Rethinking sustainable development: The economic value of green spaces

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ELIZELLE JUANEÉ CILLIERS
Student number: 12248029

TRP (SA)
M.Art et Scien (Urban Planning)
PhD (Urban Planning)

Dissertation submitted for the partial fulfilment of the degree Magister Commercii (Economics)

North-West University
Potchefstroom Campus

2010

Supervisor: Prof. W. F. Krugell
Nov 2010
Potchefstroom

Acknowledgements

"If the only prayer you said in your whole life was 'thank you',
that would suffice..."

A sincere thank you to:

Prof. Waldo Krugell for his insights and help, and for opening up a new academic world for me
Prof. Calie Schoeman for being my mentor and friend
Selna Cornelius for inspiration, motivation, and understanding
Mom and Dad for being my rock
Oca for being patient and allowing me to follow my heart
Louise Pekelharing for language editing
ERSA and National Treasury for providing funds for studies and workshops
Prof. Wim Timmermans for providing international collaboration opportunities
Wageningen University in the Netherlands for being my home away from home
North West University for providing me with endless opportunities in an academic career
God, for letting me be.

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Abstract

"Economics is a study of consequences of various ways of allocating scarce resources which have alternative uses. It is not a study of our hopes and values"
- Thomas Sowell –

Sustainable development is a utopian aspiration for most modern urban areas. Sustainable development, as defined in literature, always includes three dimensions: social aspects, the economy and the environment. Sustainable development is the fine balancing act of these three dimensions. However, ten years since the introduction of the sustainable development concept, it is still not fully realised in practice and implemented in the urban environment, and reasons are being sought to clarify this reality. This study evaluates sustainable development from a spatial planning and economics perspective, arguing that the unequal prioritisation between pro-development approaches and pro-environmental approaches is the greatest reason for unsustainable urban areas. The economy (along with development pressures) and the environment (along with green space protection initiatives) should be planned holistically in order to reach a state of urban sustainability. Reality reveals however, that the environment is often neglected, and sometimes sacrificed to benefit and enhance urban development. This is mainly a result of land-use planning decision-making and the perceptions of local authorities with regard to the function and value of environmental areas (green spaces), in comparison to urban areas. Urban areas are valued higher than green spaces; mainly because urban areas can be measured (valued) in terms of monetary value (property prices or revenue drawn from development) and green spaces mainly have indirect, unmeasurable value (social, environmental). This study aimed to link green spaces and economic benefit in an attempt to quantify the intrinsic value of the green spaces, as a way to enhance green space planning. The increasing rate of worldwide urbanisation is compounding this problem as green spaces are sacrificed for residential and commercial developments. This widespread trend of green space loss is of international concern. From the objectives of urban economics and environmental (green) economics, it is believed that authorities will value green spaces better when a monetary value can be connected to it. The ability to influence land-use decisions is an essential economic development instrument, as land-use is an important factor in urban economic growth and development due to its contribution to desirability and productivity of a city. In this way economic theories and models can significantly enhance and guide future spatial planning decision-making processes. In the attempt to valuate green spaces in South Africa, Potchefstroom where used as a case study, identifying the linkages between local green spaces and residential property prices. Preliminary results were contrary to the general tendency in developed countries that property value increases with proximity to green areas, but it highlighted the city-scale and neighbourhood-scale benefit of green spaces. A tool was proposed for local authorities to evaluate green spaces in order to be able to compare revenue gained from developmental projects versus environmental projects on an equal platform, resulting in a balanced sustainable development vision and guide for future decision-making within the spatial planning process.

Opsomming

"Ekonomie is nie 'n studie van ons hoop en waardes nie"
- Thomas Sowell –

Volhoubare ontwikkeling is 'n utopiese strewe vir die meeste moderne stede. Volhoubare ontwikkeling, soos omskryf in die literatuur, sluit altyd drie dimensies in: sosiale aspekte, die ekonomie en die omgewing. Volhoubare ontwikkeling poog om hierdie drie dimensies te balanseer. Tien jaar sedert die bekendstelling van die konsep van volhoubare ontwikkeling, is dit steeds nie ten volle geïmplementeer of gerealiseer in die stedelike omgewing nie Redes word gesoek om hierdie werklikheid te verduidelik. Hierdie studie evalueer die volhoubare-ontwikkeling konsep vanuit 'n ruimtelike beplanning en ekonomiese perspektief, met die argument dat die ongelyke prioritisering tussen pro-ontwikkelingsbenaderings en pro-omgewingsbenaderings, die grootste rede vir onvolhoubaarheid in die stedelike gebiede is. Die ekonomie (en druk vir ontwikkeling) en die omgewing (en groen-ruimte beskermingsinisiatiewe) moet geïntegreerd beplan word ten einde stedelike volhoubaarheid te bereik. Die werklikheid getuig egter daarvan dat stedelike ontwikkeling plaasvind ten koste van die omgewing, dikwels verwaarloos word, en soms opgeoffer word. Dit is hoofsaaklik 'n gevolg van beplanningsbesluite van grondgebruik en die persepsies van die plaaslike owerhede oor die funksie en waarde van die groen ruimtes, in vergelyking met stedelike gebiede. Stedelike gebiede word hoër as groen ruimtes gewaardeer, veral omdat stedelike gebiede gemeet kan word in terme van monetêre waarde (eiendomspryse en inkomste wat uit die ontwikkeling spruit) terwyl groen ruimtes hoofsaak indirekte, onmeetbare waarde inhou (sosiaal, omgewing). Hierdie studie poog om 'n verband te trek tussen groen ruimtes en ekonomiese voordeel, met die doel om die intrinsieke waarde van die groen ruimtes te kwantifiseer en sodoende groen ruimte beplanning te stimuleer. Die toenemende tempo van wêreldwye verstedeliking vererger hierdie probleem en groen ruimtes word opgeoffer vir residensiële en kommersiële ontwikkelings. Die tendens van groen-ruimte verlies is van internasionale belang. Vanuit die vertrekpunte van stedelike ekonomie en omgewingsekonomie, word daar geglo dat die plaaslike owerhede groen ruimtes beter sal waardeer, indien 'n finansiële waarde daaraan gekoppel kan word. Die vermoë om grondgebruikbesluite te beïnvloed is 'n belangrike ekonomiese ontwikkelingsinstrument, omdat grondgebruik 'n belangrike faktor in stedelike ekonomiese groei en ontwikkeling is, danksy die bydrae tot leefbaarheid en produktiwiteit van 'n stad. Ekonomiese teorieë en modelle kan dus 'n aansienlike bydrae lewer tot toekomstige ruimtelike beplanning en besluitnemingsprosesse. In die poging om die waarde van groen ruimtes in Suid-Afrika te bepaal, is Potchefstroom as studiegebied gebruik, waar die verband tussen die plaaslike groen ruimtes en woonhuispryse bepaal is. Voorlopige resultate was kontrasterend tot die algemene tendens in ontwikkelde lande waar woonhuispryse verhoog het soos afstand vanaf die groen ruimtes verminder het, maar dit het wel die stad-skaal en woonbuurt-skaal voordeel van groen ruimtes uitgelig. 'n Instrument om groen ruimtes te evalueer is voorgestel, om sodoende inkomstes van ontwikkelingsprojekte teenoor omgewingsprojekte te kan vergelyk. Dit sal lei tot 'n gebalanseerde, volhoubare ontwikkelingsvisie vir toekomstige besluitneming binne die ruimtelike beplanningsproses.

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Table 1: Acronyms.

CBD	Central Business District
CO_2	Carbon Dioxide
DEAT	Department of Environmental Affairs and Tourism
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
EM	Environmental Management
EMP	Environmental Management Plan
EU	European Union
FAR	Floor area ratio
GIS	Geographic Information Systems
HSP	Housing Sector Plan
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
LG	Local Government
LM	Local Municipality
LM SDF	Local Municipality Spatial Development Framework
LUMS	Land Use Management Scheme
MDG	Millennium Development Goals
MFMF	Municipal Finance Management Act
MOSS	Municipal Open Space System
MSIG	Municipal Strategic Investment in Green
NEMA	National Environmental Management Act
NSDP	National Spatial Development Perspective
NSDS	National Sustainable Development Strategy
NW DACERD	North West Department of Agriculture, Conservation, Environment and Rural Development
NW SDF	North West Spatial Development Framework
NWPG	North West Provincial Government
NWU	North West University
PGDS	Provincial Growth and Development Strategy
SA	South Africa
SD	Sustainable Development
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SMIG	Strategic Investment in Green Spaces
TLM	Tlokwe Local Municipality
TPS	Town Planning Scheme
UGB	Urban growth boundary
WSSD	The World Summit on Sustainable Development

Chapter 1: Introduction

"To change life, we must first change space"
- Henri Lefebvre, French writer -

1.1 Points of departure

The cities of today have to be competitive. They operate in a global marketplace, competing with other urban settlements around the world for investment (City Alliance, 2007:66). The cities of today have to be sustainable. This implies, balancing the social needs of the citizens, the urban development pressures of economic growth and the protection and enhancement of the environment. Ten years after the introduction of sustainable development, cities in South Africa are still characterised by urban sprawl, fragmentation, and unsustainable urban spaces, raising questions about the current approach to sustainable development. Although there are many diverse, complex, and multi-phased reasons for the unsustainability of cities, having political, economic, and social dimensions, this study argues that the prevailing approach to spatial planning is part of the problem.

Spatial planning is constantly faced with conflicts between pro-development approaches and pro-environment approaches. Despite the vision of an integrated, holistic planning process, the environment and urban development are seen as opposing concepts with conflicting objectives. Current reality reveals that the environment is often sacrificed in order to benefit urban development (Cilliers, Diemont, Stobberlaar & Timmermans, 2010:23), mainly because green spaces are seen as a luxury, a visual attribute of the city, and not a necessity. There is no monetary value connected to the green spaces, as it is hard to quantify and measure green spaces in economic terms (Commissie Van Ek, 2009:9). Urban spaces on the other hand, are believed to be more valuable, which is to some extent due to the fact that their direct benefit can be determined in monetary value (in terms of property prices or revenue drawn from developments).

The exponential increase in the urban population places further pressure on the development sector, resulting in a reduction of the amount of available green spaces (Herzele & Wiedemann, 2002) and enhancing an unbalanced approach and prioritisation of 'development' above the 'environment'. Within the last decade the environmental dimension gained importance when literature and case studies revealed that cities which integrate the environment in spatial planning processes benefit in many ways (Van Leeuwen *et al.,* 2009; Baycan-Levent *et al.,* 2008; Kuo, 2003; Wolf, 2004; Luttik, 2000). "Such cities are more liveable, more equitable, and more inviting to investors." (City Alliance, 2007:66.)

"Simultaneously, the public's demand for green space is becoming stronger in terms of aesthetic enjoyment, recreation, and access to clean air or quiet environments." (Liu, Mao, Zhou, Li, Haung & Zhu, 2007:1.) Everyday environments are of great importance to the health of communities (Stigsdotter, 2007:3). It is thus emphasised that environmental aspects (particularly green spaces) are gaining importance, especially from a sustainable development point of view, but also endangered due to increasing urban development pressures. This fine balance between protecting green spaces and developing urban spaces should be carefully managed, as land-use is an important factor in urban economic growth and development. Land-use patterns contribute to the desirability and productivity of a city and the ability to influence land-use decisions is therefore an essential economic development instrument. This, together with the comparative evaluation of existing urban green spaces (and the objective to determine the economic value of green spaces which is currently not defined in literature), is new and challenging tasks for urban development and urban research (Kasperidus, Weiland & Richter, 2007:1).

1.2 Problem statement

Urban development often occurs at the expense of green spaces. This dissertation argues that it happens due to the perception that green spaces have little or no economic value, as reflected in local authority decision-making. This study examines ways to link green spaces and economic benefit, in an attempt to determine the economic value of green spaces, as this interface will strengthen the current local sustainable development approach and enhance green space planning.

1.3 Primary research questions

The primary research questions addressed in this dissertation include the following:

- Can green spaces enhance the current sustainable development approach?
- Can the economic value of green spaces be determined?
- Is there scope in the South African context (particular Potchefstroom) to enhance green space planning?

1.4 Aims and objectives of this study

The objective of this research is to rethink the current sustainable development approach in terms of the linkage between green spaces and economic benefit, and the contribution thereof to future urban development decision-making processes. The theoretical founding and literature research aim to:

- Capture relevant definitions and the status quo applicable to the research theme.
- Illustrate policy and legislative linkages with regard to 'environmental' protection versus urban 'development'.
- Identify and evaluate current sustainable development approaches.
- Evaluate urban economic and green economic theories and with regard to the theme of this research.
- Capture international lessons and best practices with regard to green-planning approaches.

