case study we will go into greater detail on how to achieve this. Albert Park will feature as an example of a lost space that has the potential to be used in urban agriculture.

World population distribution statistics for 2006 indicated that, more than 50 per cent of the world's population lives within cities (Renwood, 2010). Redwood explains that this migration has two scenarios; on the one hand the city is seen as an engine for growth and it has been able to help many people move out of the poverty they found themselves in. However, this has also led to cities being unable to govern the sudden population growth. This leads to a lack of basic services for the poor, failing infrastructure and areas that become highly polluted landscapes and slums. To compound this problem even further, is the issue of feeding these people or them trying to feed themselves. With the price of food directly linked to the price of oil, the escalation in food prices means that the poor are becoming less able to feed themselves[37]. It is obvious that something needs to be done and soon. One way of solving the problem is urban agriculture. Reducing or even cutting out the costs of transportation will help to greatly reduce the price of food. Furthermore, with all the poor and unemployed in the city, it could also serve as an opportunity for the

[37] The urban poor are highly susceptible to food market instability, largely due to three factors. First, most of the urban poor (and the poor in general) spend a large portion of their household income on food. The Asian Development Bank estimates that 60 per cent of the income of the poor in Asia is spent on food. Therefore it is clear that a small change in price - let alone the doubling of the price of basic foods such as rice and grains as was seen in 2008 - can lead to a significant increase in hunger (Redwood, 2010)

government to create jobs. Although most urban agriculture currently occurs at the city's edge on flat pieces of land, this research study provides examples on how this production capacity can be multiplied, through vertical farming.

With regard to sustainable cities, Pearson indicates that most studies indicate that greening cities could help reduce the levels of carbon dioxide and other harmful gasses, while providing other positive outcomes from having green spaces. This literature hardly ever picks up on the fact that green spaces could also be used as spaces to grow food. Pearson is of the opinion that the problem lies in planning. She states that "the disconnection between urban agriculture and city ecology may be attributed equally to the focus of planners on the built environment, and the narrow focus of research into urban ecology" (Pearson, 2010). Planners need to expand their view and look at new and innovative ways of planning. Conventional city planning is not only unsustainable; it is actually encouraging many of the socio-economic problems previously discussed. More research and sustainability projects need to be brought into the realm of planning. Furthermore, planners need to expand their minds and realise that, as the concept of the city is evolving, so too should the concepts of planning and space design.

The concept of green or public open spaces needs to be reconsidered. These spaces can still be use for recreation, but they need not only have a single use. For example, parks could have fruit trees instead of other trees that only provide shade, the shrubs in the patches could be vegetables and the parks could serve not only as a place of recreation, but as places of education and food security. The potato is a good example of a plant that could be used for aesthetic reasons and for food production. The potato plant comes in a variety of forms and there are almost 4 000 varieties. Most have lush green leaves and beautiful flowers (refer to Plate 3.2 and 3.3). In some cases, up to 75 per cent of the entire plant can be used for human consumption[38].

[38] Tubers are one of the temperate staples that are eaten boiled, baked, fried, stewed, etc. Surplus potatoes are used for fodder and alcohol and chemurgic applications. The flour can be used for baking. Potato starch is used to determine the diastatic value of starch. Boiled with weak sulphuric acid, potato starch is changed into glucose, fermented into alcohol. (www.hort.purdue.edu/newcrop/duke_energy/Solanum_tuberosum.html)

Plate 3.2: Sweet potato planted in recreational Park. Wichita falls park - Texas

Source: www.wichitafallstx.gov/index.aspx?NID=617

Plate 3.3 : Flowers of the common potato "Solanum Tuberosum"

Source: www.agroatlas.ru/

Leeuwen refers to this kind of space planning as "the multifunctional use of urban greenspace". Leeuwen, Nijkamp and Vaz argue that cities' green spaces are a resource that is being wasted; a wasted resource is a wasted space (van Leeuwen *et al,* 2010). They add that these spaces could be used as areas of production of food, wood, fruit, compost and electricity. They also indicate that converting these green spaces into areas /

centres for production as well as beauty[39] (refer to Plate 3.4) will result in an increase in the value of real estate. Urban green spaces have always been considered spaces of value; however, their use and value have evolved over the years. Table 1 illustrates the evolution of the urban green space.

Table 3.1: Evolution of the urban green space

Time Period	Use of Green Space
600 BC	Private power and social status
1300 AD	Innovative agriculture
1700 AD	Collective gardens for knowledge
1900 AD	Food production
2000 AD	Leisure and recreation
2010 AD	Health and ecology

E. van Leeuwen *et al.* 2010. *Multifunction use of green space*.

Plate 3.4: Beautiful garden scape of vegetables and flowers.

Source: www.ledlighting2011.typepad.com

[39] The Potager style, also known as French kitchen garden is one where vegetables are grown alongside flowers and herbs to form a unique layout. Various design patterns in this style give a beautiful look to the garden (www.ledlighting2011.typepad.com/blog)

In an expanding city such as Durban, converting green spaces into areas of food production is not the only option. A large area of usable, fertile quality space / land is lost to roads and railways; however, the verges or the areas running along these spaces serve as buffers for the safety of citizens. By making better use of these wasted spaces for example, through planting food crops, these lost spaces can be “found”. In Durban alone, there are many wasted spaces on national roads leading in and out of the city. These roads require maintenance and private companies are contracted by the municipality to come in every few months to cut and clear away the weeds which grow along these areas. This valuable land could easily be converted into urban farming. van Leeuwen *et al* states that in developed countries, this land is given over or rented to communities to grow flowers and vegetables. The paper “*Multifunctional use of urban green space”,* cites the Netherlands as an example of such urban gardening (van Leeuwen *et al,* 2010). Further stated by van Leeuwen *et al* “This country has around 250 000 community and allotment gardens, which account for 4000ha of land” (van Leeuwen *et al,* 2010). Surely Durban could follow suit and turn its lost spaces into spaces of production? It should also be noted, that great care must be taken when making use of the land along road infrastructure as carbon monoxide from vehicles could pose health risks. If this space were to be farmed it will have to be done after or before peak traffic phases.

Expanding on urban agriculture and lost spaces a step further, one could look at rooftop gardening. Growing fruit and vegetables on rooftops is a growing trend in cities. With the current focus on climate change and the degradation of the natural environment, more and more cities around the world are looking at using the flat rooftops of multistory buildings as areas for food production. In South Africa, a pioneering company “Green Roof Designs” is promoting this idea. Leading company member Clive Greenstone has already set the wheels in motion. He approached the eThekwini Municipality and convinced them to fund a pilot project, where the flat roof of a municipal building was used to construct a green space for the city (Green Roof Pilot Project: GRPP - Greenstone, 2004).

The GRPP (refer to Plate 3.5) is just one example of how rooftop gardening could work in Durban. Green Roof Designs has used public and private buildings for various rooftop gardens to show that this form of urban gardening can be a viable and environmentally friendly way of offsetting the carbon footprint of a building. Durban has a warm tropical climate and Greenstone has proven through his various ongoing projects that there is absolutely no valid argument against the use of rooftop gardens in the city.

Plate 3.5: The eThekwini Municipality Green Roof Pilot Project

Source: www.greenroofdesigns.co.za

The spectrum of activities based on urban agriculture is only limited to our imagination and the impetus for urban agriculture is up to the citizens of the city. One need not limit oneself to traditional ways of gardening. In a multistory building, multistory gardening is an option. Using the facades of buildings for vertical planting, skyscraper farms, suspended gardens and even walkway rooftops used as trellises for fruit such as grapes are examples.

The next step is to get government involved, as they need to be informed about the opportunity to grow fresh produce in the city and the potential that this activity has for creating jobs, saving money, improving the natural environment and helping feed the city's growing population. Policies need to be introduced which recognise lost spaces such as flat roofs and freeway verges (with safety in mind) as potential high yield areas for the growing of food. Municipalities also need to recognise that simply using green spaces to beautify city environments is not sufficiently sustainable. In doing so, they are missing an opportunity to increase their own ability to improve the overall quality of life, by decreasing the cost of food and helping people feed themselves. Ultimately the future of contemporary cities resides in the use of urban green areas and urban agriculture in order to create sustainable cities.

3.5 Urban Design and Environmental Quality

Urban design incorporates not only the physical buildings, but the surrounding landscape. It is a built environment discipline that lies between architecture and urban planning and has also been referred to as the place making approach. Consequently, urban design is directly linked to environmental quality. It involves all the elements discussed previously, namely the compact city debate, the creation of commercial centres, mixed-use developments, building to human-scale and context-conscious design. It also has elements of image-making but most importantly, it deals directly with the public realm.

Watson is of the opinion that urban design has its roots in architecture and planning, as it draws from these disciplines and incorporates and develops resources and skills that are required to bring these entities together. “Urban design is about making connections between people and places, movement and urban form, nature and the built fabric. Urban design draws together the many strands of place-making, environmental stewardship, social equity and economic viability into the creation of places with distinct beauty and identity” (Watson, 2003).

Urban design is also known as the art of creating and shaping cities and towns; with this in mind, the urban designer is at the forefront of the built environment with regard to issues of lost and wasted urban space. Creating positive space and good environmental quality begins with taking all the variables into account. As stated previously, designing and building cities for the automobile has to come to an end and it is this discipline that will inevitably be tasked with making the appropriate design interventions that will help create the sustainable cities of tomorrow. Urban design already considers the basic elements of sustainability and sustainable urban space usage, such as mixed use buildings and greening of the city; however these practitioners need to incorporate other concepts. Urban agriculture and ecocity design now need to be a key feature in the designing of cities, as cities are growing at a much faster rate than before. Ensuring food security and being able to feed and house the increasing population is an enormous responsibility. Therefore, the human population cannot simply go on living and consuming at the current rate. Pollution, climate change and global warming are putting life on earth at risk. One way to counteract this threat is responsible urban city design. Rooftop gardens and other urban agriculture and key ecocity elements should become a standard feature of all

buildings. Applying these sustainable features and concepts to the built environment will aid the earth in coping with the growing demand from the ever increasing human population. According to the Hannover principles[40] , The challenge for humanity is to develop human design processes which enable us to remain in the natural context (McDonough, 1992) .

[40] The Hannover Principles should be seen as a living document committed to the transformation and growth in the understanding of our interdependence with nature, so that they may adapt as our knowledge of the world evolves. The Hannover Principles: 1. Insist on rights of humanity and nature to co-exist in a healthy, supportive, diverse and sustainable condition. 2. Recognize interdependence. 3. Respect relationships between spirit and matter. 4. Accept responsibility for the consequences of design decisions 5. Create safe objects of long-term value. 6. Eliminate the concept of waste. 7. Rely on natural energy flows. 8. Understand the limitations of design. 9. Seek constant improvement by the sharing of knowledge (McDonough, 1992).

3.6 Urbanisation - Housing in the City

Ranking at the top of the list of commodities which the world is running out of is land for housing, and in the city this truth is a harsh reality. The real estate prices of housing in most cities are of the highest value, simply due to its proximity to the central business district (CBD); as research[41] indicates, only two years ago (2010), just under half the world's population lived in cities and this number is climbing steadily every year. This suggests that cities are going to require a lot more housing than is currently available. The city of Durban does not have twenty-four hour trading. Most business currently trade from 9h00 to 17h00. After that, business shut down and most people commute back to the suburbs; therefore entire buildings are shut down over night. This is due to the sprawled nature of the city and the legacy of apartheid.

Housing has become of great concern in the city and plans need to be put into place to house the influx of people which is occurring. This is where lost and wasted spaces located within the city will become invaluable. Parking lots, single use buildings and neglected green spaces in the city can be used to help solve this housing problem. The city of Durban currently has a number of informal settlements and these areas are growing rapidly as more and more people flock to the city in search of employment and better services. This influx is putting a great deal of pressure on existing services as they were not built to cope with the current and ever growing number of people. A more suitable way to deal with the housing shortage is making use of lost and wasted spaces located in the city. This can easily be carried out in creative and inventive ways.

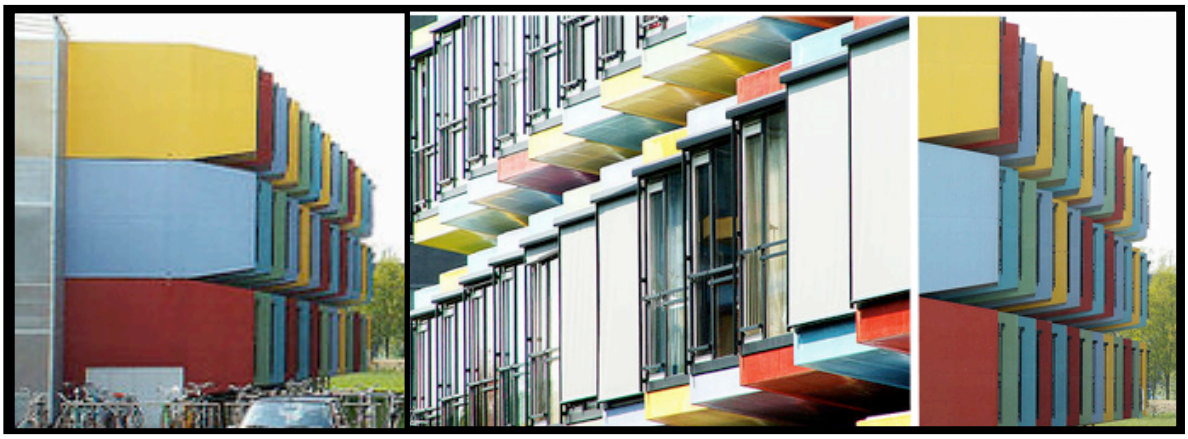
One idea which has been around for many years is the creation of housing through the use of shipping containers. The innovative aspect of these designs lies in its simplicity. Shipping containers allow for flexibility (design layouts) while also providing the added benefits of permanency (they can be fixed to the ground) and mobility (stacked on trucks and moved). Designs also provide the minimum requirements for human comfort, with

---

[41] One hundred years ago, two out of every 10 people lived in an urban area. By 1990, less than 40 per cent of the global population lived in a city, but as of 2010, more than half of all people live in an urban area. By 2030, six out of every 10 people will live in a city, and by 2050, this proportion will increase to seven out of 10 people. Currently, around half of all urban dwellers live in cities with between 100 000 and 500 000 people, and fewer than 10 per cent of urban dwellers live in megacities - World Health Organization (www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/index.html)

regard to living conditions and these units can be stacked. Another key feature of this type of housing is that it is recyclable, as the containers are made of steel (refer to Plate 3.6). A parking lot that is used during the day for private cars can be used for housing. This is a good example of how lost or wasted space can be put to better use. No foundations and building materials need to be moved to the site. The single story parking lot is more than likely already paved or concreted; all that needs to be done is some reinforcing of the ground to cope with the weight of the shipping containers and the installation of bulk services such as water, sewerage and electricity.

Plate 3.6: Shipping container homes



Source : www.webecoist.momtastic.com

Argued by the designers is that the simple, geometric shape of shipping containers makes them perfect for housing, whether creating a small recycled dwelling out of just one container or stacking multiple containers for a larger home or complex of small living spaces. The Ecopod is a great example of just how easy transforming a shipping container into a compact, modern, energy-efficient home can be. It is easy to set up and relocate, has a small footprint and is surprisingly light and airy, with an entire wall made up of sliding glass doors. The Ecopod is perfect for adding an extra bedroom to your home, or for use as an office or art studio (www.webecoist.momtastic.com/2009/04/05/15-awesome-ways-to-reuse-shipping-containers/). It also needs to be noted that South Africa already makes use of shipping containers for a variety of purposes such as offices and classrooms. Among the key concern of users is that of insulation of the shipping containers from the elements (heat and cold). For shipping containers to be turned into dwelling units, the issue of proper insulation must be addressed.

Although shipping containers are a feasible idea, one needs to bear in mind that these are modular homes (refer to Plate 3.7.1, 3.7.2 and 3.7.3) which can be built off site in a factory and simply “plugged in” to the neighbourhood once purchased as a possible future scenario. As Durban being a coastal city, land is not even required to achieve this type of mass or modular housing. Inventors have been able to design concrete slabs which float, making even the ocean a viable option to address the housing shortage (Haug, 1996).

Plate 3.7.1 Tower of module homes

Source: www.inhabitat.com

Plate 3.7.2 Single living module.

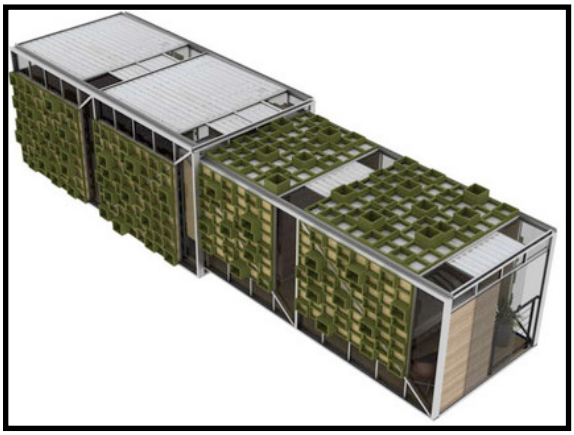
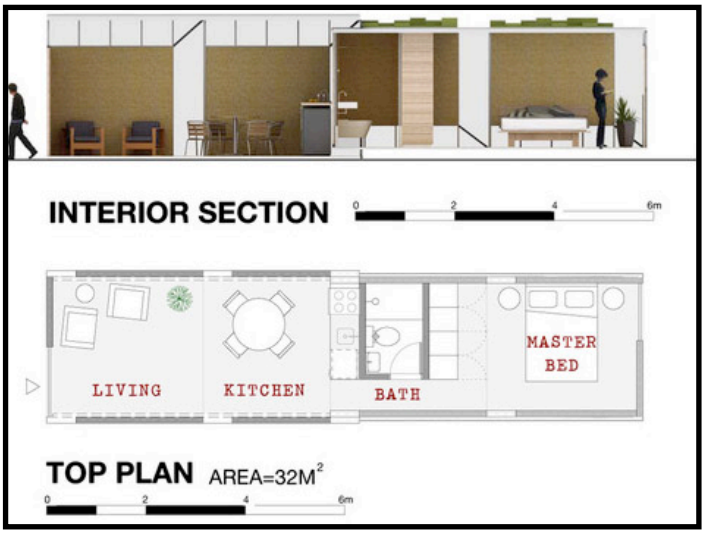


Image source: www.inhabitat.com

Plate 3.7.3 Plan of single living module.



Based on images and arguments above, the question arises; In today's wireless world, why are our apartments still tied to a location? In this dynamic building concept, Felipe Campolina combines eco-friendliness with the mobility of a trailer – all within the confines of an urban environment. It is said that home is where you make it and that couldn't be more true than with these green roofed, transportable, stackable dwellings" (Valen, 2012).

The ideas on modular housing presented above, and the use of lost and wasted spaces are just two of many solutions that inventors, designers and architects are putting forward to cope with what is sure to be the major problem of the cities of tomorrow. Leonard suggests that the increasingly high cost of living and the unaffordable nature of housing will increase the level of poverty that most countries are currently experiencing. This will lead to an increase in the level of homelessness (Leonard, 1989). Although relatively dated, this argument still has merit in this context. He suggests that change needs to start at the policy level as government needs to apply its resources to remedy the problem before it is overwhelmed by the need for basic housing.

The purpose of this research study is not to labour the issue of housing and housing shortages, but merely to bring attention to the housing problem that the country is currently experiencing, and illustrate how lost and wasted spaces in the city could be part of the solution. In the south African context, it needs to be noted that there is significant tension between the need and provision of green open spaces and that of the demand for housing. This tension is an ongoing challenge in the planning process. Housing is a critical issue; with strategic planning, government can start to take a step in the right direction in terms of dealing with the problem. The following chapter (Chapter 4) includes further examples and suggestions on how to deal with housing shortages through the use of lost and wasted space.

Chapter 4 - Chapter Four - Empirical Analysis of the Adaptive Reuse of Lost and Wasted Spaces in the City of Durban

4.1 A Brief history of South Africa and the Durban Esplanade

The case study areas are the Durban Esplanade and Point Road (refer to Map 1). The Durban Esplanade's geographical location is 29°51'45.68"S and 31° 1'10.36"E in South Africa. It is located adjacent to the port and forms part of the central business district of the city. The Durban Esplanade, also known as Victoria Embankment, was originally built in 1897. Natal was discovered by Vasco Da Gama in 1497; Today, the province is known as KwaZulu-Natal; it is made up of the previous KwaZulu homeland and the province of Natal. Victoria Embankment has also been renamed and is now known as Margaret Mncadi Avenue.

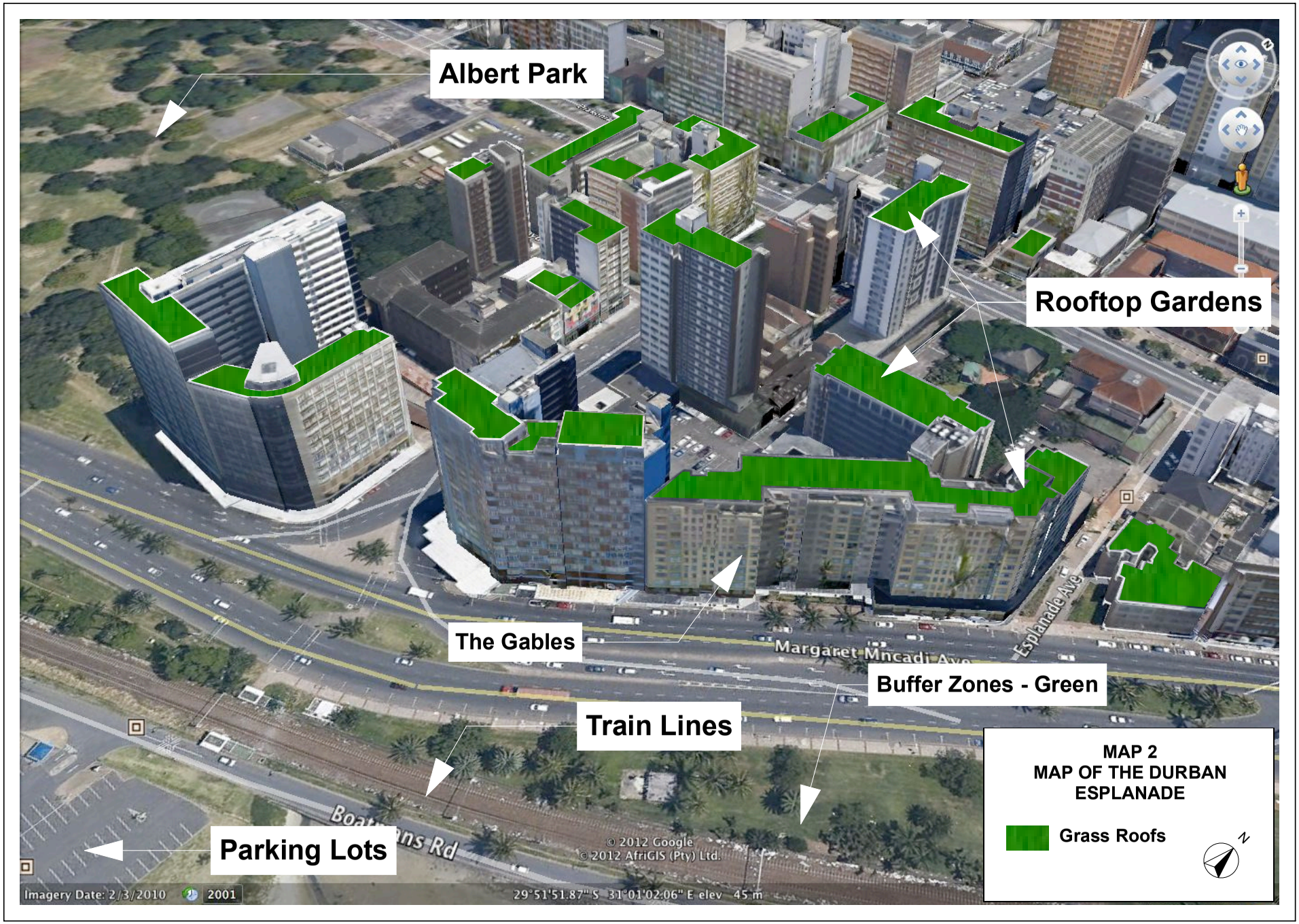
Durban has many Victorian-style buildings which were built in the late 1800s of which may still stand today. The area also has many historic memorials which are dedicated to the people who have made the city what it is today. The Vasco Da Gama clock and the statue of Dick King, who saved Durban during its siege in 1842 with his epic ride to Grahamstown, stand on the Durban Esplanade. Victorian buildings give the Esplanade a distinct character of old mixed with new. The city of Durban also has one of the largest ports in Africa, with thousands of tonnes of goods leaving and entering the city's docks on a daily basis[41].

One of the main reasons for the choice of the study site is the mixture of the building typologies and variation in sizes and architectural styles (refer to Map 2). The site will allow for recommendations to be made to alleviate the lost space that can be used in any location around the city. Furthermore, the main road that runs along the Esplanade serves as an arterial road to the CBD and the port. Besides Albert Park, the site also has a number of existing green spaces which have historically been created as a buffer between the port and the city. Running parallel to the tarred road on the Durban Esplanade is a train line and green areas exist to keep people away from the line (refer to Map 2). Ironically, this area, with its manicured lawns and variety of flora, has attracted people living in the area to use the space for recreation. Built in the 1930s, the train line is used to move cargo from the port to the various storage and manufacturing areas located to the east of the Victoria Embankment.

[41] (www.travelground.com)

MAP 1 - LOCALITY
CASE STUDY AREAS
AND SOUTH DURBAN BASIN

Original Source: www.docstoc.com/docs/73187827/Map-of-south-durban-basin


Albert Park
Rooftop Gardens
The Gables
Buffer Zones - Green
Train Lines
Parking Lots
Margaret Mncadi Ave
Esplanade Ave
Rd
© 2012 Google
© 2012 AfriGIS (Pty) Ltd.
Imagery Date: 2/3/2010
2001
29°51'51.87" S 31°01'02.06" E elev 45 m
MAP 2
MAP OF THE DURBAN ESPLANADE
Grass Roofs
N

The area to the South of the Durban Esplanade (refer to Map 1) is referred to as the South Durban Basin[42] and is a mixture of businesses and residences. This area has a history of social and environmental injustice and human rights violations due to the high volumes of air and water pollution caused by the refineries and manufacturing industry located here. The system of apartheid was implemented in the late 1940s when the Afrikaner National Party came to power. Apartheid left a legacy of urban sprawl, the negative impacts of which the city of Durban and all South African cities are still experiencing.

Although apartheid officially ended in 1990, 1994 is generally recognised as the year that apartheid was truly abolished as this was the year of the first democratic election. Cities in South Africa have been evolving ever since. Change is visible in the form of the architectural style of contemporary buildings (African style architecture) in Durban. Ushaka Marine World and Sibaya Casino are good examples; they make use of classic African elements (domes, thatch, gum-poles and earthy colours). The change in government has also shaped planning in South African cities. Zones and planning legislation have evolved to allow the previously disadvantaged to make use of land which was previously reserved for white only use, while other legislation and planning policies have been implemented to protect the natural environment (NEMA).

Apartheid policy aimed to maintain white domination by extending racial segregation. Separate residential and territorial areas were enforced through brutal oppression. The Group Areas Act[43] separated the various race groups into different areas away from the city centre. This further compounded the existing sprawling nature of the city of Durban. Furthermore, no “non-whites” were allowed to live in the city. Consequently the buildings in the CBD were mostly designed as places of work (commercial, civic, educational, etc) and not all the buildings incorporate residential accommodation. Conversely, the buildings

[42] The South Durban Basin is the industrial hub of Durban. It stretches from the Port of Durban in the north to eZimkokodweni in the south and is home to two large petrochemical refineries, a large paper mill, motor manufacturers and at least 5 000 businesses, 22 000 households and 200 000 residents. It includes the residential areas of Bluff, Clairwood, Wentworth, Merebank, Isipingo, and Lamontville and the industrial areas of Jacobs and Prospecton (www. http://www.durban.gov.za/City_Government/Administration/Area_Based_Management/South_Durban_Basin/)

[43] In the 1950s, through the enforcement of the Group Areas Act, Coloured, Indian and African communities were often relocated to areas adjacent to heavy industries. Furthermore, later during the late 1980s this lead to a tense relationship between residents, big business and environmentalists (Mabin 1992).

facing the ocean and the harbour / port, were mostly residential flats for whites-only occupation as the beautiful views which Durban offers were considered to belong to the whites.

This apartheid mentality carried over into architecture; some buildings have built in servants' quarters with the walls facing these living quarters consisting of high level windows or blank facades (refer to Plate 4.1).