The empirical research aims to:

- Determine the linkages between green spaces and economic value.
- Determine the local scope for green space planning to enhance economic value.
- Present a case study of different approaches to determine the value of green spaces.
- Evaluate the possibility of an interface between spatial planning, urban economics, and the environment.
- Evaluate the possibility of a planning tool to guide integrative, economically driven, green space planning.
- Integrate the above mentioned and to use it to the advantage of the economy and the people of South Africa.

1.5 Method

The concepts 'environment' and 'development' were specified in this document as the study aimed to engage with both concepts (which are the core forces present in the current urban environment and part of the dimensions of sustainable development). In an attempt to rethink the balance and sustainability of these concepts, the economic value of green spaces was evaluated as the proposed interface between 'development' and the 'environment'. To understand the interconnection between these concepts, the following methods were used in the study:

- Extensive reviews of literature with regard to sustainable development and spatial planning (as well as the underlying dimensions of urban economics and green economics) internationally and locally.
- Reviews of international case studies included in the INTERREG IVB North West Europe project, 'Valuing Attractive Landscapes in the Urban Economy' and related studies based on the value of green spaces.
- Structured interviews with experts in the fields of spatial planning, economics and environmental management (green-planning) to determine the current and future value of green spaces as perceived by the authorities planning for these spaces.
- Surveys (questionnaires) completed by residents in an attempt to determine the current and future value of green spaces as perceived by the actual users of these spaces.

Figure 1 illustrates the conceptual model of the research process.

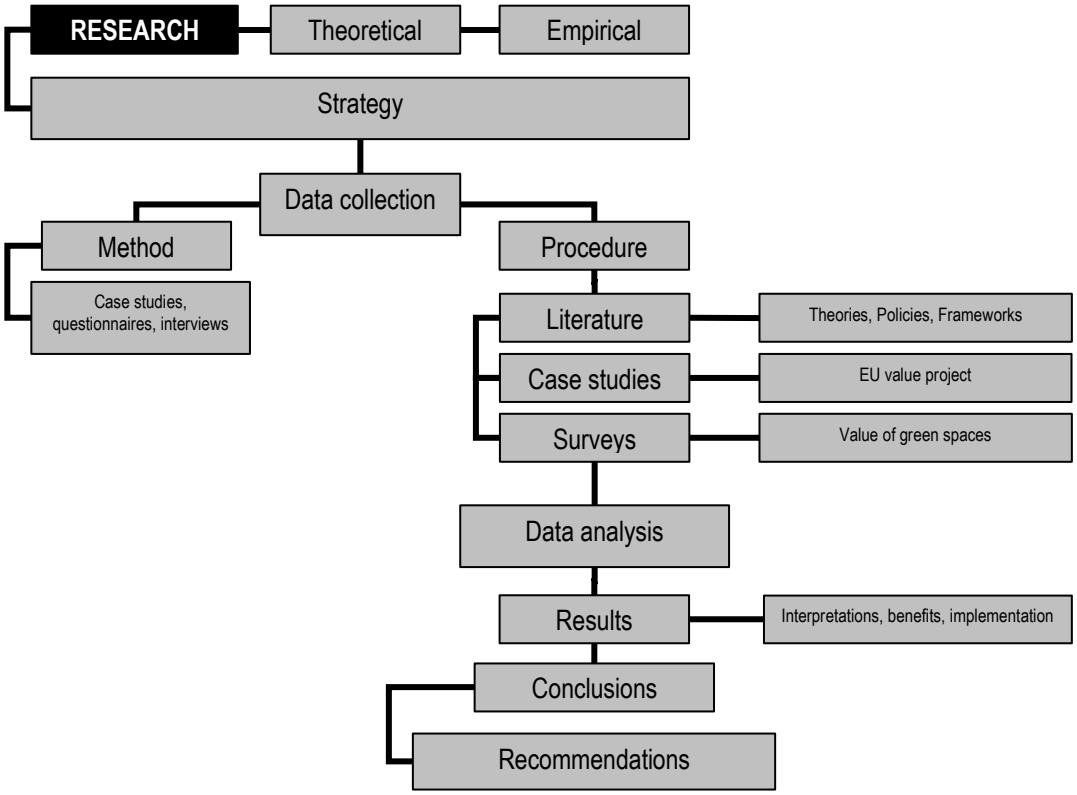


Figure 1: Conceptual model of the research process.

Source: Own construction (2010).

1.6 Delineation of the Study Area

The international studies were based on the INTERREG IVB North West Europe project (Valuing attractive landscapes in the urban economy), including case studies in the United Kingdom, the Netherlands, Belgium and Germany. The local case study was undertaken in Potchefstroom, within the Tlokwe Local Municipality, North West Province (South Africa).

1.7 Limitations of the research

The research is multi-disciplinary in nature, employing methodologies from environmental economics, urban economics, public participation studies, urban planning, ecology, and geography to form a wide-ranging, yet detailed analysis, of the subject matter. The study is based on the hypothesis that urban green space makes an essential contribution to quality of life and should therefore be connected to a monetary value. Reliability of results are limited by assessment of green spaces, which is based on first impressions of users (residents) of the spaces, and it should be noted that 'value' is subjective and will differ between people, between municipalities, between areas and between spaces. Attractive qualities may thus differ within a space or vary greatly from space to space, limiting the validity of standardised measurements to connect an economic value to green spaces.

1.8 Structure of the dissertation

The following is a summary of the structure and content of the remainder of the dissertation:

Chapter 2: The sustainable development approach is described and placed in international and local context, illustrating the linkages with the concepts of spatial planning, urban economics and green economics.

Chapter 3: The economic value of green spaces is analysed in terms of common goods, overall values of green spaces, the aspects that have an impact on the value of these spaces, specific spatial analysis methods to determine these values and relevant approaches to determine green-value in the empirical study.

Chapter 4: The case study of Potchefstroom is presented, as basis of the empirical investigation, describing the specific empirical approaches used, the details of the desktop studies and new data collection from interviews and surveys, and the findings of the empirical investigation.

Chapter 5: Conclusions are drawn, with specific reference to sustainable development and green spaces, as well as the economic value of green spaces.

Chapter 6: Recommendations are presented, based on the proposed tool (Municipal Strategic Investment in Green, MSIG), in order to maximise competitive benefits of green spaces and guide long term strategy proposals.

1.9 Definitions

The following are important definitions of applicable terminology that were used in this study. These concepts are implemented within a spatial planning and urban economic context, as their meanings will illustrate. These definitions have been formulated to relate to the context of the research theme. It refers to existing policy and legal frameworks applicable to the research.

Table 2: Glossary.

Active recreation	Recreation such as golf and organised baseball that depends on developed facilities.
Agenda 21	A programme of action for sustainable development, which was adopted by the General Assembly of the United Nations following the Earth Summit in Rio de Janeiro in 1992. The need to include the social and economic dimensions of development, in addition to concerns for the natural environment.
Corridor	Adjoining land forming a passageway or connection between land areas.
Development	A process for improving human well-being through a reallocation of resources that involves some modification of the environment. It addresses basic needs, equity and the redistribution of wealth.
Economic development	The increase in the number of people in a nation's population with sustained growth from a simple, low-income economy to a modern, high-income economy. Its scope includes the process and policies by which a nation improves the economic, political, and social well-being of its people.

Environmental management	The management of the environmental aspects and elements to enhance the qualities of the natural environment.
Environmental sustainability	Environmentally sustainable activities do not deplete environmental resources faster than they can be regenerated. It is the ability of an activity to continue indefinitely, at current and projected levels.
Externalities	The "spill over" effects, the results of production or market transactions that affect individuals not directly involved in the process itself. It is difficult to calculate, and the measurement is even more difficult in the contemporary service economy.
Greenbelt	A belt of parkways, parks, farmlands, and open space that is often at the edge of, or passing through, an urban area or community.
Green economics	Results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.
Green planning	Comprehensive management planning that has the final goal of achieving environmental and economic sustainability.
Green spaces	Land in natural or un-built condition that is proximate and easily accessible to residences and work places; and serves as recreational paths for people; and is protective of natural habitat.
Integrated development	The interrelationship between economic activities and other development dimensions such as social, demographic, institutional, infrastructural, financial and environmental aspects.
Integrated environmental management	A code of practice ensuring that environmental considerations are fully integrated into the management of all activities in order to achieve a desirable balance between conservation and development.
Land development	The process of building and landscaping land in order to enhance its commercial or social value.
Land-use planning	Planning of human activity to ensure that land is put to optimal use, taking into account the different effects that land-uses can have in relation to social, political, economic and environmental concerns.
Land value	The practice of developing an opinion of the value of real land.
Local government	A local authority that is officially responsible for all the public services and facilities in a particular area, whose remit covers an area less than that of the nation, in this study, the municipality.
Marginal principle	The level of an activity where the marginal benefit equals the marginal cost.
Mixed-use development	Mixed-use development locates residential, commercial and industrial land-use in close proximity to one another.
Municipality	An administrative entity with a clearly defined territory and population, governed by the local authorities or local government.
Municipal planning	Planning by municipal government for the more effective management of its functions.
New economy geography	The study of location of economic activity across space, to help explain why industries cluster within specific countries and regions
Nodes	A place where both private and public investments tend to concentrate. Nodes are different in terms of size, the types of activity that occur within them, the size of the areas served and the significance within the city.
Open space	Undeveloped land.
Public green space	Permanently protected green space in urban areas which, in addition to the attributes associated with green space in general, provides alternative benefits and enhances a more natural, green setting.
Public value	The widely held perceptions of the public regarding the function and service contributions of any public entity.
Rural character	Areas containing natural landscapes with an informal placement of trees. The area is characterised by indigenous vegetation, and increasing agricultural activities.
Spatial development planning	A participatory process to integrate economic, sectoral, spatial, social, institutional, fiscal and environmental strategies in order to support the optimal allocation of scarce resources between sectors and geographic areas, and across the population, in a manner that promotes sustainable development, equity, and empowerment of poor and marginalised communities and groups.

Spatial integration	Spatial integration is a strategy for doing away with the expensive and exclusionary land-use patterns. It seeks to enhance the efficiency of the city by minimising distances, reducing the costs of development, enhancing social dimensions and increasing the access in the city.
Sustainable development	Sustainable development implies economic growth together with the protection of environmental quality, each reinforcing the other. The essence of this form of development is a stable relationship between human activities and the natural world, which does not diminish the prospects for future generations to enjoy a quality of life at least as good as our own.
Spatial planning	Gives geographical expression to the economic, social, cultural and ecological policies of society. It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy.
Stand	South African term for a plot of land or land portion. Usually urban, zoned for building purposes. Also referred to as 'erf' or 'site'.
Urban	A city, town or node of activity. Closely linked to the density of development.
Urban area	Place with a very high population density, compared to the surrounding area.
Urban economics	The analysis of economic activity in cities, most frequently in terms of the spatial distribution of populations.
Urban green space	Public and private open spaces in urban areas, primarily covered by vegetation, which are directly (active or passive recreation) or indirectly (positive influence on the urban environment) available for the users.
Urban growth management	A term that encompasses a whole range of policies designed to control, guide or mitigate the effects of urban growth.
Urban sprawl	An undesirable situation in which the geographical size of the city keeps expanding to include development of new areas. The antithesis of a compact city.
Urban environmental amenities	All those natural assets including green spaces that are aesthetic, ecological, and economic in nature, as well as those that have a physical or psychological effect on human health, such as pollution control, noise abatement, and the provision of recreational opportunities (Tyrväinen & Miettinen, 2000).
Zoning	The division of a community into districts in which certain activities is prohibited and other are permitted.

Source: Own construction based on Kramer, 2009; The South African Cities Network, 2005; Wolf, 2004; Brundtland Commission, 1987; Baycant-Levent *et al*., 2005; Wyly, 2010:2; Oxford Dictionary, 2010; Cemat, 2010; UNEP, 2010.

With these concepts in place, the notion of sustainable development was described within the context of this research, as captured in chapter 2.

Chapter 2: Sustainable development approach

"Land is an asset. Land is scarce. Land is fragile"
- White Paper on Spatial Planning -

2.1 Background

"Land is an asset. Land is scarce. Land is fragile. These three statements reflect the basic relationships of humankind with land" (Du Toit, 2001:1) and capture the three core dimensions of sustainable development: social, economic and environmental, acknowledging that there are various other determining factors as well. Complexity and multi-functionality is stressed, as land is a sensitive topic, especially when confronted with the sustainable development thereof. This chapter focuses on the different approaches towards sustainable development and the implementation thereof in a local South African context. It furthermore investigates the dimensions of sustainable development, with regard to urban economics and green economics, and the local implementation of these dimensions.

2.2 Sustainable development

"Sustainable development implies economic growth, together with the protection of environmental quality, each reinforcing the other." (Cross-reference to Table 2, Brundtland Commission, 1987.) Sustainable development is one of the most fundamental challenges confronting humanity and a utopian aspiration for South African cities, which are still characterised by fragmentation and unsustainable development patterns.