Plate 4.1: Apartheid Architectural Style Flat in Durban With Panoramic Views

Source: Author

Moreover, apartheid planning also made it impossible for Durban to be a properly walkable city, due to the proximity of residential accommodation and commercial activity. The city required large streets to accommodate the vehicles that would be required for people to commute to and from work every day. To address these lost or wasted spaces created by apartheid planning and issues such as urban sprawl and informal housing, various solutions will be explored. One possible solution is to retro fit elements to the streets in order to make the city more walkable/pedestrian friendly. For example, existing pedestrian paths in the city could be covered to provide shelter and promote walking and cycling.

These sheltered walkways would make use of solar panels as roofing material, which will generate electricity during the day. Furthermore, increasing the number of trees and plants will contribute to beautifying the city while improving the quality of life, as more trees mean more oxygen and shaded areas (see the heat island effect). Existing parking lots (refer to Map 2) can be roofed with solar panels and roof gardening (urban farming) can occur on them. A restriction on traffic into the CBD could also be put in place with the aid of a park and ride facility (with a green building typology) so as to free up lanes on the city streets for people on foot and bicycles. These and other methods of sustainable design will be explored in this chapter as part of the possible solutions to the problem of lost and wasted spaces in the city.

4.2 The Case Studies

4.2.1 Defining Lost and wasted Space

Space is separated into two main categories, positive space and negative space. Positive spaces are all the areas which are used on a daily basis; this includes space which people are able to interact with and in. Negative space is the space that is left over when creating positive space. For example, when architects design and create a multistory building, the building is considered to be the positive space and the leftover unstructured area at the base is regarded as the negative space. To take the concept of positive and negative space further, a figure ground diagram of the Durban Esplanade was drawn up to diagrammatically explain this concept (refer to Figure Ground Study p:20 or Appendix C).

Trancik explains that this separation of space into negative and positive can be used to locate the negative spaces present in a city. He defines these negative spaces as “lost space”. Trancik defines lost space as areas which have no human activity or proper human interaction. He explains that there are various levels of lost spaces and provides the following examples:

- Leftover unstructured landscape at the base of all buildings.
- Unused sunken plazas away from the flow of pedestrian activity in the city.
- Surface parking lots which ring the urban core.
- No-man’s land at the edge of freeways.
- Abandoned waterfronts, train yards, vacated military sites, and industrial complexes.
- Vacant blight clearance sites - remnants of urban renewal.
- Residential areas between districts.
- Loosely composed commercial strips.
- Deteriorated parks.
- Marginal public housing projects.
- Undesirable urban areas that are in need of redesign.
- Ill-defined spaces, without measurable boundaries.

Trancik explains that there are five major causes of lost space:

(1) Increased dependence on the automobile.

(2) The attitude of architects of the modern movement towards open space.

(3) Zoning and land use policies.

(4) Unwillingness on the part of contemporary institutions (public and private) to assume responsibility for the public urban environment.

(5) Abandonment of industrial, military or transportation sites in the inner core of the city.

Although Trancik is discussing lost spaces in America, these concepts fully apply to the city of Durban. This research study will use these concepts in order to understand the lost spaces present in the city, more specifically in the case study of the Durban Esplanade.

Taking into account Trancik's ideas of lost spaces as a base or starting platform, this research study takes his ideas and concepts a step further by looking for "wasted spaces". The contribution of this research study to the body of knowledge, with regards to lost spaces, is to take this idea further and find lost spaces within even the positive spaces (or what Trancik refers to as "found space"); these spaces have been referred to as wasted spaces. Wasted spaces refer to spaces or surfaces on buildings (blank facades and flat roofs), bridges and other components of the built environment that have a designated use; however, they also present opportunities for improvement or mixed use. The concept of wasted space has also been influenced by the concepts of ecocity design and it builds on these various concepts to arrive at a realistic and achievable way of alleviating lost and wasted spaces within the cityscape.

In order to suggest a solution to the problem of lost and wasted spaces in the city, three specific studies of lost and wasted space were carried out. The knowledge gained from the literature review and the theoretical framework will support the retro fit out, techniques and approaches which have been suggested in these specific areas or buildings. Of the three areas of interest, two fall within the study area (the Durban Esplanade) while the third falls

just outside (The Point) the study area (refer to Figures 4.1.1 and 4.1.2). The three cases are:

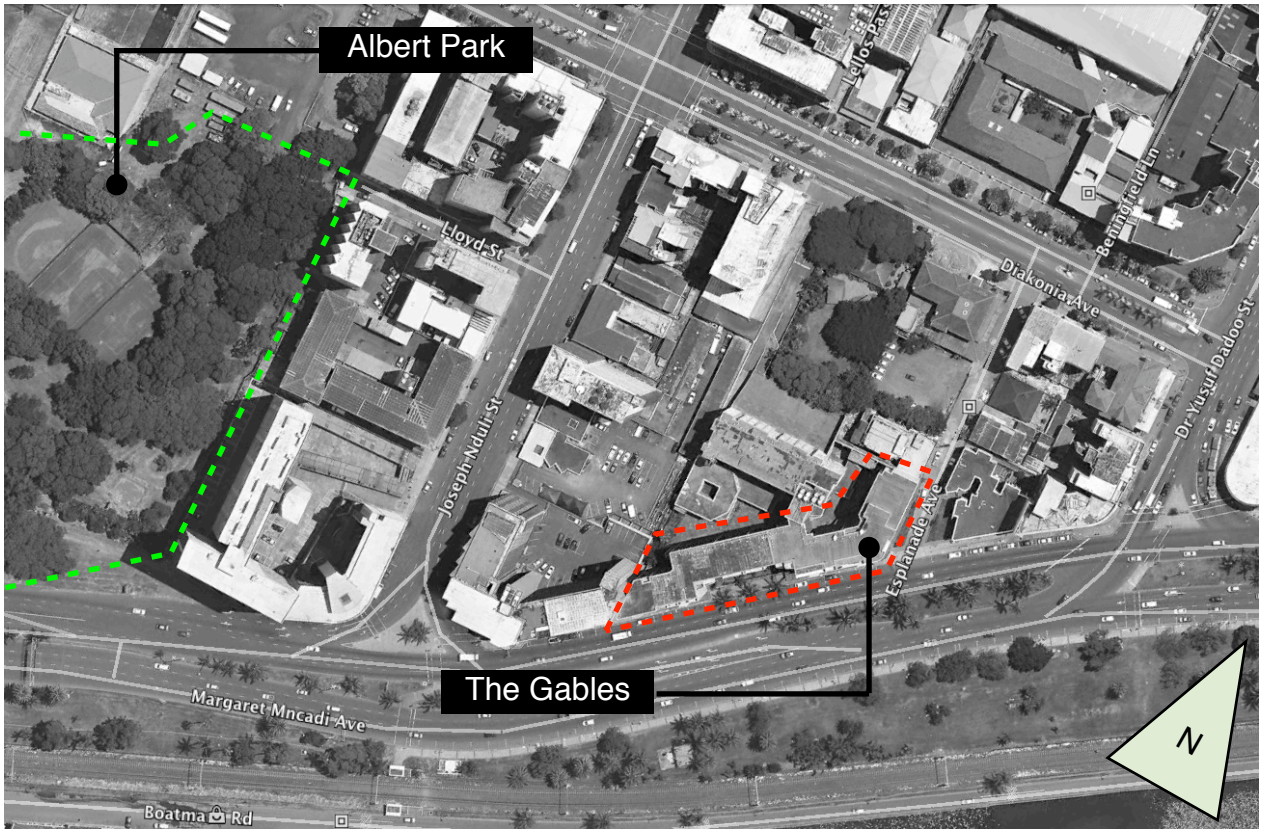
(1) Existing multistory buildings which can be retrofitted in order to make the building green (The Gables).
(2) Existing green spaces which can be used for recreation and urban agriculture (Albert Park).
(3) Abandoned buildings within the city's urban core.

The concept of wasted spaces as an opportunity to add to the existing infrastructure and design elements of buildings will also be examined. From a planning point of view, vertical farms and roof gardens, which are both social and economic components of planning, will be explored. Urban agriculture will feature as a general solution to the alleviation of what are perceived as lost or wasted spaces.

4.2.2 Site Selection

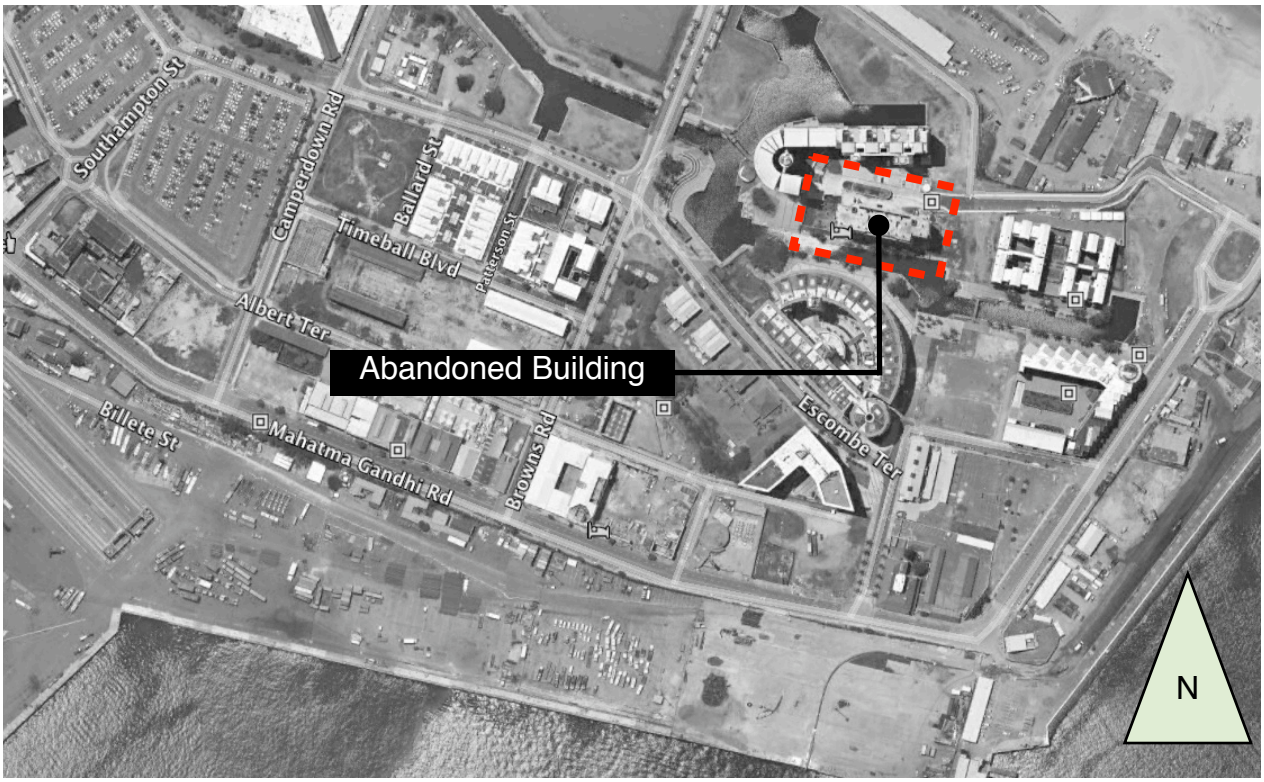
Durban has many areas in which lost and wasted spaces are a problem. However, the criteria for site selection for this study were: the case study had to be of significance to the central business district (CBD); the study area had to include a large recreational green space (Albert Park); and it had to have a variety of typologies of buildings, of which size, densities and variances in building use was important. The Durban Esplanade is also an excellent site as it is the showcase for the city of Durban due to it being in the foreground of the city's skyline. Visitors to Durban's shores will frequent this area as it is directly in front of the entrance to the port and the Yacht Club. The area also serves as a link to the various light industrial and recreational areas present in the city. Finally the Durban Esplanade is experiencing a number of problems which can be turned into opportunities, such as pedestrianising the area, spaces for urban agriculture and buildings with uninterrupted facades, which can be used to generate electricity through the use of solar panels. It is the intention of this study to demonstrate how problem areas can be turned into areas of opportunities.

Figure 4.1.1 : Part Map of Study area Indicating Places of Interest



Source: Google Earth

Figure 4.1.2: Map of The Point Area Indicating Places of Interest



Source: Google Earth

4.2.3 Places of Interest

1) The Gables

The building which was chosen to demonstrate the various interventions in the case study area is a multistory block of flats located within the study area known as “The Gables” (refer to Plate 4.2.1). This building is a perfect candidate as it has large flat, blank surface areas between its window bays. It also has a large flat concrete roof which is currently not being used. Exclusively a residential block, it can be assumed that many residents make use of single unit air-conditioning as observed during a site visit of the buildings interior corridors; therefore, the ‘greening’ of this building will firstly help passively cool the building and secondly reduce its environmental impact.

Plate 4.2.1: The Gables

Source: Image by D. Raman

2) Albert Park

The second space of interest is Albert Park (refer to Plate 4.2.2) which is a public recreational area. Interviews with members of the police service and residents living around the park indicated that the park is not being used to its full potential. In fact, during visits to the site, it was observed that the park was not being used during the week at all. This is due to the high levels of crime and vagrants who loiter in and around the park. The high crime levels, including drug and alcohol use by vagrants making use of the park has negatively influenced people's perceptions of this beautiful public facility. Consequently, very few members of the general public make use of the park. Fortunately, this trend has been changing since the establishment of a police station adjacent to Albert Park. The police presence has discouraged (but not eradicated) illegal behaviour. Furthermore, the municipality has put plans in place to promote public use of the park.

Plate 4.2.2: Images of Albert Park

Source: Images by D. Raman

3) The Point

The third and final space of interest is an abandoned building (refer to Plate 4.2.3) located just outside the study area, at the Point Waterfront[44]. This building is of interest as abandoned buildings make up prime lost space; they are positive (created) spaces with no current use or value to the city or community in which they are located. These areas are often used as spaces for dumping or committing crimes. Abandoned buildings present a unique opportunity as they can be easily shaped and adjusted as needed. Furthermore, city officials usually support the creation of use for abandoned areas and buildings as the city or municipality is able to generate revenue from these areas, once in use.

Plate 4.2.3: Image of Abandoned building at The Point Waterfront Development

Source: Images by D. Raman

[44] One of the Point Waterfront's plush developments is set to lose millions of rands after serious defects in construction caused the structure to "skew". The building is part of the Durban Waterfront Precinct, which is the city's residential and commercial development flagship project aimed at rejuvenating the Point Waterfront area. The construction of the building began in 2005. The development, Dolphin Whispers, was to have been a 10-storey luxury residential apartment complex, complete with overhanging balconies and a commercial component on the ground floor (www.iolproperty.co.za/roller/news).

4.3 Proposed Urban Planning Solutions for the Case Studies

4.3.1 Urban Agriculture on the Durban Esplanade

As noted previously, urban agriculture will feature prominently in this research study; the primary reason for this is the lost opportunities which are present in the current way people living in the city feed themselves. Most of the produce which people living in the city consume is grown outside the city limits in rural areas and farms. Food is then transported hundreds and in some cases, thousands of kilometres to be sold in the city, increasing the price of food and adding to the carbon footprint due to the use of fossil fuels. Fossil fuel is used to grow and harvest produce as well as to transport it to the city. These issues were raised in the literature review, but it is important to reiterate them as they are relevant to the current discussion. Alternatives will now be explored; these will link directly to the concept of lost and wasted spaces.

4.3.2 Roof Gardens

Many multi-story, flat roofed buildings exist in the study area (refer to site plan). Firstly, these spaces are not being used and they therefore become wasted. Secondly, owners or stakeholders of these buildings are losing an opportunity, not only to protect the environment, but to generate additional income and help their fellow citizens. In most buildings in this area, structurally speaking, the concrete flat roof is able to take the weight of an additional floor, therefore adding planter boxes or other types of roof garden systems should not affect the buildings' structural integrity in any way.

Plates 4.3.1 to 4.3.3 on the following page illustrate how this technology can be implemented on existing flat concrete roofs. Another way to use wasted space is to construct a lightweight greenhouse on the flat roof. By making use of the existing walls as structural members, building this retrofitted greenhouse will pose no risk of structural failure to the building.

Plastic trays stacked side by side on plastic roof-sheeting underlay(waterproofing) exiting roof slab.
Plates 4.3.1- Source: www.greenroofdesigns.co.za

Plastic trays filled with lightweights soil and compost combination
Plates 4.3.2 - Source: www.greenroofdesigns.co.za

Plants selected , brought to and planted on site in rows for easy growing &harvesting
Plates 4.3.3 - Source: www.greenroofdesigns.co.za

4.3.3 Vertical Gardens

As noted previously, the purpose of this research study is to add to the body of knowledge with regards to lost and wasted spaces. However, Trancik does not mention facades of buildings or any other usable structure as a lost space; therefore, these spaces are referred to as wasted spaces. This is simply due to the fact that they do have a purpose and a use; however further opportunities can be explored. The facades of buildings change over the years, mostly in terms of colour. All that is done to enhance the aesthetics of buildings is the application of a fresh coat of paint. What if this could be taken a step further to make the buildings change with every season? This facade change is possible and has been successfully implemented in many buildings around the world. Botanist and vertical landscape architect Patrick Blanc has been creating beautiful vertical gardens for more than 12 years. He has been commissioned to create vertical gardens all over the world, using technology to achieve elaborate and highly complex aesthetic designs. South African architects and landscapers need to follow suit, and take advantage wherever opportunity presents itself, as this idea has already been introduced to the South African community in “City of Cape Town Smart Building Handbook”(www.capetown.gov.za)

Vertical gardens are not only highly aesthetically pleasing (refer to Plates 4.3.4 and 4.3.5); they also offer other positive spinoffs. The first is that of passive cooling. Buildings with vertical gardens will not generate a great amount of heat as the plants in the facade will absorb most of the solar radiation; this will decrease the cost of cooling the building on hot days. This is particularly important in parts of South Africa with a hot and humid tropical climate. Durban is known to have very warm winters and does not experience snow, thus providing endless opportunities with regards to plant species, which could be used for vertical gardens. A second positive spinoff for the building will be an increase in the oxygen supplied to it. Plants absorb carbon dioxide and carbon monoxide and convert them to oxygen; this means that the overall air quality will improve in buildings which have vertical gardens. Lastly, the vertical garden also offers opportunities to grow fruit and vegetables. This type of gardening/ farming could contribute to the produce available to the city at an incredibly low (and even zero in some cases) carbon cost. If all buildings in the city made use of vertical gardens in some form or another, they would greatly contribute to the overall health of the natural environment. This could also have a positive impact on curbing global warming.

Plate 4.3.4 : Image of a bridge in Provence Cote D' Azur in France. The blank facade of the bridge which was a wasted space is now a vertical Garden.

Source: www.verticalgardenpatrickblanc.com

Plate 4.3.5: Image of Quai Branly Museum in Paris. The boring facade of the building which was a wasted space is now a vertical garden.

Source: www.verticalgardenpatrickblanc.com

The images on the previous pages illustrate work by Patrick Blanc and how vertical gardens have been used to beautify wasted spaces. Using Patrick Blanc's work as a precedent study, suggestions will be made as to how the alleviation of wasted spaces on building facades could be carried out. These techniques could also be adopted to facilitate the improvement of other built environment structures, such as bridges and road verges. The Durban Esplanade has a number of old ornate buildings which this type of intervention will not be appropriate for, as the facades are not simple and flat; however, there are some newer, modernist buildings which are perfect candidates for this type of intervention. One of the larger buildings will be used to illustrate exactly how a vertical garden could work and what it would look like in its context.

The building chosen to demonstrate the vertical garden intervention is a large multistory block of flats named The Gables. The Gables is located at the western end of the study area and has facades facing in all four directions (north, south, east, and west). This building is a perfect candidate as it is a semi-modern building with flat, blank surface areas between its window bays. It also has a large flat concrete roof which is currently not being used; therefore, a roof garden can easily be retrofitted here. The building is also wrapped around a corner, which means that the vertical garden will be seen from more than one angle and could influence other building owners to follow suit. Used exclusively as a residential block, it could be assumed that many residents living in the building will be more than pleased with the aesthetic result as it will increase the value of their properties. Secondly the passive cooling provided by the plant life on the facade will reduce electricity bills as mechanical cooling will no longer be required. Furthermore, due to the style and repetitive nature of the building's modular bays, it will be relatively easy to construct the frames for the vertical garden in a workshop and retrofit them to the building. It has been noted that fruit or vegetable plants could be used. This will provide an even greater reward from this intervention as the produce from the vertical garden could be used by residents, thereby reducing their overall cost of living. An artistic impression of what this building could look like if this intervention was made a reality is presented on the next page (refer to Plate 4.3.6 - lift transparency for before and after).

Transparancy & pic

4.3.4 Vertical Farming

With the shortage of fertile land and the increasing population in urban areas, what are our options with regards to feeding this population? According to Despommier, the answer is to grow food in buildings in the cities. Despommier is of the opinion that “up” is the only logical way to go (Despommier, 2010). The concept of vertical farming has been around for many years in theory; however with the growing world population and the need to feed the population in cities, this idea is slowly becoming a reality. Countries which have densely populated cities such as China and Singapore[45] have already adopted this method of farming (refer to Plate 4.3.7). The vertical farm is essentially a multistory building which is specifically designed to be used as a farm. The building itself would be designed more like a greenhouse than a conventional building. Floors would be double or triple volume to allow as much light in as possible. Apart from the design features, each floor could be used to grow a different crop, thereby diversifying the produce available from this single facility. This single building will be able to fulfill all the basic needs of a typical household (refer to Figure 4.3.1).

Plate 4.3.7: Functioning Vertical Farm in Singapore.

Source: www.wired.com/design/2012/10/vertical-farm-in-singapore

[45] The dense metropolis of Singapore is now home to the world’s first commercial vertical farm! Built by Sky Greens Farms, the rising steel structure will help the city grow more food locally, reducing dependence on imported produce. The new farm is able to produce one tonne of fresh vegetables every other day, which are sold in local supermarkets.

Figure 4.3.1: Multi functional ability of a vertical farm to grow food.

Source: D Despommier, 2010: 180

How then does vertical farming fit into lost and wasted space? The answer is quite simple; buildings which are dilapidated or abandoned could easily be converted into vertical gardens. Every city has buildings which go unserviced / unmaintained for years and, as a result, become unfit for human occupation; however, the building remains structurally sound. The internal walls and finishes, fittings and fixtures of the building can all be removed, so that all that is left are the basic elements of the building (floors and columns). The building can then be retrofitted with floor to ceiling glazing to form the walls. This will create a greenhouse-like structure which can now be used as a vertical farm.

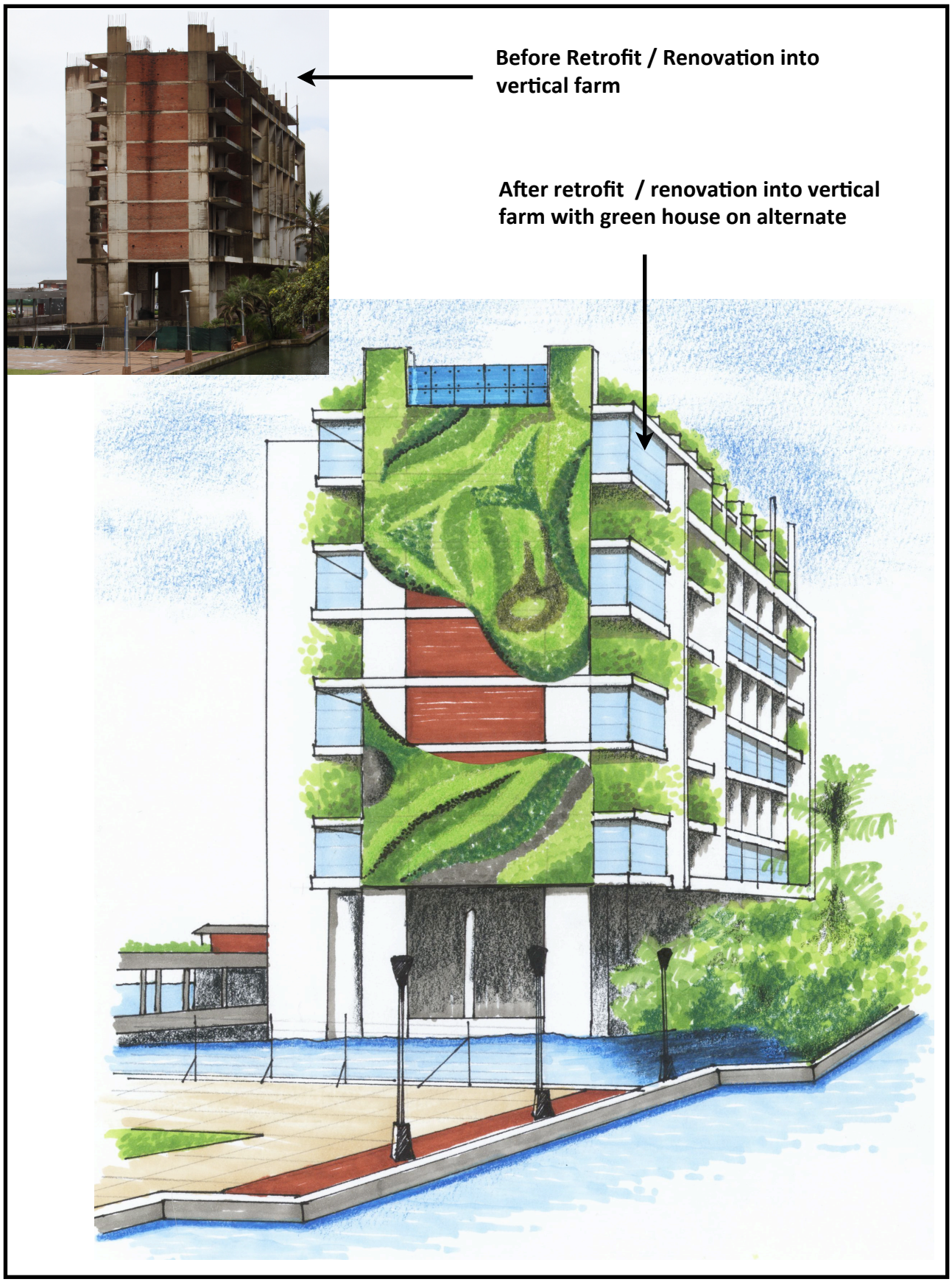
Case study 3, which is seen as a wasted space, is located in The Point. The Point has recently been upgraded; however the urban renewal programme in this area never fully caught on. The majority of the properties in this area remain unoccupied. Some blocks of flats have been occupied with a few apartments remaining empty. The streets in this area are hardly used, even after being revamped. Even the recreational facilities are not used despite the upgrade and obvious presence of private security companies. An interview with one of the private security companies' staff members revealed that the upgrade to the area has not been successful as many of the apartments in the area are holiday homes or were purchased as rental properties; however, it is difficult to find tenants (Sipho, 2012 Point Waterfront). The rentals are far too high and the area is still thought of as a high crime zone. This is due to the fact that Point Road (now Mahatma Gandhi Road) use to have a high crime rate. During the 1980s and 1990s, Point Road was known as Durban's red-light district. It was also known to have high levels of drug dealing.

The economic downturn[46] of the past few years, and declining property values have had a negative effect on the built environment. Some buildings are yet to be completed while others have been abandoned altogether. The building of interest for this component of the case study (case study 3), is an abandoned structure which lies uncompleted on the Point (refer to Map 1 and Figure 4.1.1, p 85). The building only has concrete slabs, columns and one set of walls. This and similar buildings, have the potential to become food providers to the city. The building of interest can easily be retrofitted to become vertical farms. This type of space offers the designer flexibility to make the best decisions for the building's use.

[46] The economic woes of the Point development began with the economic downturn in 1997-98 which impacted dramatically on South East Asian countries, including Malaysia. The Malaysian based company Renong had positioned itself as a major developer of the Point area (Witt, 2013)

Figure 4.3.2 below graphically illustrates the potential of this lost and wasted space.

Figure 4.3.2: Abandoned building at the Point Waterfront development project



Source: Author and L. Moonsamy

The land which exists on either side of freeways and along the path of train lines is also considered to be lost spaces. These spaces are present throughout the city of Durban. They consist of “No-man’s land at the edge of freeways, abandoned waterfronts, train yards, vacated military sites, and industrial complexes” (Trancik 1986). These areas have great potential to be used as spaces of urban agriculture. As the highways leading into the city are rather dangerous, due to speeding vehicles, the first item to consider would be the addition of concrete barriers between the land and the road.

Making use of this land for urban agriculture will have other positive outcomes, including job creation and food security. The various strips of land leading to and from the city will add up to hundreds of hectares if used for agriculture (refer to Map 3 - Spaghetti Junction). As the land on the sides of the roads is the property of the municipalities, and it is their responsibility to maintain this land, using it for urban agriculture could help lower the cost of maintenance.