In theory, development that is sustainable and not damaging is possible, but in reality, there are politics and numerous challenges involved (Shah, 2007:1). "While everybody agrees about the need for sustainable development, operationalising this consensus goal in public policy is extremely difficult because there is as yet no commonly accepted definition of the term." (Paul, 2006:1.) In terms of spatial planning, sustainable development implies a fine balancing act (Emmett, 1998:1) as it is not merely development that can be sustained, but development that would allow the achievement of a state of sustainability.

The concept of sustainable development has existed for as long as the urban planning concept has existed. In Greek antiquity, philosophers such as Plato (400 BC) described the relation between man and the nature, and the depletion of the natural system. Attention was given to the size of the population, the availability of natural resources, the total area of fertile land and a strong sense of nature's usefulness. This idea that everything in nature has a purpose influenced the western world until today (Van Zon, 2006:2).

The Brundtland Commission (1987) defined Sustainable Development as "development that meets the needs of the present without compromising the ability of future generations to meet their needs and aspirations". Within all definitions of sustainable development, three core dimensions are present: people (social aspects), place (environmental aspects) and profit (developmental aspects), as illustrated in Figure 2.

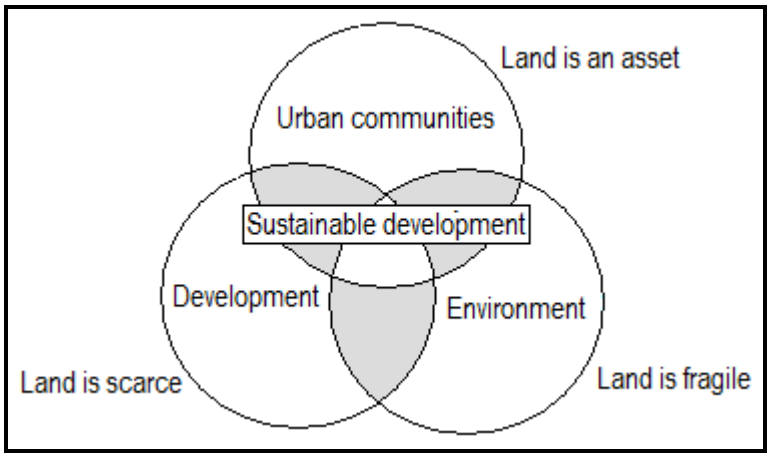


Figure 2: Core dimensions of sustainable development.

Source: Own creation (2010).

Since democracy was introduced in South Africa in 1994, more than 800 policy documents have been written to guide sustainable development (Schoeman, 2010). Within the development-planning sector, the notion of sustainable development was translated into a physical ideal, directly related to human development and progressive land-use management with the aim to generate economic growth opportunities, and the equal distribution of the benefits (Gauteng, 2007:19).

However, there was never one holistic policy to guide integrative sustainable development, but the concept and dimensions were captured within various policies and pieces of legislation, as summarised in Table 3, including the Environment Conservation Act number 73 of 1989, the Development Facilitation Act number 67 of 1995, the Constitution of the Republic of South Africa, Act 108 of 1996, the Urban Development Framework of April 1997, the National Environmental Management Act number 107 of 1998, the Green Paper on Development and Planning of April 1999, the Municipal Systems Act number 32 of 2000, the Land Use Management Bill of 2003 and the National Spatial Development Perspective of 2006. These guiding policies and legislation and their relation to sustainable development are summarised in Table 3.

Table 3: Sustainable development guided by applicable legislation and policies in SA.

Date	Name	Guide	Relation to sustainable development
1989	Environment Conservation Act No 73 of 1989.	Legislation	To provide for the effective protection and controlled utilisation of the environment and for matters incidental thereto.
1995	Development Facilitation Act No. 67 of 1995.	Legislation	A "fast-track" approach to development. It resolves conflicts through "development tribunals" at provincial level. Facilitates development of settlements, discourages land invasions, promotes efficient and integrated land development, discourages urban sprawl, makes maximum use of resources and provides guidance and information to people.
1996	Constitution of the Republic of South Africa (Act 108 of 1996).	Legislation	The supreme law of the country of South Africa that provides the legal foundation for the existence of the Republic of South Africa sets out the rights and duties of the citizens and defines the structure of the government of SA.
1997	Urban Development Framework. April 1997.	Policy	Examines current dilemmas and realities facing South Africa's urban areas. It provides a positive and common vision of a desired future for South Africa's urban areas in the year 2020. Contains Government's vision for sustainable urban settlements, as well as guidelines and programmes for the achievement of the vision.
1998	National Environmental Management Act (Nema). No. 107 of 1998.	Legislation	The National Environmental Management Act provides co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions; and matters connected therewith.
1999	Green Paper on Development and Planning. April 1999.	Policy	Focus is on co-operative governance between national, provincial and local spheres of government to establish a shared vision and consistent direction for spatial development based on protecting the rights of people and the environment.
2000	Municipal Systems Act No 32 of 2000.	Legislation	It is a legislated plan that supersedes all other plans that guide local development, enforced the IDP.
2003	Land Use Management Bill. 2003.	Policy	Provides for the uniform regulation of land use management in South Africa, sets principles for spatial planning, land development and land use management, and provides for spatial development frameworks.
2006	National Spatial Development Perspective (NSDP) 2006.	Policy	Ensure economic growth, government spending, future settlement and economic development in main growth centres, informs development plans and support government's national spatial development vision.

Source: Own creation from various sources (2009).

The sustainable development objectives as captured in these South African policies and legislation were implemented at national, provincial, and local level by means of the following mandatory frameworks and development guides as captured in Table 4.

Table 4: Sustainable development enforced in South Africa by frameworks and guides.

Environmental Impact Assessment (EIA)	Used within an Integrated Environmental Management (IEM) planning process as a decision support tool to compare different development options based on the environmental impact.
Strategic Environmental Assessment (SEA)	Ensure that environmental issues are addressed from an early stage in the process of formulating policies, plans and programmes, and incorporated throughout this process.
Land Use Management Schemes (LUMS)	The system of legal requirements and regulations that applies to land in order to achieve desirable and harmonious development of the built environment.
Spatial Development Frameworks (SDF)	Facilitate development within the local municipality in context to the metropolitan region within which it functions to achieve economic, social and environmental sustainability related to the IDP cycle.
Town Planning Schemes (TPS)	Describes the property zoning that is applicable and which determines such aspects as possible land use, floor area, coverage, building lines and parking provisions.
Integrated Development Plan (IDP)	Function of municipal management, as part of an integrated system of planning and delivery. Guides decisions on issues such as municipal budgets, land management, promotion of local economic development and institutional transformation.

Source: Own creation from various sources (2010).

Based on the above mentioned legislation and frameworks, and the comprehensiveness thereof, one would think that development in South Africa is sustainable. In reality, South African cities are characterised by fragmentation, urban sprawl and unsustainability, mainly due to politics and other challenges (social, cultural, economical) and therefore theory and practice are still far apart in this regard. This dissertation aims to rethink sustainable development from a spatial planning and economic perspective, focussing on the environmental- and developmental aspects, which guide current spatial planning approaches. Figure 3 explains the sustainable development approach of this line of research.

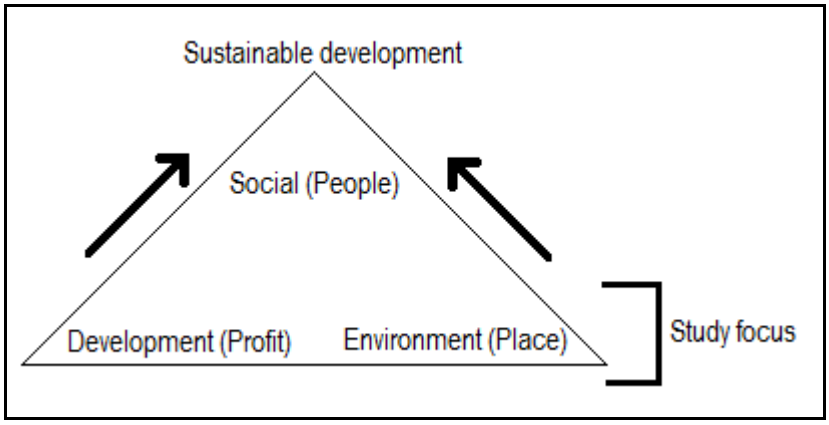


Figure 3: Sustainable development approach of this research.

Source: Own creation (2010).

The economic (or development) dimension and the environmental dimension are currently unbalanced and in constant conflict, mainly due to the green-value-gap that exists. The green-value-gap is the gap in understanding the concepts of development, economics, and environment, along with the impacts, benefits, and opportunities it offers to urban life. Leonardo da Vinci believed that it was important to understand the connections between the "art of science" and the "science of art." His argument was that his success in one field was due to his understanding of how the other field works, namely anatomy and art (Sertiglanges, 1992). This is also the case with economics and the environment. The environmental-approach does not understand the economic-sector, and the financial-sector does not understand the green-sector. This translates into unbalanced development, conflicting objectives, and a lack of sustainable development. The sustainability movement is thus a global movement that in particular is forcing economists and environmentalists to find mutual beneficial solutions (Newman, 2000).

"It is necessary to bridge the gap between fifty years of progress in urban economic research and the intellectual stagnation typically found in operational urban planning. It is unfortunate that the main audience of most urban economists are fellow urban economists rather than urban practitioners. Urban planners, meanwhile, are mostly working without any reference to a theoretical framework. However, urban planners are taking day-to-day decisions that affect the lives and livelihood of millions of people. The goal is to translate the theories and equations of urban economists into approaches and methods which can lead to concrete decision making in the everyday world of an urban planning office." (Bertaud, 2010:1.) The goal is to re-balance the dimensions of sustainable development and re-establish green spaces as being equally valuable (in comparison to urban development and economic growth) to urban life. With this in mind, the current spatial planning approach to sustainable development was evaluated and rethinked, specifically with the objective to bridge this gap between environmental and developmental objectives. The approach as proposed by this study is illustrated in Figure 4, based on the links between the core dimensions of sustainable development, as derived from their definitions. The development-dimension and social-dimension (of urban communities) is linked by means of the 'urban economics', as urban economics is defined in terms of economic activity and the spatial distribution of populations (Oxford Dictionary, 2010). The environmental-dimension is linked with the social-dimension by means of the 'green economics', as green economics is defined in terms of human well-being, social equity, and environmental risks and ecological scarcities (UNEP, 2010). Spatial Planning can thus be regarded as the link between "development" and "environment" and should therefore accommodate both urban economics and green economics in order to create a state of sustainable urban development.

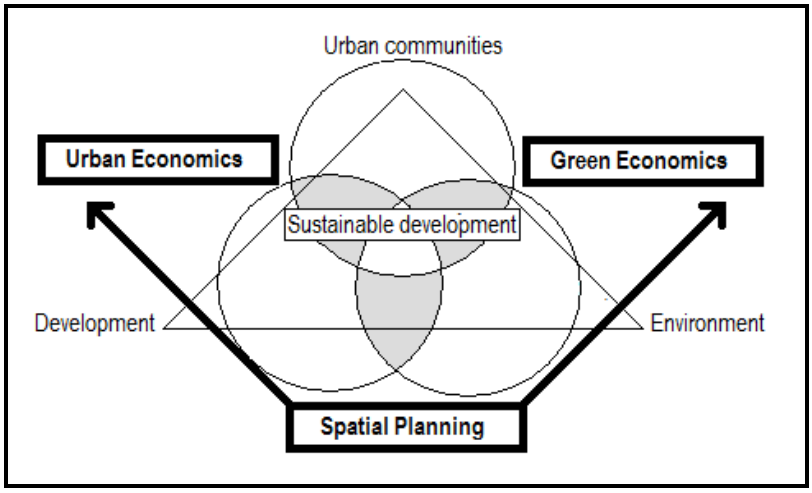


Figure 4: New approach to sustainable development.

Source: Own creation (2010).

Sustainability is a vision and a process, not an end product. "Development" and the "environment" can no longer be seen as separate systems, independent of, or even competing with each other. As stressed in the definition of sustainable development, economic growth should be realised together with the protection of environmental quality, each reinforcing the other (Anders, 1991). The links between (2.3.1) spatial planning, (2.3.2) urban economics and (2.3.3) green economics, is believed to be the key issues for re-establishing the balance of sustainable development, and will be described briefly in order to clarify the concepts before describing the proposed approach to implement these concepts in practise.