An alternative way in which these urban gardens could help the citizens of Durban is if they were given over as community gardens. Informal housing is a major problem in Durban. Many of the people moving from the rural areas to the city in search of jobs and services end up living in informal housing. In most cases, even after finding employment they cannot afford proper housing. To assist such communities, the municipality could create community gardens and give them over to these communities; they will maintain and use them for farming. This will obviously require some sort of control and regulations to ensure that all community members benefit. Regulation and agreements are also required with regards to road expansion; the community needs to be clearly informed that this land remains the property of the municipality and can be taken back at any time.

Finally, with regard to this type of urban agriculture, one could also look at using land around railway lines. Abandoned railway yards and train tracks would also make good spaces for urban agriculture (refer to Map 2, p 78). In some cases, even railway bridges which are no longer in use could be used for urban agriculture or spaces for recreation. The Highline project in New York (refer to Plate 4.3.8) is an excellent example of how a lost and wasted space was put to good use and is now a found and well used space.


N3
N3 To Durban CBD
MAP 3 OF MAIN INTERCHANGE
INTO DURBAN CBD
(SPAGHETTI JUNCTION)
OUT OF CITY
INTO CITY
URBAN AGRICULTURE
N

Plate 4.3.8: Images of The High Line Upgrade in New York

Image Source: www.thehighline.org

Durban has many kilometers of abandoned railway lines and although it is hoped that they could be put to use again soon, these areas are currently wasted spaces and could be put to better use as places for growing of food or places of recreation as illustrated in the images above.

During the research process, a number of interviews (34) were carried out in the case study areas, in order to gain a general idea of public opinion regarding lost and wasted spaces in work and residential areas (refer to Appendix A). The interviews revealed that the general public are fully aware of wasted spaces in their area; however not all of them agree on exactly what wasted spaces are. For example, Trancik states that parking lots are wasted spaces. One of the questions included in the interview questionnaire was:
"Durban has far too many parking lots and (single and multistory) and not enough green spaces, do you agree?"

Approximately 60 percent of the interviewees agreed with this statement (refer to Table 4.3.1); however, the other 40 percent disagreed, stating that parking lots are not wasted spaces. They added that finding parking in the city is already a problem and converting parking lots into green spaces will make it even more difficult.

Table 4.3.1: Parking lots in the city.

Durban has far too many parking lots and (single and multistory) and not enough green spaces, do you agree?	General public	%	Professionals	%
Strongly agree	4	11,8	4	66,7
Agree	17	50	2	33,3
Neutral	2	5,88		
Disagree	5	14,7		
Strongly disagree	6	17,6		
TOTAL	**34**	**100**	**6**	**100**

However all the interviewees who are professionals agreed that parking lots are wasted spaces purely due to their singular use. They added that flat parking lots should have bays dedicated to greening or a roofing structure which has some planting, while in multistory parking lots at least the top floor should be used as a roof garden.

The second interesting outcome of the interviews was the results of responses to question three:
“What does lost space mean to you? What do you understand by wasted space?” (refer to Appendix A).

Similar responses to this question were elicited from the general public. Almost all of the interviewees said that abandoned and broken down buildings or spaces are what they consider to be wasted spaces. Those who gave this answer added that the government or the owner of the property should do something to make these sites useful, as they are not only an eyesore but also harbour criminal elements. The general consensus was that abandoned buildings are taken over by vagrants and are used as places for drug dealing, murder and other crimes.

Linked to this opinion on crime were the answers to question 6 (refer to Appendix A):

“Do you use parks, gardens or other green spaces in the city?”

The question was first asked in general, and then directed solely at Albert Park, where Albert Park was the green space and park in question. Up to 80 per cent of the interviewees stated that they would not use Albert Park as it is an area with a very high crime rate (refer to Table 4.3.2). These statements were confirmed after speaking to the local police in the area. The police officers interviewed provided some rough estimates which backed up the general public’s opinion on this matter (Officer John, 2012. Albert Park).

Table 4.3.2: Green spaces and Albert Park.

“Do you use parks, gardens or other green spaces in the city?”	General public	%	Professionals	%
Yes	4	10	0	0
No, due to Crime	28	80	0	0
No, due to Time	2	5	2	33,3
No, comment	2	5	4	66,7
TOTAL	**34**	**100**	**6**	**100**

One of the police officers (Officer John, 2012. Albert Park) stated that just prior to the opening of the new police station at Albert Park the average reported rate of serious crime was between 60 and 100 cases every week. However this number has dropped drastically since the police station located within Albert Park was opened. The officer stated that they now deal with an average of five cases of serious crime a week, with an increase during the vacation months (June and December). Unfortunately, this has not changed public perceptions; the interviewees revealed that most people still think that the park is not a safe place due to personal experience, reading about it or listening to the experiences of others (Table 4.3.2 - interviews).

The police officer who was interviewed also stated that an additional problem is the issue of illegal immigrants who previously constituted the majority of vagrants and homeless people using the park. Many of these people used to use Albert Park as a rendezvous and lookout point for ships coming in and out of the harbour. The immigrants would then stow away on the ships spotted from the park. The police officer also stated that, with the establishment of the police station, the number of illegal immigrants has decreased. While there are still some illegal immigrants, they no longer loiter in the park, but rather under bridges and in other areas where they are able to find shelter. This behaviour is illustrated in the images on the following page (refer to Plate 4.3.9).

The other upgrade to the park that has increased its safety and decreased the number of vagrants is the erection of a fence around the entire park. Admission to the park, although not restricted, can be controlled by the gates and fence on the property. The question that has to be posed is: is this park now a public space or a private space? The answer to this question is not straight forward, as the answers differ depending on the person interviewed. For example the police officer stated that the park is still a public space and is not restricted; however, it was clear that the added security was put in place to restrict access on the part of certain individuals (the homeless and illegal immigrants).

Plate 4.3.9: Homeless people living in and around Albert Park

Images by D.Raman

During the site visit, it was observed that, the park is not extensively used by the public. Secondly, there are spaces in the park that simply cannot be made use of by the public due to its design or proximity to the commonly-used areas of the park (mostly the periphery). For this reason and the issues discussed in the previous paragraphs, some intervention needs to be put in place to help transform this wasted space into a useful one. Since the park is already a green space, it would be counter-productive to use it for an alternate use such as housing. Therefore one intervention could be to use the wasted areas in the park (places which are not used by the public) for urban gardening. This would not only make the park more useful, but it would also create jobs for people living in the area. Some of the plants in the park could be substituted with fruit and vegetables and some of the younger and non-indigenous trees could be replaced with fruit trees. This would enable the park to not only serve as a recreational space, but as an urban agricultural space.

4.4 Renewable Energy

The most important reason for finding lost spaces is to alleviate waste in the city. Unfortunately the cities of today are not only wasteful with regards to space, but also with regards to resources. Renewable energy was covered fairly extensively in the literature review, as it is a recurring theme in the various topics addressed. Therefore, this part of the research study is dedicated to understanding how the implementation of such technologies could occur in the current context of the case study. In so doing, the study will examine the options currently available, as well as how these options can best be implemented in the city of Durban. It should be noted that the various sources and renewable energy typologies listed in this chapter are merely a finite number of examples; there are many other ways and means of generating renewable energy. Only a few examples of renewable energy techniques have been highlighted as a means of proof of concept.

The “greening” of existing buildings is very limited in terms of interventions, as the buildings’ structure, material and methods of construction limit what can be done to the building to make it sustainable. These limitations are not as restricting with new buildings as the architect is aware of the issue of environmental costs. Newer buildings incorporate thermal insulation, efficient lighting, higher quality glazing and higher efficiency temperature control fixtures to respond to the needs of energy efficient buildings, thereby making new buildings somewhat sustainable. Strong states that architects have come to understand that the goal of good design is no longer simply buildings which are aesthetically pleasing, but buildings which are also environmentally responsive. According to Strong, it is important to incorporate Photovoltaic (PV) panels into buildings (Strong. 1994).

ESKOM is currently South Africa’s sole electricity producer. Unfortunately, ESKOM’s power plants currently make use of only fossil fuels (coal and oil products) to generate the electricity which it produces for general consumption. Consequently, the financial cost of electricity will continue to rise as fossil fuel stocks become depleted[47]. Even higher than

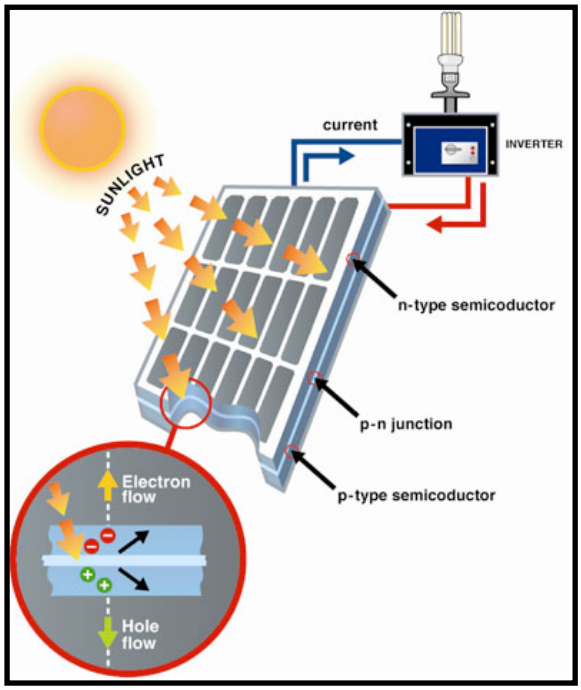
[47] Presently, about 77 percent of South Africa’s primary energy needs are provided by coal. This is unlikely to change significantly in the next decade, due to the relative lack of suitable alternatives to coal as an energy source. South Africa's coal reserves are estimated at 53 billion tonnes, and at the present production rate there should be almost 200 years of coal supply left (www.eskom.co.za/c/article/200/coal-power/)

the financial cost is the cost to the environment. The burning of fossil fuels is said to be the number one cause of global warming, due to the high levels of carbon dioxide (CO2) that are produced when these fossil fuels are used. Therefore, not only is the current means of energy creation not sustainable, it is also causing irreversible damage to the environment. Currently all cities in South Africa rely exclusively on ESKOM for their energy requirements. The unsustainable methods used to generate electricity by energy producers in countries around the world, has led to global warming and climate change, which could ultimately lead to the mass extinction of most creatures on earth, including human beings. It is no longer a question of choice; countries have to make the shift to becoming more sustainable. Furthermore, the world's population is increasingly migrating to cities; this demands that cities become more sustainable.

4.4.1 Solar Energy

The most abundant renewable energy source available to Durban is solar energy. Every day the sun produces large quantities of free energy in the form of light and heat which is not harnessed to its maximum capacity by municipalities or individuals. This is a lost opportunity for the city of Durban, as it receives large quantities of uninterrupted sunlight every year. Solar panels (refer to Figure 4.4.1) have been around for many years and every year, they become more cost effective and increasingly efficient.

Figure 4.4.1 : How photovoltaic panels work



Source: www.geoliving.co.uk/solar/photovoltaic-cells

The photovoltaic cells are made from layers of semi-conducting material, such as silicon. When light shines on these cells, an electric field is created across the layers and the stronger the sunlight, the more energy is produced. Most PV systems feature panels that will fit on top of an existing roof to help you generate your own electricity. (www.geoliving.co.uk/solar/photovoltaic-cells)

Most solar panel installations in South African buildings (homes and offices) have been used to heat water, as this is currently responsible for the highest electricity consumption. However with the use of photovoltaic panels, solar installations can also be used for all electrical requirements. Photovoltaic panels do not require direct sunlight, which means that they will also be able to generate electricity (not optimal) on overcast days.

With regards to the case study area (Case study 1) and the building of interest (The Gables) the use of solar panels becomes an integral part of the building's move towards sustainability. These solar panels are easily retrofitted to the building on the northwest facing facades as these facades are the "back of the buildings". The backs of buildings are often wasted spaces as building designers leave this aspect of the building to the end and it is usually the disjointed, afterthought feature of many buildings in the city. Durban's beachfront is a prime example as most of the hotels have wonderful front ocean facing facades, but rather bland and blank back facades (refer to Plate 4.4.1).

Plate 4.4.1 Building Facades at Durban beachfront

Source: Google earth - Street view

These facades become wasted spaces as they have no real use (except closing in the building envelope) or role to play with regards to the aesthetic of the buildings' overall design. In a case such as this, the intervention will be as follows: the front of the building will be used for vertical gardening and the back of the building will be clad with solar-voltaic panels. Although this has been specified for the building of interest, the overall intention is for buildings in the city in general to have a mixture of vertical planting and solar panel usage on their facades, depending on their orientation and on which facades experience the maximum exposure to sunlight. In a case where the backs of buildings receive very little or no direct sunlight, plant species which do well in shaded areas can be used.

Solar panels need not only be a feature of buildings; they could also be fitted to other flat surfaces in the built environment which experience direct sunlight exposure. Road surfaces, parking lots, bridges and walkway roofs are just some of the examples of surfaces which could be used to capture solar energy. A company in the United States of America (Solar Roadways) is developing a solar panel for road surfaces (refer to Plate 4.4.2). This would be a superb way of contributing to the move towards sustainability as the city of Durban was built for the motor vehicle. Although one of the interventions to make a city more sustainable would be to reduce the number of roads and render it walkable, a more realistic way of addressing the environmental problems currently being experienced, would be to work with the available infrastructure and gradually make the shift to where the city should be with regards to compacting the city and reducing the number of motor vehicles on the roads.

Plate 4.4.2: Solar Panel Clad Freeway.

Source: www.solarroadways.com

For now, the wasted spaces which exist on the side of freeways could be used as solar farms. A solar farm refers to any area where a large number of solar panels have been set up to collect solar energy (refer to Plate 4.4.3).

Plate 4.4.3: Solar farm in North Carolina

Source: www.ewh.ieee.org

The freeways and highways leading to and from the city are currently lost and wasted spaces. These areas could be used as solar farms (refer to Plate 4.4.4). This would not only reduce the lost and wasted spaces in the city, but could also contribute a great deal to its move towards sustainability.

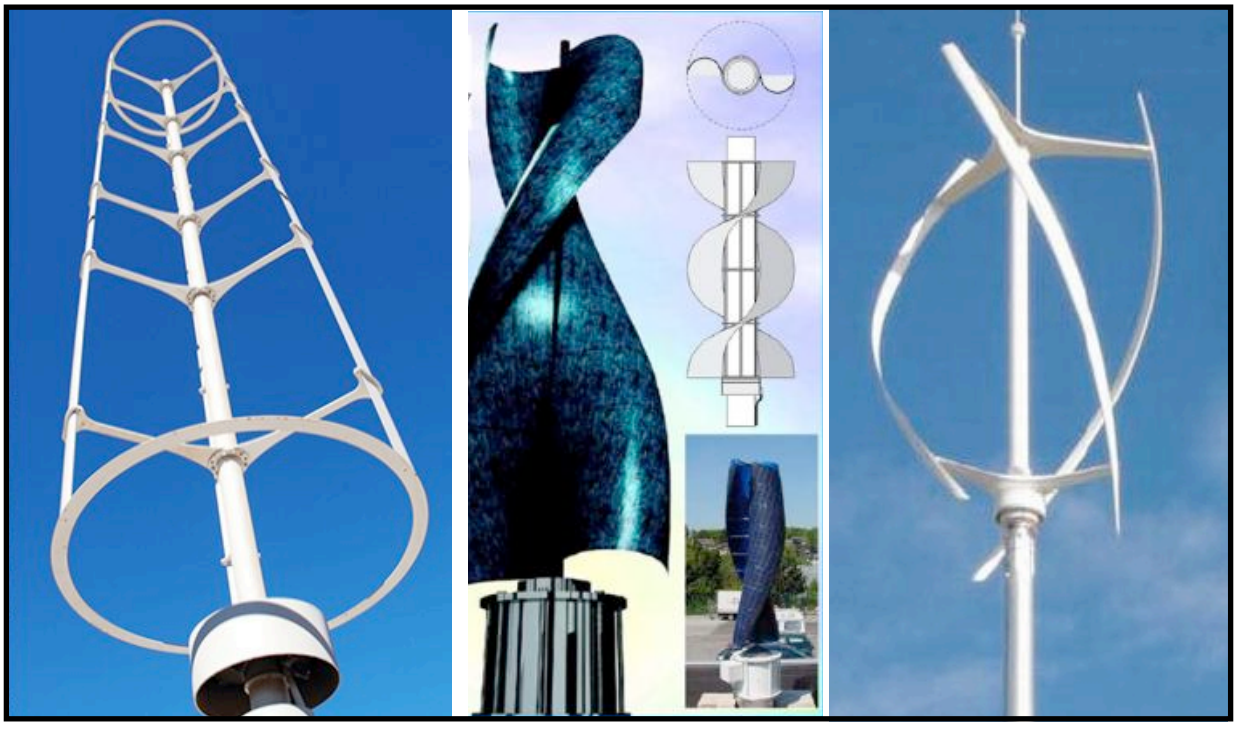
Plate 4.4.4: Solar Panels on the lost spaces of a freeway.

Source: www.greenenergy-solar.co.uk

4.4.2 Wind Energy

The advantage of a coastal city with regards to sustainable energy is that a number of natural elements can be taken advantage of, to create clean, renewable energy. Air movement in the form of wind is almost constant in coastal areas; therefore, another energy source that could be used for the city of Durban is wind energy. Retrofitting wind turbines onto rooftops of buildings within the city can easily be accomplished as wind turbines exist in a variety of sizes, shapes and forms. For Durban, large scale wind turbines could easily be fitted out at sea to create energy which could be carried back to feed the city's electricity grid. A combination of solar and wind energy could easily be incorporated into new and existing buildings in order to generate clean renewable energy. These structures can be incorporated into all three case studies and even be used on the wasted spaces along freeways. The newer designs of wind turbines are more efficient and require far fewer materials than the older ones to produce equivalent power outputs (refer to Plate 4.4.5). It is also cheaper to produce wind machines as they require smaller quantities of material and less surface area to produce electricity than a solar panel. Both solar and wind energy have their pros and cons (solar energy is not efficient on overcast days and will not work at all on dark rainy days and wind turbines will not work on still days); therefore it would be best to use a combination of the two technologies to ensure constant energy production.

Plate 4.4.5: Images of new inventive wind turbines.



Source: www.ecofriend.com

5. Chapter Five - Review of Research, Recommendations and Conclusions

5.1 Review of Research

Lost and wasted spaces are a problem not only in Durban, but in cities around the world. This research study illustrates the many opportunities which city officials and municipalities miss as a result of not taking full advantage of available space within the city limits. Some of the examples discussed in the previous chapters such as housing provision, urban agriculture and renewable energy should be the core goals of cities of the future. Sustainability has been a driving theory with regards to lost space and it is the intention of the research study to provide planners and space designers with recommendations on the way forward with regards to lost space in the city. The purpose of this chapter is to review the research and the research objectives which were set out in chapter one and in doing so, provide answers and solutions to the research questions.

The negative effects that lost and wasted spaces have on a city have been extensively discussed throughout this study; however, this chapter will focus on the positive outcomes of lost space, should these spaces be addressed in the proper manner. Although, the steps which need to be taken to mitigate neglected spaces have already been discussed in chapter four, they will be recapped in this chapter. It is important to note that throughout the research process the purpose of "finding" the lost and wasted urban spaces is to illustrate how they could be used in a positive way to uplift a city.

The main research question; "How can planning be used as a tool to create positive outcomes from lost, negative spaces?" has been answered by the research study and the recommendations presented in chapter four, which concentrates on the case study and proposed solutions to the issue of lost and wasted space. Sustainable and eco design principles constitute the "toolbox" of the planner when it comes to the issue of dealing with lost and wasted urban space.

The research study has also been able to provide answers to the subsidiary questions set out in chapter one, which were:

- What is the definition of lost or negative spaces?

- How does lost space occur?
- What are the possible solutions to redefining the uses of lost spaces?
- Where does the city of Durban stand with regard to lost spaces and how can the possible solutions be implemented?

5.1 Recommendations

In terms of recommendations, the research study has outlined many technologies, techniques and approaches with regards to the retrofitting of existing buildings that are not sustainable. These include single and multistory structures with blank facades and flat roofs, which could be used for urban farming or vertical gardening. Furthermore, renewable energy techniques and technologies could be retrofitted to these structures to maximise the use of the wasted spaces on the facades. Solar panel and wind energy technology have been highlighted as items which all buildings should have in order to become somewhat sustainable. With regards to new developments it is suggested that every aspect / stage of the building process, from the acquisition of materials to the installation of electrical fittings needs to be carefully considered so as to create a low impact, low carbon footprint building. The current rules and regulations with regards to architectural requirements have also been discussed; these link to “green buildings”. The various techniques which constitute the core values of ecocities have been explored at length and some basic techniques such as roof gardening, vertical gardening and grey water harvesting have been used in the case study recommendations to illustrate how simple it is to implement / make use of these eco design principles in new and existing buildings and other structures. The Gables which is located in the main study area (Durban Esplanade) was used to illustrate these techniques and principles. The reason that this building was chosen is that it represents the typical structural layout and finishes which exist in the city of Durban. Making use of this building as a case study, the research study was able to illustrate through the aid of computer-generated graphics, how these simple green building design concepts could be put to use in any existing building or structure in the city.

In order to respond to the growing population and demands on resources, the research study explored urban farming. As illustrated, urban farming can take many forms. Using existing green spaces for urban farming was one of the recommendations put forward; the

case study for such an undertaking was Albert Park. Although not part of the case studies, urban farming along the Spaghetti Junction was also explored as a way of alleviating lost and wasted space, as well as an area which could be used for urban farming. As the city of Durban has many of these types of wasted spaces, this area was used as an example to illustrate just how vast the issue of lost urban space is. This space was also used to illustrate that the lost and wasted spaces along transport infrastructure offer many opportunities. The concept of urban farming was taken a step further by exploring cutting edge research and design concepts in the form of vertical farming. This farming technique requires a multistory building which is specifically designed for the sole purpose of growing food. This was discussed in detail in chapter four. This research was taken a step further by looking at abandoned buildings as possible candidates for a vertical farming fit out, in order to address the issues of lost and wasted spaces. The abandoned building located in The Point was the case study for this aspect of the research study. With the aid of graphic illustrations, the techniques and principles of vertical farming and sustainable design were presented in this case study.

5.3 Conclusions

The envisaged outcome of this research study is to use the case studies as models of solutions in the form of innovative urban planning interventions. Its intention is to equip the town planner of today with not only the tools, but the proper mindset, with regards to city design. Space designers need to not only look more closely at their own designs, but at how their ideas impact the context in which the designs exist. Solutions need to be considered in both short- and long-term usage. The research study provides detailed evidence of negative outcomes that could occur when all aspects of space design are not taken into consideration. Therefore, when town planners, architects and engineers create buildings, infrastructure and even green spaces, proper research needs to be carried out prior to the implementation of the project. This research study has shown that lost space is not only the result of poor design; social and economic change can also have a great impact on the use of a space. Chapters three and four discussed the social impacts that economic turbulence can have on a neighbourhood; therefore, it is important that socio-economic factors be taken into consideration at every level of current and future projects.

The study's contribution to knowledge lies in the simple solutions illustrated in chapter four, which could be implemented by space designers to make cities more efficient. The research study also outlines key theories which need to be taken into consideration when addressing the issue of lost and wasted space. Furthermore, it outlines the uses of wasted space from basic solutions, such as vertical and rooftop gardening, to more complex and long-term solutions such as vertical farming and urban agriculture. The solution to wasted space is only as limited as our imaginations. Humans need to look to nature in every aspect of their lives, as nature creates no waste. In nature, everything is part of a finely balanced cycle and the concept of waste is nonexistent. The lifespan of products (from the cradle to the grave) needs to have a minimal impact on nature, and be as close to 100 per cent recyclable as possible.

As noted previously, the intention of this research study is to not only change the mindsets of space designers, but also to motivate them to revise their approach to design issues. By applying some of the basic, key concepts discussed in this study, designers will come to see that wasted spaces in the city are not a problem; instead, they provide unique opportunities. The challenge is to be innovative enough to take these negative and unproductive spaces and convert them into spaces which benefit not only the immediate community that they are located in, but the entire city. This is the prime purpose of the examples which have been provided in the case study; however, it needs to be stated that the examples provided are finite and that there are many more ways to solve the problem of lost and wasted spaces in the city. Innovative thinking, public and private funding and the involvement of key role players and citizens is required to firstly decrease the amount of lost and wasted spaces in the city, and secondly to help it move towards becoming a sustainable city in the future.

Bibliography

Books:

1. Ahlbrandt Jnr, R.S. and Brophy, P.C. 1975. *Neighbourhood Revitalisation: Theory and Practice*. Massachusetts: Lexington Books DC Heath and Co.

2. Appleyard, D. 1981. *Livable Streets*. Berkley, California: University of California Press.

3. Bacon, E.N. 1978. *Design of Cities*. New York: Penguin Books.

4. Beateley, T. and Manning, K. 1997. *The Ecology of Place, Planning for Environment, Economy and Community*. Washington DC: Island Press.

5. Breuste, J.H. 2011. *Urban Ecology: Patterns, Processes and Applications*. Oxford University Press.

6. Broadbent, G. 1996. *Emerging Concepts in Urban Space Design*. New York: Van Nostrand Reinhold.

7. Bullivant, L. 2012. *Masterplanning Futures*. London and New York: Routledge, Taylor and Francis Group.

8. Coppock, J.T. and Wilson, C.B. 1974. *Environmental Quality*. Edinburgh and London: Scottish Academic Press.

9. Crossible, A.J. 1976. *Environmental Quality*. Edited by Coppock, J.T and Wilson, C.B. Edinburgh: Scottish Academic Press.

10. Despommier, D. 2010. *The Vertical Farm: Feeding the World in the 21st Century*. New York: Thomas Dunne Books.

11. Dewar, D. 1992. *South African Cities: A Manifesto for Change*. University of Cape Town: Urban Problems Research Unit.

12. Dewar, D. and Todeschini, F. 2004. *Rethinking Urban Transport after Modernism: Lessons from South Africa*. Ashgate, Aldershot

13. Dwyer, J.F., Schroeder, H.W. and Gobster, P.H. 1994. *The Ecological City: Preserving and Restoring Urban Biodiversity.* Amherst : The University of Massachusetts Press.

14. Gaston, K.J. 2010. *Urban Ecology*: Cambridge University Press.

15. George, C.J. and McKinley, D. 1974. *Urban Ecology: In Search of an Asphalt Rose*. New York: McGraw-Hill.

16. Gibson, M. and Langstaff, M. 1982. *An Introduction to Urban Renewal.* London: Cornway Street.

17. Gleick, P.H. and Shiklomanov, I. 1993. *Water in Crisis: A Guide to the World's Fresh Water Resources.* Oxford: Oxford University Press.

18. Hawken, P. 1993. *The Ecology of Commerce: A Declaration of Sustainability*. New York: Harper Collins.

19. Jackson, L.E. 1997. *Ecology in Agriculture.* San Diego: Calif Academic Press.

20. Krier, R. 1979. *Urban Space*. New York: Rizzoli International Publications, Inc.

21. Hough, M. 1995. *Cities and Natural Process*. London and New York: Routledge.

22. Hysler-Rubin, N. 2011. *Patrick Geddes and Town Planning: A Critical View*. London and New York: Routledge, Taylor and Francis Group.

23. Landry, C. 2006. *The Art of City-making*.Trowbridge: Earthscan.

24. Langenberg, A. 2006. *Urban Gardening A Hong Kong Gardens Journal*. Shatin: The The Chinese University Press.

25. Lynch, K. 1960. *Image of the City*. Massachusetts: MIT Press.

26. Maki, F. 1964. *Investigation in collective form*. St.Louis Washington University.

27. Marzluff, M.J. 2008. *Urban Ecology: An International Perspective on the Interaction between Humans and Nature*. New York: Springer Science and Business Media.

28. Murray, M.J. 2008. *Taming the Disorderly City: The Spatial Landscape of Johannesburg after Apartheid*. Cape Town: UCT Press.

29. New Oxford American Dictionary. Second Edition. 2005. Oxford: Oxford University Press Inc.

30. Norberg-Schulz, C. 1979. *Genius Loci: Towards a Phenomenology of Architecture*. London: Academy Editions.

31. Public Technology Inc. 1993. *Local Government Sustainable Buildings Guide Book: Environmentally Responsible Building Design and Management*. Washington, DC.

32. Redwood, M. 2010. *Food Price Volatility and Urban Poor*.London: Earthscan.

33. Register, R. 2006. *Ecocities, Rebuilding Cities in Balance with Nature*.Gabriola Island: New Society Publishers.

34. Relph, E. 1976. *Place and Placelessness*. London: Pion Limited.

35. Ribinson, C. 2004. *Urban Reconstruction in the Developing World: Learning through an International Best Practice*. Sandown: Park Lane.