2.2.1 Spatial Planning

Planning is a continuous process of anticipating and preparing for foreseeable future changes. The terms “land use planning”, “town and country planning”, “regional planning”, “town planning”, “urban planning” and “spatial planning” is often used interchangeably, although not always having the same meaning. For purposes of this study, the term “spatial planning” is used. “Spatial planning is the way in which different activities, land-uses and buildings are located in relation to each other, in terms of distance between them, proximity to each other and the way in which spatial considerations influence and are influenced by economic, social, political, infrastructural and environmental considerations.” (South African Cities Network, 2005:5.) Spatial planning gives geographical expression to the economic, social, cultural, and ecological policies of society. “It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy.” (Cemat, 2010.)

Spatial planning includes all levels of land-use planning, and the objective of spatial planning with regard to this research, is to balance urban development (expanding urban areas) and growth management (limiting urban areas), thus responding to both, forces of urbanisation, and needs of sustainability. Spatial planning is thus the management of change, a political process by which a balance is sought between all interests involved, public, and private, to resolve conflicting demands on space. Spatial planning guides the land-use patterns and the efficiency of the urban area. As a profession, spatial planning claims to be comprehensive in scope, future oriented, public interest driven, and of wanting to enhance the liveability of human settlements. It is also distinguished by its focus on numerous functional systems that make up the community, including the study of their characteristics and interconnectedness (Faludi, 1973).

Spatial planning approaches have changed throughout the centuries and still need to be revised frequently, as our cities are becoming more and more complex. With “sustainability” being the current focus in spatial planning, new approaches and tools are being developed to address the complexities related to sustainable development. Environmental considerations are gaining importance in this context.

The following models are a summary of spatial planning approaches that have aimed to integrate and enhance environmental (green space) planning in the city (Chapin & Kaiser, 1979).

- The "Ecological Model" is well known among environmental specialists and transport planners. It applies a systems view, in which the city is seen as a system of inter-related parts within a biological system. Planning is used as an approach to make cities healthy and disease free. Open and green spaces are seen as lungs to purify pollutants from the environment. It is dominant in environmental planning and management approaches, as promoted by Local Agenda 21 to address nutrient and waste recycling, health conditions of residents and the beautification of the city (RUAF, 2006:60).

- "New Urbanism" integrates design, engineering, and architecture to promote the idea of a compact city. The aims are to reverse the trend of the urban sprawl by learning from traditional urban development patterns. It promotes small plot sizes and open spaces within the city. It promotes the recreational function within cities. New urbanism is strongly influenced by urban design standards and encompasses principles of traditional neighbourhood design. It is closely related to Regionalism, Environmentalism and the broader concept of smart growth (Steuteville, 2004).

- The "Collaborative or Communicative Model" is a procedural theory of how planning should be done. It acknowledges the divergent social-political and at times ethnic groups in the city, and encourages a process of consensus building in addressing problems and developing a vision for the city (RUAF, 2006:60). It promotes multi-stakeholder processes, in which the planner should bring consensus among stakeholders and should not impose his own blueprint as in the new urbanism model. Green spaces, in this way, emerge as a community needs them and should be expressed as such.

- The contemporary "Just City Perspective" is characterised by democratic radicalism. It calls for a radical form of participation that goes beyond stakeholder involvement. It places emphasis on governance by the civil society, and explicitly states the differences in power and the need for the "excluded" to fight for power and influence change (RUAF, 2006:62). Negotiation is thus necessary for the use (and enhancement) of green spaces.

Spatial planning is subjective and related to the view and perspective of planners and planning authorities, budgets and policies. Within these strict regulations and limitations, spatial planning approaches need to find a creative angle, to not only address complex problems, enhance the environment and address social needs, but also to stimulate economic growth. Spatial planning and land-use is an important factor in urban economic growth and development because land-use patterns contribute to the desirability and productivity of a city. In this sense, spatial planning, (and land-use planning) is a complex and controversial process involving competing values (Jordaan, 2000:85).

2.2.1.1 South African approach to spatial planning

While international approaches to spatial planning and the desirable spatial form of urban expansion were based on assumptions about 'better' urban form, expressed in phrases such as 'compact city', 'densification' and 'urban corridors' (Mabin, 2000:2), South African urban development was left to laissez-faire. "Cities of developing countries were not planned and not the result of some prescient ground-design, but emerged spontaneously, if not chaotically." (Jenks & Burgess, 2000:12.) This lack of planning is still visible today, revealed in the fragmented urban-pattern, characterizing the most South African urban areas, as in the case of Johannesburg, which grew rapidly due to the labour-need in the gold mines. Within months of its establishment, Johannesburg experienced a surge of building activity and by 1898 the present fabric of the city centre had already been defined (South African History Online, 2010). The city invested in motorcar-dominated-streets, which mostly served to connect suburbs with the central business district (CBD). Physical growth, although somewhat limited by transportation, increased dramatically. This system continued until the 1980s, when international sanctions and a poor security situation lead to a large contraction in the economy. The phenomenal growth of the residential sector in areas surrounding Johannesburg was boosted by parallel trends towards decentralisation of the business district.

In many ways, the Johannesburg City Council failed to plan for the large expansion of both population and the CBD which took place during the 1960s (South African History Online, 2010). This resulted in many businesses and professional practices moving out of the central core. Many companies abandoned skyscrapers that had been built in the CBD in the 1960s and 1970s, and left warehouses empty or little used. The Northern suburbs benefited from the deterioration of the CBD, as many people and businesses moved to the North, stimulating urban sprawl, and fragmentation of the CBD even more.

The benefit of concentrating urban functions that offers considerable advantages (resource conservation, waste-minimisation, efficiency, sustainable urban form, and economic, social, and political issues) then changed. The European believe that compact cities are the ideal places to live and experience the vitality and variety of urban life, was questioned by local planners within South African context (Jenks, Burton & Williams, 1996). The forces behind the process of accelerated urbanisation seemed to be irreversible (Evans, 2002:ix). The "old" city was left vacant, unsustainable, and failed in terms of the compact city approaches that were said to increase the built-area and residential population densities, intensify urban economic-, social- and cultural-activities and manipulate urban size, form, structure and settlement systems in pursuit of global sustainability (Jenks & Burgess, 2000:8). Conventional land-use planning failed to produce a substantial improvement in land management (Healey, 2007; RTPI, 2006; DCD, 2006).

In recent years, as mentioned previously, a broad interest was taken in planning for "sustainable development" and spatial planning therefore became a mechanism for decision-support, rather than a technical evaluation procedure (South Africa, 2001).

A general concern for quality of life and sustainability, with a particular focus on the city, emerged since societies became more concerned with the urban-environment and with shaping green spaces within urban areas (Baycan-Levent, Leeuwen, Rodenburg & Nijkamp, 2004; Dole, 1989; DTLR, 2001; Priemus, 1999; Scottish Executive, 2001; Turner, Pearce & Bateman, 1993). The protection and enhancement of urban-green spaces gain importance, not only from an environmental point of view, but also from a social and economic point of view.

The necessity for integrative spatial planning approaches in South Africa could no longer be ignored and led to the promulgation of the Development Facilitation Act (Act 76 of 1995), cross reference to Table 3. Since then the concept of integrated development planning formed the focal point of spatial planning in South Africa and integrated development planning emerged as a distinct approach to planning.

Spatial planning approaches underwent important process- and format changes that culminated in the policy and legislative frameworks that are still applicable today (Schoeman, 2006:2). The first and foremost being the Municipal Systems Act (Act 32 of 2000) which required local governments to prepare an Integrated Development Plan (IDP), a strategic planning instrument, which guides and informs all planning, development and decisions with regard to planning, management and development in the municipality (Department of Provincial and Local Government, 2001).

The Municipal Planning and Performance Management Regulations (Department of Provincial and Local Government, 2001) promulgated in terms of the Municipal Systems Act, stated that the IDP must contain a strategic assessment of the environmental impact of the spatial development framework (Section 4f). In this regard, it brought two core spheres together, “development” and “environment”. In theory, this objective seems logical; however, the realisation thereof was far more complicated. In practice South Africa is a developing country in need of development due to pressure of urbanisation forces. A pro-development orientated approach to planning has often been (and still is) adopted, favouring urban development above the environment, as argued in the following three points:

Firstly there is the fact that the environment (especially open spaces) is still not financially valued in South Africa (De Beer & Friend, 2004:3). There was never a crucial space-problem as in European cities, where space for urban extension and development is scarce or very limited (Verzandvoort, Rietra & Hack, 2009:11). On the contrary, South African cities have adequate space for urban extension and development, and open (green) spaces are almost considered a given (resulting in vacant, unplanned, and neglected spaces, lacking quality).

Secondly, these areas and authorities of a developing country are confronted with other (more crucial) planning problems, including the need to provide basic services and houses to communities. The ‘New Housing Policy and Strategy for South Africa’ (Department of Housing, 1994:4) states, “housing the nation is one of the greatest challenges facing the Government of National Unity. The extent of the challenge derives from the enormous size of the housing backlog and the desperation and impatience of the homeless”. Reality reveals that this housing (development) need is prioritised above green-planning objectives.

Thirdly, green spaces are believed to be a luxury (Cilliers, 2009:2), only contributing to the aesthetic value of an area, enhancing some social and environmental values. The possibility that green spaces might have economic value and direct financial benefit has never been thoroughly explored in developing countries, implying that the monetary value of green spaces is not calculated when local authorities make spatial planning decisions. Future planning is mainly based on financial figures (revenues) of urban development projects, and green spaces are often not included in municipal budget and not planned for. This is due to one of the main problems of land-use in an urban area: the question of the optimal use of a specific site (linked with the most profitable use of that specific site and the concept of highest-and-best-use). "The most profitable use of a site will be that which provides the highest return to that piece of land. The residual is calculated by subtracting the conversion costs from the present value of that piece of land. The residual may vary according to the land-use." (Jordaan, 2000:85.) The highest and best use is not necessarily the most socially desirable use because various negative and positive benefits may arise in different land uses (Blair, 1995:212). This approach focuses on the economic dimension and not on the environmental and social dimension, although it is said to incorporate some form of social dimension, as profitability is normally due to the willingness of consumers to purchase at that specific site (Jordaan, 2000:85). Marginal decision-making is thus the core goal. The marginal principle implies picking the level of an activity where the marginal benefit equals the marginal cost. With regard to this study, it means providing a simple decision-making rule that helps individuals and organisations make decisions in spatial planning to enhance green spaces.

The conclusion can however be drawn, that the "development-approach" is enhanced at the cost of the "environmental-approach". Furthermore, the principle of "all growth is good" is still endorsed by most land-use planners, although not shared by environmentalists (Jordaan, 2000:86). The current reality suggests that the integrated approach is being opposed by spatial planning approaches, implementation strategies, and mindsets (perspectives) regarding green spaces. According to Turton (2009) the lack of an integrated approach (linking development and environment and the future consequences) can be illustrated in the beneficial economic model (refer to Figure 5).

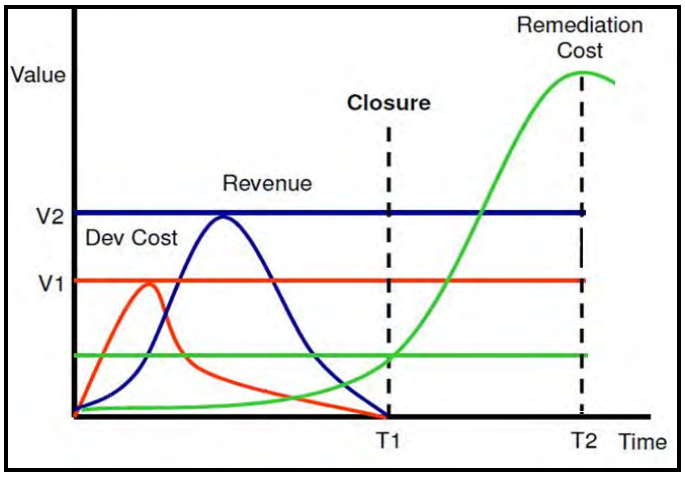


Figure 5: The current approach to development.

Source: Turton (2009).

This figure illustrates the current approach to spatial planning, prioritising development-orientated projects above environmental-orientated projects, realised from short-term driven planning, focussing on the direct benefits which are measurable in economic terms. It was initially formulated from an evaluation of the mining-sector in South Africa. Studies revealed that in most cases, when integrative planning was neglected, the end-product remediation costs were far greater than the total revenue derived from the mining activities. It was found that after the closing of a mining area (T1), the total costs for remediation (to regain total sustainability of the area similar to the state of the environment before the mining activity took place) were higher than the total profit derived from the mine and minerals (Turton, 2009). The initial planning was based on short-term profit (illustrated by the blue line V2), and did not include rehabilitation costs for recovering the environment (illustrated by the green line). More details with regard to this model will follow later in this document. With such an approach, development is prioritised above environmental considerations, and it is still the case in most spatial planning projects in South Africa. With this in mind, it is clear why the objective of sustainable development is also not reached.

The challenge is to seek a way forward to enhance both dimensions (environmental and developmental), to strengthen one another, and not stand in contrast to one another. The traditional regional science models based on the central place theory possessed a regional-urban perspective (in other words environmental-developmental perspective), but these models have now been discredited as not having a rigorous theoretical foundation. There is no widely accepted general theory of spatial location that seems to incorporate both regional (environmental) and urban (developmental) location decisions in a unified manner (Fujita, Krugman & Venables, 1999; Fujita & Thisse, 2002) and this led to the field being divided into two fields: regional and urban economics (Kim & Margo, 2004).

Spatial planning (as seen from this perspective) aims to balance the environment-approach and development-approach (as stated over-simplified in theory). This manifests in terms of urban economics (guiding the urban development and spatial inequalities) and green economics (guiding green-planning and green spaces). Accordingly, these two core spheres will be discussed next.

2.2.2 Urban Economics

Urban economics is a discipline that lies at the intersection of geography and economics (O' Sullivan, 2009:ix). Described simplistic in light of this study, it refers to the inter-connection between development and economics, as it is "the study of economics where different geographical units organize themselves as urban areas" (Jordaan, 2000:10). Urban economics identified inefficiencies in location choice and examines alternative public policies to promote efficient choices (O' Sullivan, 2009:1). Urban economics did not even exist until 1965, when the first urban economics text appeared. "Just one generation later the sub-discipline of urban economics seemed woefully outdated." (Phillips, 1996: 496.) Since Phillips penned these words, there has been a remarkable rediscovery, led by Edward Glaeser, Michael Porter, Paul Krugman, and John Quigley (Wyly, 2010:3).

The classical monocentric city model was the very core of urban economics (Ahlfeldt, 2008:1), with the assumption that the most attractive location of the city is within the central urban core, as defined by employment, population density, and land price peak. This was analysed by 'distance to the core', 'land price', 'intensity of land use', 'transport costs'. (Ahlfeldt, 2008:1).

In this way, urban economics had a real contribution to economic theorising and analysing by means of locational analysis methods. Based on the earlier location theories of von Thünen (the theory of marginal productivity), Alonso (theory of demographic changes), Christaller (central place theory), and Lösch (regional economics), locational analysis has succeeded in developing a series of theoretical contributions and empirical analysis in order to provide adequate answers to the question where (and why) specific economic activities are taking place in a given spatial system (Nijkamp & Mills, 1986:2). Locational analysis thus began the process of urban economic analysis (Capello & Nijkamp 2004:3-4), based on the monocentric city model, to understand spatial relationships and the economic motivations underlying the formation, functioning, development of cities and decision-making with regard to location (O'Sullivan 2003:1), as the location-decision of people again determines the development, size and economic structure of urban areas (McCann, 2001:1; O'Sullivan, 2003:14).

A relatively recent change in the urban structure led to the polycentric city or multiple-centre model, which allows for various employment centres throughout the metropolitan area. This change in urban structure also led to higher levels of urban expansion (Jordaan, 2000:11), and complexity. Locational analysis was increasingly being based on disaggregate models of choice (such as Logit and Probit models) and gave rise to a much more refined analysis, in which various individual locational determinants (including qualitative factors) could be taken into account (Nijkamp & Mills, 1986:2), within the polycentric development pattern.

Based on these changes in structure and approach, urban economics was sub-divided into related themes, including (1) market forces in the development of cities, explaining why cities exits and what causes them to grow or shrink, (2) land-use within cities, explaining the economic forces behind the change from centralized to decentralised cities, (3) urban transportation and the externalities associated with automobile use, (4) urban policies dealing with crime, urban problems, poverty, education and housing, and (5) local government expenditures and taxes (Bogart, 1998:4).

However, although urban economics can still be divided in these core themes, there are five axioms (self-evident truths) of urban economics, that were introduced by O' Sullivan (2009:7), which link and connect these themes, as they lie at the heart of urban economics and location choices. These include:

1. Prices adjust to achieve locational equilibrium: A locational equilibrium occurs when no one has an incentive to move. In the labour market for instance, wages are adjusted to get people to work in both desirable and undesirable environments. Prices of land vary according to location.
2. Self-reinforcing effects generates extreme outcomes: This change leads to additional changes in the same direction.
3. Externalities cause inefficiency: In most transactions, the costs and benefits of the exchange are confined to the individual buyer and seller, no one else bears costs from the transaction. In contrast, when externalities occur someone experiences some of the costs of benefits of a transaction other than the buyer or seller, thus someone external to the transaction. When there are external costs or benefits, the market equilibrium is not socially efficient.
4. Production is subject to economies of scale: Economies of scale occur when the average cost of production decreases as output increases. This is due to invisible outputs and factor specialization.
5. Competition generates zero economic profit: In urban economics, competition has a spatial dimension. Spatial competition results in monopolistic competition as firms will continue to enter the market until the economic profit is zero.

Apart from these axioms, environmental concerns and population growth are significant dimensions that also need to be taken into consideration (Hirsch, 1973:6) as urban economics link the spatial (developmental) and environmental spheres by spatial organisation of the activities within cities in terms of land-uses (supported by land-use controls such as zoning), which in return, influences the economic activity in terms of price of land and the spread of employment (O'Sullivan, 2003:14).

Urban economics has thus rapidly evolved into a mature economic discipline with a strong research orientation and a strong research potential as it gives the fundamental economic explanation for urban areas in terms of the positive externalities that result from the closely located economic activities. With this in mind, the South African approach to urban economics (although very limited) can be evaluated.

2.2.2.1 South African approach to urban economics

The National Spatial Development Perspective (NSDP), released in March 2003, captured how population, economic activities, transport connections, and key public infrastructure investments are being organised spatially across the country. Many of the challenges facing South African cities are a legacy of apartheid. At its heart, the apartheid city was a political economy of space. This had two central features: racially based spatial planning, and a political economy that meant development for some at the expense of the majority (SA Cities, 2004:24). Basic developmental factors, such as the services and essential infrastructure were thus the most important factors for locational decisions (Jourdan, 1998:718).

South Africa is currently experiencing a pro-urban shift in population. According to Statistics South Africa, 55 percent of the population is living in urban areas (Statistics South Africa, 2002). The increase in urban population increases the pressure to convert higher potential agricultural land into non-agricultural uses such as housing and other infrastructure. It is said that urbanisation takes about 30000 hectare of farmland each year (South Africa, 1995). Employment opportunities in urban areas often fail to keep pace with urban population growth and therefore urban employment and poverty increases. The informal sector is thus increasingly playing an important role in the economy. According to Statistics South Africa (2001), 18.4 percent of the 10.4 million employed people were in the informal sector. An additional 1.45 million workers were classified as informally employed (excluding domestic workers and subsistence agriculturalists), by the calculations based on the 2004 Labour Force Survey. In 2004 the informal sector employment increased to 20,0 percent (Statistics South Africa, 2005). The society and economy are today still characterised by this inequitable distribution of wealth and resources. Despite the pro-development planning approach, a minority enjoys high living standards, with sophisticated infrastructure and services, while the basic needs of the majority are not adequately met. The basic needs of the majority of people (which are all objectives of urban economics) include:

- The rebuilding of the townships.
- Creating of more jobs, housing and urban amenities through integrated development planning.
- Reducing commuting distances between the workplace and residential areas.
- Facilitating better use of underutilised or vacant land.
- Introducing environment-sensitive management of development and improving urban transport.

Another development issue is the impact of HIV/AIDS, for reasons related to its concentration in urban areas, its close interrelationship with urban poverty and inequality, and its ability to erode institutional capacity for urban development, thereby undermining the prospects of equitable urban development (Van Donk, 2003:10). HIV/AIDS will transform the current urban economy and over time and changes in the demographic composition of urban areas will be evident (Van Donk, 2003:2).

Current urban economic approaches in South Africa favour a short-term vision of planning, focusing on direct, measurable economic revenues. This is revealed in municipal planning and budget allocations, where direct revenues from urban development are preferred over sustainable development initiatives, as illustrated in the information that was sourced from Section 40(4) PFMA reports of the first quarter provincial budget of each provincial department in South Africa, as submitted to the National Treasury by July 2010, and summarised in Table 5.

Table 5: Summary Provincial Conditional Grants Expenditure 2010.

Budget item	Rand value	Percentage
Health	19852773	32.08
Human settlements	15160563	24.50
Infrastructure	11314911	18.28
Transport	4312431	6.97
Education	3931371	6.35
Higher education	3772661	6.10
Public works	1483833	2.40
Agriculture	1116867	1.80
Culture	512660	0.83
Sport and recreation	426385	0.69
TOTAL	**61884455**	**100.00**

Source: Based on Department of National Treasury (2010).

From this distribution, it can be concluded that health, human settlements (development-dimension) and infrastructure (development-dimension) is prioritised by local governments and stimulated via provincial grants. Agriculture, sport, and recreation are a mere two percent of the current grant expenditure. This proves the current unbalanced approach to planning (in terms of environment versus development), in favour of urban development. In the Budget Speech of the Financial Minister of South Africa in April 2010 (Department of Environmental Affairs, 2010), he recognised this problem and stated that the South African economy should enhance the vision of former president Nelson Mandela who said “make tomorrow better than today”, focusing on protecting and enhancing environmental assets and natural resources.

2.2.3 Green economics

"Green is the new gold." (Natural Economy North West, 2007.) The importance of urban green spaces were known for decades; however, the relationship between urban liveability and green spaces as incorporated in overall urban green structures has become the focus of international studies especially during the last ten to fifteen years (Casepersen, Konijnendijk & Olafsson, 2006:7). Environmental considerations have become an integral part of developmental thinking and decision-making and the green-environment is gaining more and more importance in political, social, and economic terms. The expanded scientific understanding that green spaces are substantially beneficial to urban communities (Wolf, 2004:1) was the basis of the new trend in perspective, focussing on a longer-term vision of planning, taking the economic spin-offs and indirect benefits into account, and not only focusing on direct, measurable economic revenues. So-called "Green economics" developed from this perspective.

Green Economics is a fairly new discipline, defined and conceptualised by early green-writers including Herbert Gruhl (1975) in Germany, Petra Kelly *Thinking Green* (1974), Jonathan Porrit *Seeing Green* (1994), Paul Ekins, Mayer Hillman and Hutchinson *Wealth Beyond Measure* (2000), Kemball-Cook, Baker and Mattingley *The 'Green' Budget* (1986), and Douthwaite *The Growth Illusion* (1992). Their theories of green economics positioned economics within a very long term, earth-wide, holistic context of reality as a part of nature, incorporated, and celebrated diversity, equity, and inclusiveness within its concepts of society and community. Green economics is therefore the economics of the real world, the world of work, human needs, the Earth's materials, and how they mesh together most harmoniously. It is primarily about "use value," not "exchange value" or money. It is about quality, not quantity, for the sake of it. It is about regeneration—of individuals, communities, and eco-systems, not about accumulation, of either money or material (Milani, 2006:42).

The philosophy behind green economics was to manage economics-for-nature-as-usual, rather than to manage the environment-for-business-as-usual (Kennet & Heinemann, 2006:1), implying its precautionary principle, to prevent foreseeable, adverse effects on people, nature, and factors in the widest possible range of costs. It is inherently aligned with the natural sciences, being the link between the environment and economics (Kennet & Heinemann, 2006:12). In this regard, some sister disciplines were the basis for the development of green economics. The most important ones (with regard to this research) are:

- **Welfare Economics,** which recognises the shortcomings of a market economy, although, still a neo-classical analysis. Pigou (1920) raised the question of divergence between social cost and private cost. Negative external effects have to be defined by the authorities to monetarise them and to adjust the price mechanism accordingly. The introduction of rights in the process of social choice poses new problems about motivations underlying individual preferences and the nature of the social alternatives. Green Economics questions whether distributive justice and efficiency are reconcilable without the market economy being specifically adjusted for this purpose (Kennet & Heinemann, 2006:16).

- **Environmental Economics** marked an important turning point in the approach of economics to environmental issues. The field applies neo-classical economics to non-market phenomena or phenomena that are relevant to society and have at least partially an economic angle, for example, common resources, public goods, human decision making in a wider sense. Turner *et al.,* (1993) and Mishan (1997) showed that where external negative effects ("externalities" of a social or environmental nature) occur, it is hard to capture the real costs of economic growth and the externalities should be included in the cost price, as production of a particular good or service may actually result in an overall decrease in welfare (Kennet & Heinemann, 2006:18).

- **Ecological Economics** regards the economy as a subsystem of a larger global finite eco-system (Boulding, 1966). Ecological economics does recognise the interdependencies of the economic, social, and ecological spheres, with the market being brought in only after equity and sustainability considerations are met, and only as a facilitator of the efficient allocation of resources (Kennet & Heinemann, 2006:20). The emphasis is more biophysical, and less on economical or institutional issues, in comparison to Green Economics.