36. Smith, F. 1997. *Environmental Sustainability - Practical Global Implications*.Florida: CRC Press.

37. Smith, D.M. 1982. *Living Under Apartheid: Aspects of Urbanization and Social Change in South Africa.* Allen & Unwin.

38. Swimme, B. and Berry, T. 1992. *The Universe Story: From the Primordial Flaring Forth to the Ecozoic Era - A Celebration of the Unfolding of the Cosmos*. San Francisco: Harper.

39. Trancik, R. 1986. *Finding Lost Space*: *Theories of Urban Design*. New York: John Wiley & Sons, Inc.

40. Solomon, S. 2010. *Water: The Epic Struggle for Wealth, Power, and Civilization.* New York*:* HarperCollins publishers.

41. Strong, S.J. 2009. *The Solar Electric House.* Harvard Massachusetts: Sustainability Press.

42. Toledo, V. M. 1997. *Sustainable development at the village community level: A Third World perspective.* Pages 233–250. in Smith, F. ed. *Environmental Sustainability: Practical Global Application*. Boca Raton (FL) St Lucie Press.

43. Watson, D. 2003. *Time-Saver Standards for Urban Design*. New York: The McGraw-Hill Companies inc.

44. Yeang, K. and Spector, A. 2009. *Green Design: From Theory to Practice*. London: Black Dog Publishing.

Journal Articles:

1. Blanc, P. 2012. The Vertical Garden: A Scientific and Artistic Approach. Online Article: Available at: <http://www.verticalgardenpatrickblanc.com> [Accessed 19 April 2012]

2. Haug, A.K. 1996. A floating concrete platform hull made of lightweight aggregate concrete: *Engineering Structures* Volume 18 issue 11.

3. Kapalan, R. 2001. The Nature of the View from Home: Psychological Benefits. *Sage.* Volume 33, Issue 4.

4. Mabin, A. 1992. Comprehensive segregation: the origins of the group areas act and its planning apparatuses. *Journal of Southern African Studies*. Volume 18, Issue 2.

5. Maylam, P. 1995 Explaining the Apartheid City: 20 Years of South African Urban Historiography. *Journal of Southern African Studies*, Volume 21, No. 1. Special Issue: Urban Studies and Urban Change in Southern Africa.

6. Pearson, L. J. 2010. Sustainable Urban Agriculture: Stocktake and Opportunities. *International Journal of Agricultural Sustainability*, Vol. 8, Issue 1 and 2.

7. Pearson, L. J. 2010. Urban Agriculture: Diverse Activities and Benefits for City Society. *International Journal of Agricultural Sustainability*, Vol. 8, Issue 1 and 2.

8. van Leeuwen, E., Nijkamp, P. and Vaz, T.N. 2010. The Multifunctional Use of Green Space: *International Journal of Agricultural Sustainability*. Volume 8, Issue 1-2.

9. Wallace, M. 2009. Types of Community Gardens. [Online Article] Available at: <http://www.slowfoodutah.org/articles> (Accessed 02 April 2012)

Papers:

1. Baird S.W. 2007. *The Early Minoan Colonization of Spain*. [online article] Available at: <http://www.minoanatlantis.com> [Accessed 02 April 2012]

2. Heang, K.B. 1997. *Sustainable Development: A Southeast Asian Perspective*. University of Malaysia: Kuala Lumpur.

3. Leonard, P.A. 1989. *A Place to Call Home. The Crisis in Housing for the Poor*. Washington DC: Center on Budget and Policy Priorities.

4. Nedučin, D., Carić, O. and Kubet V. 2009. *Influences of gentrification on identity shift of an urban fragment: A case study.* Faculty of Technical Sciences, Department of Architecture and Urban Planning.

5. O'Riordan, T. 1997. *Environmental Sustainability.* Norwich, UK: School of Environmental Studies. University of East Anglia.

6. United Nations Educational, Scientific and Cultural Organization. 1997. *A Trans Disciplinary Vision for Concerted Action*. New York.

Reports:

1. Voora, V.A. and Venema, H.D. 2008. *An Ecosystem Services Assessment of the Lake Winnipeg Watershed Phase 1 Report – Southern Manitoba Analysis*. International Institute for Sustainable Development.

Internet References:

1. Acid rain: [online] Available at: <http://www.epa.gov/acidrain>
   [Accessed 12 November 2012]

2. Cop 17: [online] Available at: <http://www.cop17-cmp7durban.com>
   [Accessed 14 November 2012]

3. Embodied energy: [online] Available at: <http://www.yourhome.gov.au/technical/fs52.html> [Accessed 14 November 2012]

4. ESCOM: [online] Available at: <www.eskom.co.za/content/The%20Solar%20Water%20Heating%20(SWH)%20Programme> [Accessed 21 October 2012]

5. Fresco, J. 2012 *The Future and Beyond: Beyond Utopia*. [online] Available at: <http://www.thevenusproject.com> [Accessed 21 October 2012]

6. Gardels, N, Editor of NPQ, 2007. [online] Available at: <http://www.digitalnpq.org> [Accessed 21 October 2012]

7. Google Earth: [online] Available at: <http://www.earth.google.com> [Accessed 05 October 2012]

8. Greenstone, C, 2004. Green Roof Pilot Project. [online] Available at: <http://GRPP www.greenroofdesigns.co.za> [Accessed 22 October 2012]

9. Grey water reuse: [online] Available at: <http://guelph.ca/living> [Accessed 05 November 2012]

10. History of Victoria Embankment: [online] Available at: <http://www.travelground.com/attractions/victoria-embankment> [Accessed 31 July 2012]

11. History of Victoria Embankment: [online] Available at: <http://www-cs-students.stanford.edu/~cale/cs201/apartheid.hist.html> [Accessed 31 July 2012]

12. LED Lights: [online] Available at: <http://www.ledlighting2011.typepad.com/blog> [Accessed 11 May 2012]

13. Map 1 - Locality Case Study Areas and South Durban Basin: [online] Available at: <http://www.docstoc.com/docs/73187827/Map-of-south-durban-basin/> [Accessed 11 May 2012]

14. Natural Resources Defense Council: [online] Available at: <http://www.nrdc.org/globalwarming> [Accessed 23 July 2012]

15. Panel Clad Freeway: [online] Available at: <http://www.solarroadways.com> [Accessed 23 July 2012]

16. Peter, F. [online] Available at: <http://www.ehow.com/facts_6850332_broken-window-theory-urban-decay> [Accessed 31 July 2012]

17. Pryor, T. *Broken Window Theory*. [online] Available at: <http://www.icms.net/brokenwindows.htm> [Accessed 31 July 2012]

18. Real Property Values: [online] Available at: <http://www.nps.gov/pwro/rtca/econ1> [Accessed 31 August 2013]

19. Society for Ecological Restoration. *Investing in our Ecological Infrastructure*. Washington, USA. [online] Available at: <http://www.ser.org> [Accessed 20 November 2012]

20. Urban Agriculture: [online] Available at: <http://www.hort.purdue.edu/newcrop/duke_energy/Solanum_tuberosum.html> [Accessed 05 November 2012]

21. Shipping Container Designs: [online] Available at: <http://www.webecoist.momtastic.com/2009/04/05/15-awesome-ways-to-reuse-shipping-containers> [Accessed 06 November 2012]

22. Solar Energy: [online] Available at: <http://www.geoliving.co.uk/solar/photovoltaic-cells> [Accessed 06 November 2012]

23. Solar Farms: [online] Available at: <http://www.ewh.ieee.org> [Accessed 06 November 2012]

24. Solar Panels on Freeways: [online] Available at: <http://www.greenenergy-solar.co.uk> [Accessed 07 November 2012]

25. South Durban Basin: [online] Available at: <http://www.durban.gov.za/City_Government/Administration/Area_Based_Management/South_Durban_Basin> [Accessed 31 July 2012]

26. Sweet Potato: [online] Available at: <http://www.agroatlas.ru/> and <http://www.wichitafallstx.gov/index.aspx?NID=617> [Accessed 31 July 2012]

27. The Business Dictionary: [online] Available at: <http://www.businessdictionary.com> [Accessed 06 November 2012]

28. The Heat Island Effect: [online] Available at: <http://www.epa.gov/heatisld/about/index.htm> [Accessed 06 November 2012]

29. The High Line Upgrade in New York: [online] Available at: <http://www.thehighline.org> [Accessed 06 November 2012]

30. The Point Development: [online] Available at: <http://www.durbanpoint.co.za> [Accessed 22 August 2012]

31. Tilford, D. 2000. *Sustainable Consumption: Why Consumption Matters*. [online] Available at: <http://www.sierraclub.org/sustainable_consumption/> (Accessed 22 August 2012]

32. Tubers: [online] Available at: <http://www.hort.purdue.edu/newcrop/duke_energy/Solanum_tuberosum.html> [Accessed 22 August 2012]

33. Urban Dictionary: [online] Available at: <http://www.urbandictionary.com/define.php?term=ebonics> [Accessed 31 August 2012]

34. Vertical gardens: [online] Available at: <http://www.verticalfarm.com> [Accessed 30 August 2012]

35. Valen, S. 2012. Mobile homes: [online] Available at: <http://www.inhabitat.com/stackable-mobile-home-tower-takes-portable-housing-to-new-heights/> [Accessed 06 November 2012]

36. Viljo, E.M. 1994. Biography of Alvar Aalto. [online] Available at: <http://www.kansallisbiografia.fi/english/?id=1408> [Accessed 31 August 2012]

37. Wind Turbines: [online] Available at: <http://www.ecofriend.com> [Accessed 31 August 2012]

38. World Health Organization: [online] Available at: <http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/index.html> [Accessed 06 November 2012]

Other Media:

Documentary Film:

The 11th Hour. 2007 : Narrated by Leonardo Di Caprio, directed by Leila Conners Petersen and Nadia Conners and financed by Adam Lewis and Pierre André Senizergues, and distributed by Warner Independent Pictures.

Interviews:

Professionals:

1. Frik Lange - Professional Architect and Partner of Osmond Lange Architects and Green Building Council of South Africa Organisation Member. Interviewed at Westville, Durban (25 October 2012).

2. Philip Rutkiewicz - Professional Architect and accredited members of the Green Building Council of South Africa.

3. Shan Gungaparsad - Landscaper and owner of Palm Garden Centre. Interviewed at Mt Edgecombe , Durban (25 October 2012).

4. Clive Greenstone - Planner, urban designer and roof garden specialist. Interviewed at UKZN, Durban (23 October 2012).

5. Mithasha Mistrey - Candidate Architect. Interviewed at, Durban (26 October 2012).

6. Sudeshna Nair - Pr Architect and Candidate Planner. Interviewed at, Durban (25 October 2012).

Public:

Public interviews were carried out in and around the study areas between October and December 2012 during site visits. The professionals interviewed were also given the public questionnaires to fill in as part of the interview. This information was used in tables 4.3.1 and 4.3.2. The documents were shredded once the information was tabulated (Appendix A).

Separate general interviews which did not follow the formal structure of the questionnaires were also carried out, of which two have been used to justify statements that were made. The two interviewees have been given pseudonyms as they asked not to be named. ‘Sipho’ was interviewed at the Point waterfront development and ‘Officer John’ was interviewed at Albert Park.

Professionals were interviewed at their various premises/places of employment making use of the questionnaire created for professionals (Appendix B).

Appendix A

Public Questionnaires

Interview sheet : For **University of Kwa Zulu Natal** research document

Sample Group Questionnaire for General Survey

Age of interviewee:_____ [M] [F]

1) Do you live in the city? [Y] [N]

If Yes then what type of building is it ? [Multistory [ ] Single Story [ ] Town House

2)Do you work in the city? [Y] [N]

If Yes then what type of building is it ? [Multistory [ ] Single Story [ ] Town House [ ]

3)What does lost or wasted space mean to you? What do you understand by wasted space?

_____

_____

_____

4)Does your building have any lost or wasted space that (if question 1 =Yes)

_____

_____

5) In your opinion, does the city have any lost or wasted spaces ? [Y] [N]

If **yes,** What and which area?

_____

_____

6) Do yo use the parks, gardens or other green spaces in your city [Y] [N]

If **No** why not?

_____

_____

Scoring System 1=Strongly disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly agree

Private transport is important to me	1	2	3	4	5
Public transport is important to me					
I would use public transport if it were more reliable & safe					
I think green spaces should only grow plants & be for recreation					
I think green spaces should be used to grow food & for recreation					
Government should promote urban agriculture in wasted space					
All buildings should start to go green in some way					
More needs to be done to combat global warming & climate change					
DBN has far too many parking lots, S & ML & not enough greenspaces					

Appendix B

Questionnaires for Professionals

Interviewees Name: _____

(1) How long have you been an architect for?

(2) What do you consider to be a lost or wasted space?

(3) What do you consider to be a wasted space on a building?

(4) What do you consider to be a lost or wasted space with regards to a city firstly and secondly what about Durban in particular?

(5) What do you think would be a better suited use to the spaces that you consider to be a lost or wasted space?

(6) Do you think that Durban and in fact any city in South Africa should be a “car free zone” please elaborate?

(7) How do you think the city of Durban could improve on its public transport infrastructure?

(8) With the current problems of global warming on the rise, who do you think are the key role players in tackling this problem, please elaborate?

(9) Do you think that we can use some of the lost and wasted space in the city to try and tackle the problems of global warming and climate change?

(10) Do you consider green spaces in the city of durban to be lost spaces? do you make use of the green spaces in the city? if not why?

(11) Do you think that Urban Agriculture should / could be incorporated into public parks?

(12) What are your thoughts on using the road verges along the in and outbound city freeways and train lines for urban agriculture, as this has been cited as a lost space?

(13) Do you think that lost spaces should be used for low income housing?

(14) Do you think that all buildings in the city should go green? How & why?

(15) What methods in your opinion should Architects put into place to ensure that their buildings do not create lost or wasted space?

(16) Do you think that wasted space is a major problem in the city of Durban?

Interviewees Name: _____

(1) How long have you been a Planner for?

(2) What do you consider to be a lost or wasted space?

(3) What do you consider to be a lost or wasted space with regards to a city firstly and secondly what about Durban in particular?

(4) What do you think would be a better suited use to the spaces that you consider to be a lost or wasted space.

(5) Do you think that Durban and in fact any city in South Africa should be planned for in future to be a “car free zone” please elaborate.

(6) How do you think the city of Durban could improve on its public transport infrastructure.

(7) Do know of any government policies which consider lost or wasted space in any way

(8) Do you think that NEMA could incorporate the use of lost or wasted space in any way

(9) With the current problems of global warming on the rise, who do you think are the key role players in tackling this problem, please elaborate

(10) Do you think that we can use some of the lost and wasted space in the city to try and tackle the problems of global warming and climate change

(11) Do you consider green spaces in the city of durban to be lost spaces? do you make use of the green spaces in the city? if not why?