Based on the objectives of welfare economics, environmental economics and ecological economics, green economics aimed to solve the economic problem of scarcity, choice and opportunity cost (Kennet & Heinemann, 2006:23), through ten principles of a green economy, as stated by Milani (2006:43):

1. Focussing on the primacy of use value, intrinsic value, and quality: This is the fundamental principle of the green economy as a service economy, focused on end-use, or human and environmental needs.
2. Following natural flows: As society becomes ecological, political and economic boundaries tend to coincide with eco-system boundaries. It becomes bioregional.
3. Useful waste: In nature, there is no waste, as every process output is an input for some other process.
4. Elegance and multi-functionality: Problem-solving strategies that develop multiple gains and positive side effects from any one set of actions.
5. Appropriate scale and linked scale: Every regenerative activity has its most appropriate scale of operation. Integrates design across multiple scales.
6. Diversity: Applies to all levels (diversity of species, of eco-systems, of regions), and to social, as well as ecological organisation.
7. Self-reliance, self-organisation, self-design: Self-reliance is not self-sufficiency, but facilitates a more flexible and holistic interdependence.
8. Participation and direct democracy: Conversely, ecological organisation and new information or communication technologies can provide the means for deeper levels of participation in the decisions that count in society.
9. Human creativity and development: Social, aesthetic, and spiritual capacities become central to attaining economic efficiency, and become important goals in themselves.
10. The strategic role of the built environment, the landscape, and spatial design: The greatest efficiency gains can often be achieved by a simple spatial rearrangement of system components.

Environmental economics aimed to quantify the social and environmental gains and losses (created by economic activity) and determine the most efficient way to reduce them (according to the ten mentioned principles), as well as to compare the cost of environmental damage to the cost of mitigation (Goffman, 2007:1). Although the field of economics traditionally deal with items that can be easily demarcated, quantified, and tagged with ownership, this became difficult when dealing with shared eco-systems. Green economics has dealt with this largely by labelling such items externalities**,** costs for which the responsible party does not pay (Goffman, 2007:2).

Several researchers have already studied the impact of environmental characteristics on residential land prices. Environmental characteristics can have a positive impact (view and experience value) or negative impact such as in the case of noise (Germino *et al*., 2001; Dekkers & Van der Straaten, 2009). Some have considered simply the distance to a given amenity, for instance an urban park, a forested area or open water (Mahan, Polasky & Adams, 2000). Other sophisticated methodologies devoted attention to the impact of land use and green space in the surroundings of properties (Irwin, 2002).

Unlike the market for most tangible goods, the market for environmental quality does not yield an observable unit price. Some researchers find the price of environmental quality by using direct elicitation of willingness to pay, travel costs, advertising costs, direct monetary damages, the household production approach, or some combination of the above (Brasington & Hite, 2005:4). The most common qualitative evaluation methods include, but are not limited to the following (Lambert, 2003:7):

- Market price method: This method is applicable to direct use values. The value is estimated from the price in commercial markets (law of supply and demand). It is however, constrained by market imperfections (subsidies, lack of transparency) and policies that distort the market price.

- Damage cost avoided, replacement cost or substitute cost method: Applicable to indirect use values where the value can be estimated from the substitute cost. The value of flood control can for instance be estimated from the damage if flooding would occur (damage cost avoided). It is assumed that the cost of avoided damage or substitutes match the original benefit, but in reality it can lead to under- or overestimates.

- Contingent valuation method: Applicable to non-use values. This method asks people directly how much they would be willing to pay for specific environmental services. It is often the only way to estimate the non-use values. It is also referred to as a "stated preference method". There is controversy over whether people would actually pay the amounts stated, but this is the only way to assign monetary values to non-use values of eco-systems that do not involve market purchases.

- Contingent choice method: Estimate values based on asking people to make tradeoffs among sets of eco-system or environmental services. It does not directly ask for willingness to pay as this is inferred from tradeoffs that include cost attributes. This is a very good method to help decision makers to rank policy options.

- Benefit transfer method: Used to value eco-system services in general and recreational uses in particular. It estimates economic values by transferring existing benefit estimated from studies already completed for another location or context.

- Productivity method: Estimates the economic values for green space products or services that contribute to the production of commercially marketed goods. The methodology is straightforward and data requirements are limited but the method only works for some goods or services.

- Hedonic pricing method: Applicable to indirect use, future use and non-use values. This method is used when green space values influence the price of marketed goods, or for estimating the economic value of open space and recreation areas, which do not have a market value. Environmental benefits will increase the price of houses or land. This method only captures people's willingness-to-pay for perceived benefits. If people are not aware of the link between the environment attribute and the benefits to themselves, the value will not be reflected in the price. This method is very data intensive as the statistical approach links a good traded in the marketplace with an environmental good that is not traded in the market at a point in time. Hedonic theory thus suggests that the price of a house represents the sum of expenditures on a number of bundled housing characteristics, each of which has its own implicit price. These housing characteristics include structural attributes such as the number of rooms and the square footage of the house and the yard. Expenditures on other less tangible characteristics, including local public goods and environmental quality, also contribute to house price (Brasington & Hite, 2005:5). Environmental amenities in an urban setting can also be valued through this method, by means of attaching them to a residential property and when a buyer purchases a house, the amenities are part of the bundle that a household purchases. The essence of the hedonic approach lies in decomposing the price of a house P into prices of individual attributes (X_1, X_2, ……X_n) including environmental amenities. This can be achieved using a hedonic price function, which specifies an equilibrium relationship between the price and the number of attributes. Consumers equate their marginal willingness-to-pay for each attribute to its marginal price when making the final choice (Rosen, 1974). However, a hedonic price function can imply only marginal changes in the environmental attribute. Different homebuyers in a heterogeneous housing market may value similar houses differently as they possess a unique utility function causing them to value characteristics differently (Sirmans *et al.,* 2005). This valuation is done through hedonic prices, which are defined as implicit prices of these utility-bearing attributes and are revealed to property dealers or agents (Gupta, Mythili & Hedge*,* 2008:4). Hedonic price function is specified as:

$$P = \alpha + \beta X + \gamma Z + u$$

'X' is environment related variables such as proximity to water, proximity to greenery and noise exposure. 'Z' represents other variables related to infrastructure and house characteristics such as distance from educational institutes, office, bus facility and railway station, and proximity to slums (Gupta *et al.,* 2008:9).

Knowledge of the determinants of land prices had in this way been improved by careful analyses of the role of "green" amenities in residential choice modelling (through abovementioned methods) (Geoghegan *et al.,* 1997; Tyrvainen & Miettinen, 2000; Kestens *et al*., 2004; Roe *et al.,* 2004). Other theoretical models of urban economics were also formulated, incorporating amenities and open space (Brueckner *et al*., 1999; Turner 2005), illustrating the importance to account both for distance to economic opportunities and amenities when analysing the urban equilibrium and residential land prices (Goffette-Nagot *et al.,* 2010:3). Some of these methods used GIS technology to improve on aspects of the hedonic analysis, as various indicators of the greenery of an area were computed and introduced into the regression equations. These indicators combine different sources of data (census data and remotely sensed data), land cover (different types of vegetation), and spatial extent (administrative entities or buffers around a location). The objective was to see how far land prices are influenced by ecological characteristics compared to the more traditional economic variables (Goffette-Nagot *et al.,* 2010:9). These studies conducted in Belgium revealed that at a country level, variations in land prices mainly result from the role of distance (a factor that depends on the unit transport cost and the trade-off between transport and land costs), and natural amenities do not have a stable or well-defined role. Environmental and natural variables are more important at a local level (Goffette-Nagot *et al.,* 2010:28). This is also the case in South Africa, where actual planning, implementation, and monitoring of green spaces are subject to local government decision-making and planning processes. The overall objective of green economics, and relevant models and methods used within environmental, ecological and welfare economics, was, and still is, to apply the insights of economics to environmental issues, using supply and demand to minimise the impact of the human economy on eco-systems.

2.2.3.1 South African approach to green economics

Green economics is a new phenomenon in South Africa, as South Africa was slow to develop and institute formal procedures for environmental impact assessment (Schoeman, 2010), in comparison to other countries. It was only with the enactment of the Environment Conservation Act (Act 73 of 1989) that provision was made to determine environmental policy to guide spatial planning decision-making (and land-use planning) and to prepare environmental impact reports (Sowman & Gawith, 1994). Ngobese and Cock (1997) highlighted problems of duplication. They stated that the institutional framework for environmental policy in South Africa was not comprehensively defined. Rossouw and Wiseman (2004) stated that environmental functions were fragmented, within and between the three spheres of government. National as well as provincial spheres of government were empowered to enact environmental legislation that falls within their functional areas. Kahn *et al*., (2001) indicated that in the past, Town Planning Schemes in South Africa have concentrated on addressing urban development within the defined municipal boundaries. It did not address the rural land uses or the concerns of environmentalists. The publication of the National Environmental Management Act (Act 107 of 1998) followed and provided a framework for environmental governance, promoting the application of environmental assessment and management tools to ensure integrated environmental management of activities (Baloyi, 1999:29).

Green-planning and green economics gained some limited importance since, as is still the case today, illustrated in municipal planning and budget allocations, and the information that was sourced from Section 40(4) PFMA reports of the first quarter provincial budget of each provincial department in South Africa, as submitted to the National Treasury by July 2010. The report concluded that provinces have spent 22.9 percent (R75.7 billion) of their total budgets of R329.8 billion for the first quarter, mainly on education (totalled 24.1 percent of the budget, refer to Table 6), health expenditure (23.7 percent) and housing and local government (17.4 percent, refer to Table 7). There is no indication of money spent on the natural environment, implying if there was an investment made for "environment planning or enhancement", it is not significant enough to mention in the overview of the budget.

Table 6: Provincial Social Services Expenditure as at 30 June 2010.

	Main budget	Actual spending 30 June 2010	Actual spending as % of budget	% share of total provincial expenditure	% share of total social services expenditure	2009/10 outcome at 30 June 2009	Year-on-year growth
Education	137 438 683	33 183 268	24.1	43.8	56.6	30 180 129	10.0%
Health	98 380 858	23 341 156	23.7	30.8	39.8	20 927 930	11.5%
Social Development	10 235 907	2 065 407	20.2	2.7	3.5	1 969 075	4.9%
TOTAL	**246 055 448**	**58 589 831**	**23.8**	**77.4**	**100**	**53 077 134**	**10.4%**

Source: Department of National Treasury (2010).

Table 7: Provincial Housing and Local Government Expenditure as at 30 June 2010.

	Main budget	Actual spending 30 June 2010	Actual spending as % of budget	% share of total provincial expenditure	% share of total LG & Housing expenditure	2009/10 outcome at 30 June 2009	Year-on-year growth
Eastern Cape	2 533 676	509 141	20.1	4.3	59.8	515 863	-1.3%
Free State	1 684 961	227 046	13.5	5.0	56.6	343 303	-33.9%
Gauteng	4 511 575	833 136	18.5	5.4	78.4	1 392 817	-40.2%
KwaZulu-Natal	4 173 516	627 943	15.0	4.1	47.7	762 170	-17.6%
Limpopo	1 885 787	314 655	16.7	3.6	59.9	460 647	-31.7%
Mpumalanga	1 601 587	316 704	19.8	5.3	62.2	213 865	1.2%
Northern Cape	493 017	116 908	23.7	5.8	59.5	113 950	2.6%
North West	1 704 199	204 679	12.0	4.6	68.0	228 379	-10.4%
Western Cape	2 163 261	452 855	20.9	6.1	84.2	414 027	9.4%
TOTAL	**20 751 579**	**3 603 067**	**17.4**	**4.8**	**65.5**	**4 544 021**	**-20.7%**

Source: Department of National Treasury (2010).

The conditional grant expenditure did not include the "environment" as part of the budget, although it did include 'agriculture' (for purposes of this study regarded as green spaces due to the environmental characteristics linked to agriculture). The total conditional grant allocation for 2010/2011 was R61.9 billion with health being 32 percent of the budget, human settlements 24 percent, and infrastructure 18 percent, in comparison to the 1.8 percent budget share of agriculture. The development-dimension is being stimulated in terms of grants, while the environmental-dimension is being neglected, as revealed in Table 8 and Table 5.

Table 8: Provincial Conditional Grants Expenditure as at 30 June 2010.

	Actual spending as % of main budget
Agriculture, Forestry and Fisheries	6.2%
Arts and Culture	10.5%
Basic Education	15.4%
Health	19.9%
Human Settlements	15.6%
Public Works	16.2%
Sport and Recreation South Africa	16.5%
Transport	97.5%
TOTAL excluding Schedules four (4) and eight (8) grants*	**18%**

Source: Department of National Treasury (2010:10).

* Schedule four (4) grants specifying allocations to provinces to supplement the funding of programmes funded from provincial budgets. Schedule eight (8) grants specifying incentives to provinces to meet targets of priority government programmes.

Current practice further reveals that the frameworks are more focused on protecting current green spaces, than enhancing the planning of new green spaces, (limited budgets result in a shortage of funds to plan for new areas and invest in development and maintenance costs. The current lack of new green space planning is also linked to the inability of local authorities to value these spaces, as described in the next chapter). Not having a strategic framework for including adequate amounts of urban green space throughout cities would be fine if municipal budgets were adequate to support park development, tree plantings, and natural area management (which are not the case, as stated in 2.3.2). Such activities, unfortunately, are also often the first to experience cuts in times of budget constraints (Wolf, 2004:1). In the budget speech of the Financial Minister of South Africa in April 2010 (Department of Environmental Affairs, 2010) he concluded with a statement regarding to "balancing the impact of development on the environment effectively" and announced the plan to publish the new Environmental Impact Assessment (EIA) regulations that will come into effect in July 2010. The aim is to align the 2006 Regulations with the new and improved Act, streamlining the EIA process with other processes such as water use licenses, emission to air licenses and mining related approvals. Although the last financial year illustrated some progress towards the development and implementation of an effective environmental assessment system that enhances environmental quality whilst being efficient in terms of both the time frames associated with decision-making and maximising value for money, there is still major room for improvement, when compared to international initiatives.

Gauteng Province was the first in South Africa to develop a 'green economy' strategy for the province (Gauteng Provincial Government, 2010:5), as part of a broader Gauteng Growth Employment and Development Strategy (GGEDS). The overall strategic goal was sustainable economic growth and sustainable job creation for Gauteng. It argued that a change in thinking is required to achieve the goal of green economics in South Africa (Gauteng, 2010:12), including aspects such as:

- Environmental protection must no longer be viewed as a constraint to economic growth, but as a driver of growth and essential for long-term economic sustainability.
- Production and consumption must no longer be viewed as "linear" processes, but must be thought of and consciously designed using holistic life cycle/circular concepts.
- A shift from capital-focussed investment to strategic investments in knowledge capital and the systems that create innovation.

A review of the role of green spaces in meeting the needs of a growing African city (the Durban case study) showed green spaces to have a key role in providing goods and services (such as water supply and pollution control) that are vital in meeting the basic needs of urban residents, in particular poor, conventionally un-serviced communities. In Durban, the total replacement value of these open space services was estimated, using international research in the field of resource economics, at R2.24 billion per annum. This figure excluded the value of Durban's tourism sector, worth approximately R3.5 million per annum. This project provided the opportunity to test the usefulness of tools such as resource economics in raising the profile of "green" issues on the political agenda (Roberts & Diederichs, 2002:5).

These approaches are linked with the greater green economics objectives that strongly advocate the need for each generation to leave behind an adequate bundle of resources and a habitable planet. Mainstream economics are still too bound up with concerns of price, profit, economic growth and the perspective of the owners of production versus the workers as "other " and therefore entirely fails to grasp this new reality. Green Economics, in this regard, can address current spatial and urban problems as it brings new perspectives to conventional economic tools, in terms of both time and space (Kennet & Heinemann, 2006:4).

2.3 Conclusion

In order to re-establish the balance of sustainable development, all of the dimensions (development, environment and economic) and sub-dimensions (spatial planning, urban economics and green economics) need to be valued on an equal platform for local governments to plan equally for each sphere. As mentioned previously, green spaces are currently neglected and sacrificed to "benefit" urban development and economic growth, implying that the environmental dimension is valued less.

Attitudes to nature are being completely revised. According to Goldsmith (2005) economics needs to keep within nature's carrying capacity and at the moment many of its systems are being so overloaded with the impacts of human economic activity that they cannot continue. It is time to "rethink economics" (Goldsmith, 2005) for the benefit of humans and the natural world and accepts the boundaries imposed by the earth.

Environmental situations in South African cities require a different emphasis analytically than situations in first world countries. Urban planners and development agencies must understand what constitutes "quality" green space and how it can be achieved within the local context (Sutton, 2008:1). The challenge for planners is to identify and determine the value that green spaces can offer, and to enhance these values within planning structures, in order to gain additional benefit in this regard and to assist municipal planning and budgeting. This balance between spatial planning, urban economics and green economics should be reinstated and realised in terms of land-use planning, conducted by joint forces of urban planners, economists and environmentalists. An approach to strengthen the environmental dimension (and to regain the balance of sustainable development) and to justify municipal spending (specifically for green spaces) is to determine the value of green spaces (Goosens, 2009), in order to be more measurable and comparable to urban spaces and revenues. This approach is described in the following figure.

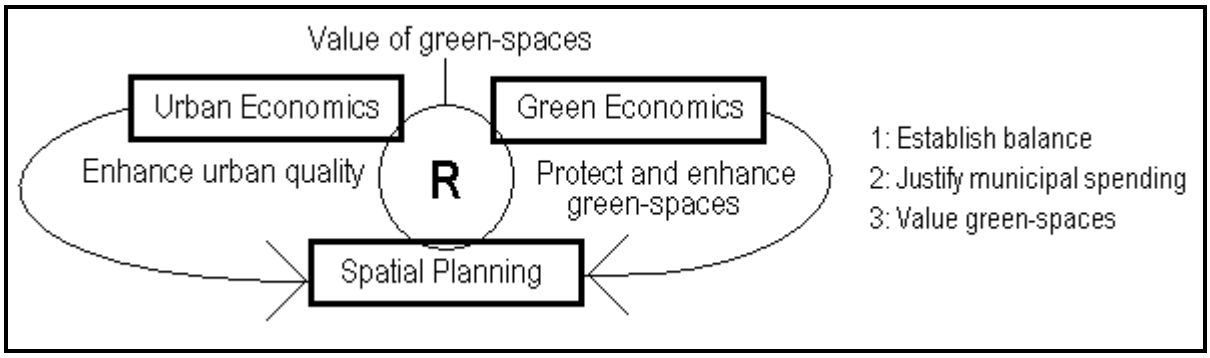


Figure 6: Approach and methodology to value green spaces.

Source: Own creation (2010).

Based on this approach to strengthen the environmental dimension and to justify municipal spending the next chapter will focus on green spaces, the values connected to green spaces, and the different approaches and methods to determine the economic value of green spaces.

Chapter 3: The economic value of green spaces

It is no exaggeration to say that the economic, social, and environmental future of our country depends on the wise use of our land resources. One of these resources is our green spaces.
- South Africa, 2001 -

3.1 Introduction

The current sustainable development approach was described in the previous chapter, linking the sustainable development dimensions with the spatial planning, urban economics, and green economics spheres. The explosive growth of urban areas has brought about fundamental changes, not only to the physical landscape, but also to people's perceptions of land and environment, and it is argued that urban areas are (and will always be) unbalanced in terms of environmental and socio-economic factors, since they 'consume' natural resources and 'produce' waste and pollution incessantly (Vasconcelos & Pritchard, 2007:1). In an attempt to regain the balance, this study claims that the environmental dimension needs to be strengthened. This can be done by determining the value of green spaces in order to justify municipal spending (specifically for green spaces) and create a platform to compare urban-spaces and green spaces and the related revenues. This chapter focuses on the concept of green spaces, as well as the relevant benefits (indirect and direct) of green spaces, and how to determine the economic value related to the green spaces.

3.2 Green spaces

Green spaces are land in natural or un-developed condition that is proximate and easily accessible from residences and work places. It serves as recreational paths for people and is protective of natural habitat or corridors for wildlife. Urban green spaces refer to public and private open spaces in urban areas, primarily covered by vegetation, which are directly (active or passive recreation) or indirectly (positive influence on the urban environment) available for the users. There are a multiplicity of terms for and definitions of green space, which are related to the way that they are valued and viewed. The most common of these terms include “open space”, “open areas”, “green space” and “public space”.

For the purposes of this research, the term green space is used, implying a network of green-elements, as defined by die European Commission, recognising the environmentally beneficial role, and other services that green spaces offer, such as the social, economic, and psychological or health services (Sutton, 2008:11).

The Johannesburg Metropolitan Open Space System Report (JMOSS) defines natural open spaces as being those undisturbed natural and undeveloped areas that remain within the urban centre (Strategic Environmental Focus, 2002:4). However, it further divides the concept into categories, incorporating all undeveloped land within and beyond the urban edge, belonging to any of the following six categories: ecological, social, institutional, heritage, agricultural and prospective, also known as degraded, land (Sutton, 2008: 46). This definition also makes it clear that there are different categories of open space, and that these can be independent or mixed types. The Durban Metropolitan Open Space System Report (DMOSS) goes one-step further than the JMOSS and acknowledges the distinction between urban and rural by identifying two different types of open spaces, namely "urban open spaces" and "natural open spaces". Urban open spaces are those that are legally designated and human created places and areas within the urban centre that are developed for community use, including parks, sports fields and town squares. (Durban Metropolitan, 2004). This is in contrast to natural open spaces, which are those that are in their most natural state, and usually include wilderness areas and national parks (Sutton, 2008:15).

VROM, the national planning authority in the Netherlands, defines green space according to function. Parks and public gardens are referred to as functional green space, with high quality and maintenance connected thereto. Experiential green space on the other hand is often referred to as green space with high aesthetic qualities, which contributes to the overall 'green-feel' which users consciously, or unconsciously experience within certain areas. However, these distinctions are not mentioned within policies and legislative frameworks and are being addressed under the umbrella-term of green spaces. The development of green space is thus highly subjective to the demand of the actual users of the particular area, and the function thereof – functional or experiential (Consultancy 644, 2010:19). Urban green spaces provide a range of benefits at both a national and local level and offer many opportunities to urban residents in different ways. Many studies refer to these contributions of urban green spaces from several perspectives including social, economic, ecological, or planning dimensions (Baycan-Levent *et al.*, 2004; Baycan-Levent & Nijkamp, 2004; Dole, 1989; DTLR, 2001; Groot, 1994; Hart, 1997; Hough, 1984; Hueting, 1970; Jacobs, 1961; Priemus, 1999; Scottish Executive, 2001; Stanners & Bourdeau, 1995). Green spaces help to define and support the identity of towns and cities, which can enhance attractiveness for living, working, investment, and tourism, thus contributing to the competitiveness of cities (Baycan-Levent *et al*., 2005:2).

Different types of green space have different predominant functions, which can fall into functional green-functions (focussing on the use of the green space) or experimental green-functions (focussing on the beauty and aesthetics of the green space). This is further clarified by the category of the functional green space (Sutton, 2008:30), including urban open space (public green spaces with a high level of intervention, often having recreation and intensive activities), ecological spaces (with high conservation value and low disturbance), and agricultural spaces (in urban margins and rural areas). "This green space typology is important because it helps planners to recognise and understand the variety of services and functions that different green spaces perform." (Scottish Executive, 2005.)

The various functions of urban green spaces illustrate the complexity and multidimensional structure, and the important values that green spaces offer to the overall quality of urban life (Van Leeuwen *et al*., 2009:5). Green spaces provide many benefits well documented in literature but difficult to evaluate in monetary terms.

The fact that green spaces are not articulated in monetary terms may be the main reason for their susceptibility to urban pressures (More *et al*., 1988). If the value of green spaces could be expressed in monetary terms, they would become comparable to economic elements of urban development and would consequently have more weight in the decision making process (Luttik, 2000:161-162). Development decisions are often based on comparisons of monetary values, such as cost-benefit analysis, which stress the importance to supply public decision-makers with reliable, comparable valuations methods (Defrancesco *et al*., 2006:40). This however, does not imply that the indirect (unmeasurable) benefits and values of green spaces should be ignored. Green space can be viewed as a common good, as the next section will prove.

3.3 Green space as a common good

Modern economic science originated in the 18th century with strong ties to the idea of the common good. Whether in the Scottish tradition of Adam Smith, centred around 'the Wealth of Nations' (1776), or in the Italian tradition of Antonio Genovesi, centred around 'public happiness', both conceived the economy in terms of the common good of the society and its welfare (Bruni, 2009:1). Economics was thus always oriented towards discussions of the public welfare; arguments for free markets and free trade, and analytical concepts like public goods, optimality, and externalities, all with the public welfare and public policy in mind (Yuengert, 2000:2).

The commons are terminology referring to resources that are collectively owned or shared between or among populations. These resources are said to be "held in common" and can include everything from natural resources and land to software. In *Economics for the Common Good,* Mark Lutz introduces economics in terms of human rather than material welfare in the light of community decay and inequality and lays the case for a 'broader more sensitive economic science' that goes beyond the paradigm that produced conventional economics. This includes common goods. Common goods comprise a wide range of shared assets and forms of community governance (Bollier, 2002). Some are tangible, while others are more abstract, political, and cultural. The tangible assets of the commons include the vast quantities of oil, minerals, timber, grasslands, other natural resources, green spaces, public facilities such as parks, stadiums, and civic institutions. The "people" are the real owners. In many cases, these resources have no officially recognised value, let alone the legal definition and protection enjoyed by private property. Nevertheless, commoners realise all too well that community structures and social relationships are vitally important in creating wealth, not to mention a humane society. Moreover, the idea of the commons identifies and describes the common values that lie beyond the marketplace.