(12) Do you think that Urban Agriculture should / could be incorporated into public parks

(13) What are your thoughts on using the road verges along the in and outbound city freeways and train lines for urban agriculture, as this has been cited as a lost space

(14) Considering the housing shortage in South Africa, do you think that lost spaces should be used for low income housing?

(15) Do you think that all buildings in the city should go green? How & why?

(16) What methods in your opinion should Architects put into place to ensure that their buildings do not create lost or wasted space.

(17) In your opinion, how can planner and planning in general be better implemented so that lost and wasted spaces are reduced.

(18) As the IDP os the standard document for all planning and strategic projects for a municipality, do you think that lost and wasted space should / could form part of the IDP?

(19) Do you think that planning is in any way responsible for the lost and wasted spaces in the city?

Interviewees Name: _____

(1) How long have you been a Landscaper for?

(2) What do you consider to be a lost or wasted space?

(3) What do you consider to be a wasted space on buildings and surroundings?

(4) What do you consider to be a lost or wasted space with regards to a city firstly and secondly what about Durban in particular?

(5) What do you think would be a better suited use to the spaces that you consider to be a lost or wasted space?

(6) Do you think that Durban and in fact any city in South Africa should be a “car free zone”, please elaborate?

(7) With the current problems of global warming on the rise, who do you think are the key role players in tackling this problem, please elaborate?

(8) Do you think that we can use some of the lost and wasted space in the city to try and tackle the problems of global warming and climate change?

(9) Do you consider green spaces in the city of durban to be lost spaces? Do you make use of the green spaces in the city? If not, why?

(10) Do you think that Urban Agriculture should / could be incorporated into public parks?

(11) What are your thoughts on using the road verges along the in and outbound city freeways and train lines for urban agriculture, as this has been cited as a lost space?

(12) Do you think that lost spaces should be used for agriculture?

(13) Do you think that all buildings in the city should go green? How & why?

(14) What methods in your opinion should be put into place to ensure better use of lost or wasted space in general?

(15) Do you think that wasted space is a major problem in the city of Durban?

Appendix C

Maps of Case

Study Area

LOCALITY MAP

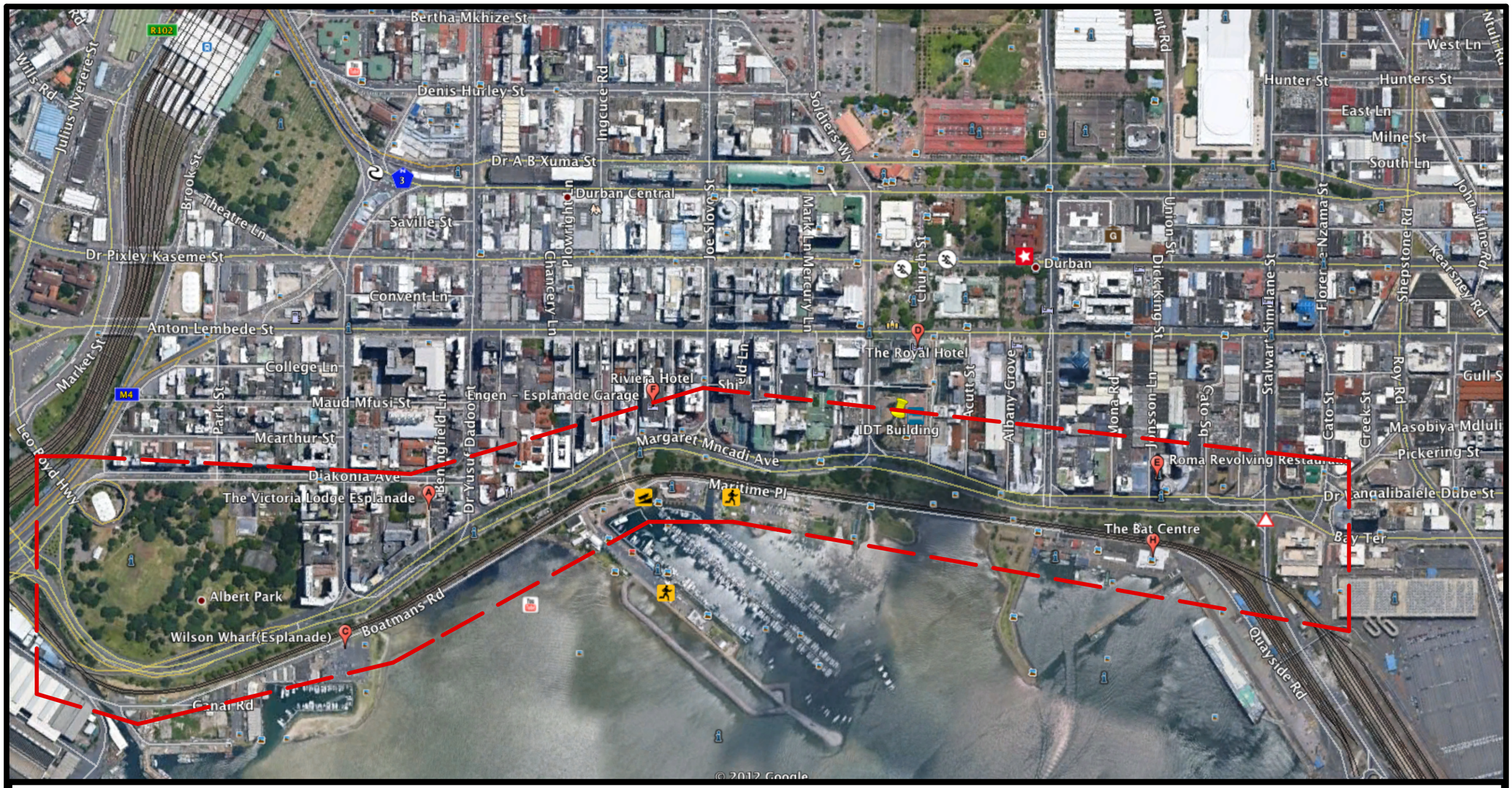
Durban Esplanade -
(Margaret Mncadi Ave)

Kelvin Gungaparsad
204513529
(Source : Google earth)

CASE STUDY - DURBAN

KEY

- Area of interest
- Buildings of interest
- Main street intersections



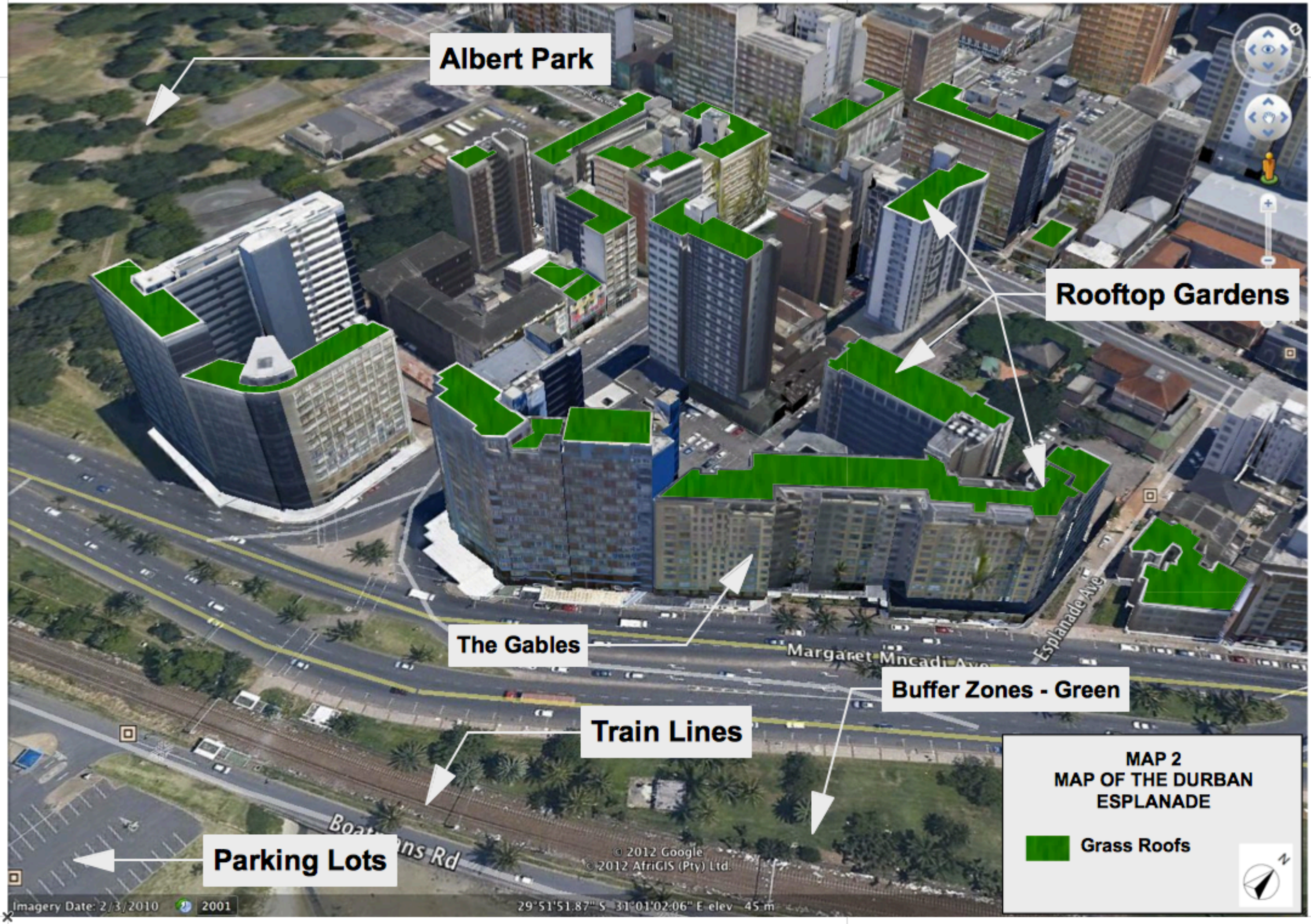
LOCALITY MAP

Durban Esplanade -
(Margaret Mncadi Ave)

Kelvin Gungaparsad
204513529

(Images via : Google earth)

—— Case Study Area


Albert Park
Rooftop Gardens
The Gables
Buffer Zones - Green
Train Lines
Parking Lots
Margaret Mncadi Ave
Esplanade Ave
© 2012 Google
© 2012 AfriGIS (Pty) Ltd.
Imagery Date: 2/3/2010
2001
29°51'51.87" S 31°01'02.06" E elev 45 m
MAP 2
MAP OF THE DURBAN ESPLANADE
Grass Roofs
N

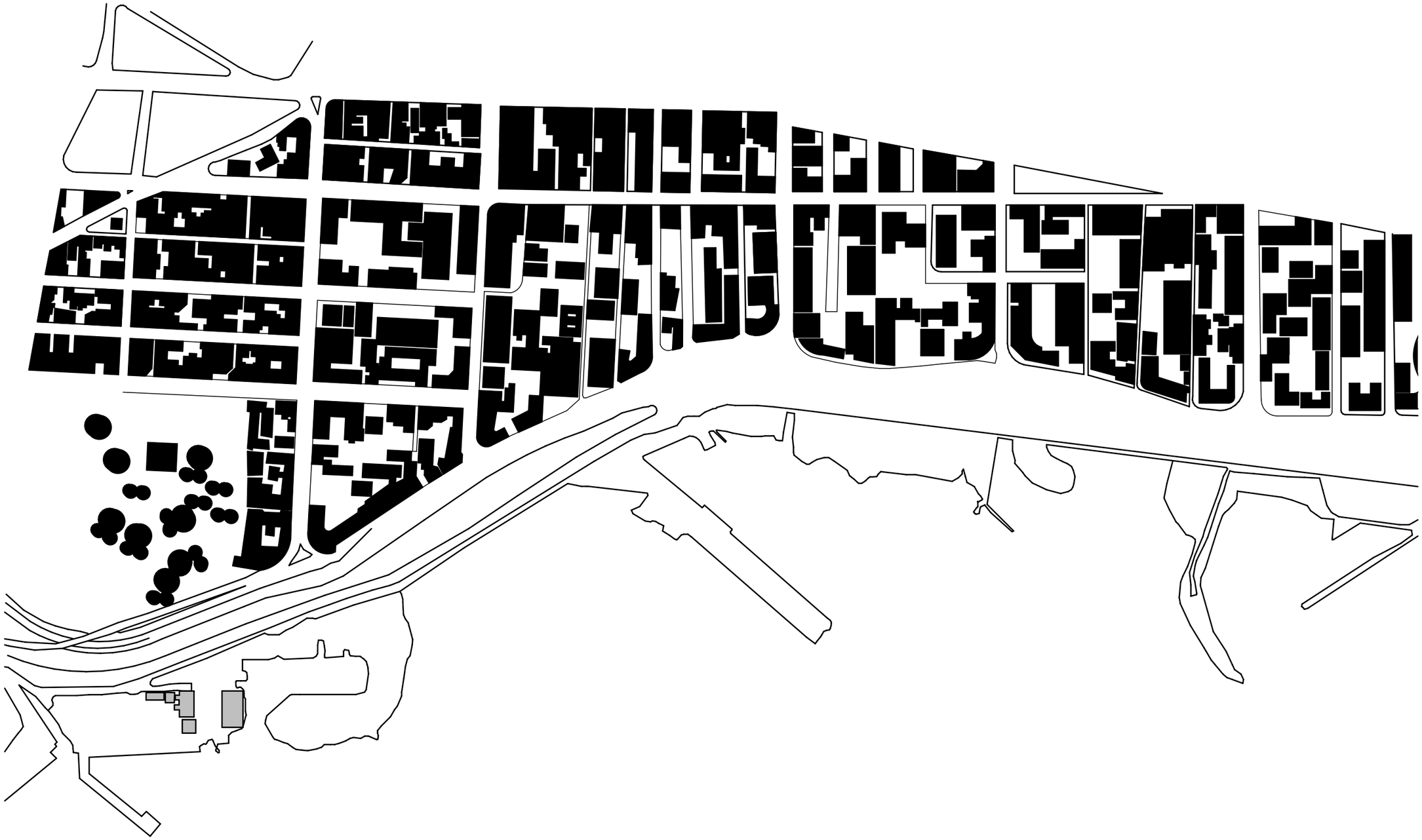


FIGURE GROUND STUDY OF CASE STUDY AREA

Kelvin Gungaparsad
204513529