In contemporary modern economic theory, the concept of the "common good" was replaced by "public good". This was mainly due to an attempt to clarify the objectives of the concept, and the diverse perceptions as to what exactly classifies as 'common good'. Furthermore, it was believed that even if one were to *desire* to aim at the 'common good', one would simply *not know* how to act, given the complexity of the links between (mostly unintentional) actions and effects (Bruni, 2009:2). This approach was too subjective, and the original objective to enhance social (community) benefits, was not realised as intended. Replacing the concept to 'public good' gave a different expectation and clarification. Purely public goods have two distinguishing characteristics: (1) it is non-excludable (people who are not willing to pay for goods cannot be excluded from enjoying them) and (2) it is non-rivalry in consumption (one person's enjoyment of goods does not exclude another person's enjoyment of them).

Within the realisation that the earth provides only limited resources that can be exhausted if they are not conserved, the concept of 'tragedy of the commons' results. "The tragedy of the commons," (Hardin, 1968) is when a scarce resource (open to all consumers) is depleted and left to ruin. The commons fall apart because all consumers enjoy direct benefits from over-exploiting the commons, while suffering only indirect costs. Eventually, over-use destroys the resource. This happens as commons is frequently confused with an *open-access* regime. "Tragedy of the commons often results, not from any inherent failure of common property management, but from institutional failure to control access to resources, and to make and enforce internal decisions for collective use." (Adhikari, 2001:1.) In contrast, a real commons have a "social infrastructure" of cultural institutions, rules, and traditions, and the resources are restricted to personal (non-market) uses by members of the community. The value of 'common' goods is therefore limited to the perception users, valuing the green spaces as a 'common good' or 'public good'. The different values are connected to individual preferences, needs, and views.

In South African commons, resource management is almost always formally in the hands of the respective governments, whose resource management agencies operate in various degrees of cooperation with local communities, and/or traditional decision making authorities (Magole *et al.,* 2010:3). Participation of the traditional authorities is the key to the effective enforcement of management rules (Wilson *et al*. 2006), although reality reveals this necessary element is not sufficient. Countless cases from across the South African commons (Magole *et al.,* 2010:5) proves that the interlocking political, economic and institutional problems in the region prevent many policies from being understood and implemented in the manner that was intended, or being implemented at all (Mosse, 2004; Magole, 2008). The 'gap' between policy and practice is often wide and getting wider and it is clear that commons governance strategies should aim to provide equitably balanced incentives to what should be the full range of economic interests represented in rural resource-using society (Magole *et al.,* 2010:12).

3.4 Understanding the value of green spaces

Land value can be thought of as the relationship between a desired location and a potential user. The ingredients that constitute land value are utility, scarcity, and desirability. These factors must all be present for land to have value (Gwartney, 2010). By themselves, utility and scarcity confer no value on land. User desire backed up by the ability to pay value must also exist in order to constitute effective demand.

There are various factors that impact on the value of land, including the physical attributes of land (quality of location, accessibility, availability of services, patterns of land use, streets and lot sizes), the legal or governmental forces (taxation, zoning and building laws, planning requirements and restrictions), the social factors (population growth, ages and education levels), the economic forces (value and income levels, vacancy and availability of land). It is the influences of these forces, expressed independently and in relationship to one another, that impact on the total value of land (Gwartney, 2010).

A transparent description of the values of urban green spaces is important in order to define and measure their contributions to urban quality of life. The value of green spaces can be determined by means of direct (measurable) and indirect benefits. Direct benefits can be measured in monetary terms, whereas indirect benefits are hard to quantify in monetary terms, as explained accordingly.

3.4.1 The indirect benefits of green spaces

Indirect benefits of green spaces refer to the attractive landscapes, aesthetic pleasure, psychological well-being, social interaction, and enhancing attraction for living, working, investment, and tourism, which contribute positively to the competitiveness of cities (Baycan-Levent *et al*., 2008:2). These indirect benefits of green spaces are hard to quantify in monetary terms (Harnik, 2009:6), and therefore classified as an indirect benefit of green spaces, measured in terms of:

- **Social benefits:** The most common social benefit derived from green spaces is the aesthetic value it offers, creating a qualitative living environment. Ahmed and Hassan (2003:9) conducted a study to evaluate the perception of residents with regard to urban green space-values and related it to socio-economic factors including income, occupation, and education. They concluded that the lack of green space and the exponential increase of the population enhance physical, social, psychological, and environmental hazards, stressing the need to enhance current green spaces and plan for new (future) green spaces. Various other studies revealed that community cohesion is built using green spaces, as users are bound by location and common interest (Kazmierczak & James, 2008; Kuo, 2003; Cilliers *et al.,* 2010). Social interaction is stimulated within the green spaces, contributing to cultural and historic values of the area itself. Human

health and mental health are also part of the social benefits of green spaces. Human health refers to contribution of green space usage (recreation possibilities) to decrease diseases. Mental health is a second arena of health benefits with economic consequences. Recent studies have established that the presence of trees and "nearby nature" in human communities generate numerous psychosocial benefits. A series of studies (Kuo, 2003:11) has determined that having trees in public housing neighbourhoods lowers levels of fear, contributes to less violent and aggressive behaviour, and encourages better neighbour relationships. Other studies (Roger, 2002) confirm that hospital patients recover quicker and require fewer pain-killing medications when having a view of nature (stating therapeutic value).

- **Environmental benefits:** Ecological systems provide a myriad of services to human societies. Trees and green spaces are elements of the eco-systems that clean air and surface water, provide or renew potable water, and reduce energy consumption, thereby contributing to life support systems. The greatest environmental benefit derived from green spaces is the enhancement of biodiversity. The Centre for Urban Forest Research scientists have conducted micro-scale studies, focusing on street tree costs (tree planting, irrigation, pruning and other maintenance) versus calculated benefits (energy savings, reduced atmospheric carbon dioxide, improved air quality, and reduced storm water runoff). The economic data was mathematically combined to generate a per tree estimate of net benefits (McPherson *et al*., 2002). Similar modelling of environmental benefits is often based on the economic principle of deferred costs, implying that if trees are not present, residents or authorities would have to invest in additional engineered infrastructure or equipment to remedy environmental problems (Wolf, 2004:3).

- **Future benefits:** The quality of life or 'liveability' that a city offers is important in ensuring its future economic performance. In this regard, environmental resources are assets to a city and green spaces contribute to competitiveness and marketability. Furthermore, it is far less costly to avoid environmental degration than it is to live with its consequences, or to repair its damage (City Alliance: 2007:26), as illustrated by the beneficial economic model (refer to Figure 5 in section 2.3.1.1). Green spaces can be viewed as the catalyst stimulating and enhancing the sustainability of an area.

3.4.2 The direct benefits of green spaces

Alongside these abovementioned social, environmental and future benefits (which all has economic spin-offs but cannot be measured in monetary terms), green spaces also have economic benefits (Natural Economy North West, 2007) known as the direct benefits or value (Perman *et al.,* 2003). The following tables include a comprehensive list of studies and reports that have been conducted on the economic benefits of green space, in chronological order.

Table 9: Studies conducted on the economic value of green spaces.

Year	Authors	Methodology and Approach	Key Findings
1973	Weicher and Zerbst	The externalities of five urban parks in Columbus were assessed and related to property values in surrounding areas.	Evidence was provided that neighbourhood parks generate externalities for surrounding property, though the relationship was greatest when the property was immediately adjacent to the facilities.
1990	Lacy	The effect of open space on clustered housing.	Market appreciated rates for cluster housing with associated open space can be equal to those for conventionally developed housing types.
1991	Environment Canada	Proximity of green space to property value in Windsor (Canada).	Homes 30 feet from a green space were valued $6 995 more than those at a mean distance of 1 035 feet.
1991	Evergreen	Property value increase in four British Columbia urban communities, due to greenways.	It was found that a 10 percent to 15 percent increase in property value could be attributed to the land's proximity to a riparian greenway system.
1991	Environment Canada	The effect of tourist spending and green spaces.	Greenways can have a positive effect on tourist-spending as easy access to green spaces has become a new measure of community wealth
1998	Breffle *et al.*	Contingent valuation was used to estimate a neighbourhood's willingness-to-pay to preserve an open-space and wildlife habitat.	Willingness-to-pay was estimated at $774 000 in comparison to the purchase price of $600 000.
2000	Bolitzer and Netusil	Open-space proximity and type was examined using GIS and sales price data for homes in Portland.	Proximity to open-space has a statistically significant effect (positive) on a home's sale price.
2000	Curran and Leung	Reviews literature documenting the effect of natural open space preservation on property values.	Green-development saves in terms of marketing costs because of media interest.
2000	Benson *et al.*	Increase in property values in Bellingham (Washington) due to green spaces.	Views of natural green space increased property values by an average of 26 percent.
2001	Acharya and Bennett	Hedonic property value analysis was conducted in New Haven County, using spatially referred housing and land-use data to capture the effect of environmental variables around the houses, in terms of environmental quality.	In addition to structural characteristics, variables describing neighbourhood socio-economic characteristics and variables describing land-use and environmental quality are influential in determining values. The spatial scale is important.
2001	Benson *et al.*	Estimating the value of the view amenity in single-family residential real estate markets of Bellingham.	Results from a hedonic price model suggested that willingness-to-pay for the view is high.

2001	Espey and Owusu-Edusei	Proximity to different parks and the effect on single-family housing prices sold between 1990 and 1999 in Greenville.	Greatest impact was found with proximity to small neighbourhood parks, with positive impact to all other parks as well.
2001	Lutzenhiser and Netusil	Information on home sales in Portland was analysed to determine the effects of proximity of open space and recreational land on sale price.	Homes that were within one half-block of any type of open space were estimated, on average, to experience the largest positive effect on their sale price.
2001	Miller	Hedonic regression analysis to quantify the effect of neighbourhood parks on residential property values.	Homes adjacent to parks received an approximate price premium of 22 percent relative to properties 2600 feet away.
2001	Shultz and King	Hedonic price methods for determining marginal implicit prices of open space amenities and non-residential land-use were estimated using housing data from the census.	The results provided empirical evidence that proximity to the large protected natural areas, golf courses and wildlife wetlands, as well as the percentage of vacant and commercial land-use, positively influences housing values.
2002	Irwin	The marginal values of different open space attributes were tested using hedonic pricing models with residential sales data from central Maryland.	A premium associated with permanently preserved open space, as open space is valued for providing an absence of development, rather than for providing a particular open space amenity.
2003	Wolf	The impact of trees on commercial property and shoppers' behaviour in retail business districts using contingent valuation methods.	People are willing-to-pay about 10 percent more for products in a shopping area with trees, as compared to a comparable district without trees.
2004	Crompton	Illustrate the 'proximate principle' on urban park development in terms of house prices.	The economic boost in property value existed up to 600 feet away from the park.
2004	Lindsey *et al.*	Taxonomy of the values of greenways and how particular types of values can be measured using complementary techniques.	Some, but not all greenways, have a positive significant effect on property values, and recreation benefits of a trail exceed costs.
2004	Nicholis	Reviewed hedonic price analyses conducted in Portland, Texas, Austin.	Several open spaces (especially urban parks, greenways, and golf courses) increase property values.
2004	Evergreen	Surveying the needs of tourists with regard to urban facilities and green spaces.	85 percent of visitors indicated they value the green space within cities more than attractions (theatre, concert productions, and art galleries).
2005	McConnell and Walls	Review more than 60 articles attempted to estimate the value of different types of open space. Both contingent valuation and contingent choice studies were reviewed.	Both the revealed and stated preference studies generally show a value in preserving most types of open space land. The value of open space amenities appears to be site- or location specific.

2006	Anderson and West	Hedonic analysis was conducted on home transaction data in Minneapolis to estimate the effects of proximity to open space on sales price.	The value of proximity to open space was higher in neighbourhoods that were dense, near the CBD, high-crime or home to many children.
2008	Nicholis *et al.*	The hedonic pricing method was applied to four large parks in Bastrop County, near Austin.	The analysis revealed that these large, public open spaces had no statistically significant impact on property prices in the rural country in which they were located.
2009	Pivo and Fisher	Measured the degree to which an area within walking distance of a property encourages walking for recreational or functional purposes.	All else being equal, the benefits of walk-ability are capitalised into office, retail, apartment and industrial property values with more walkable sites commanding higher property values.
2009	Harnik	Green space impact on property values.	30 empirical studies have shown that parks have a positive impact (of 20 percent) on nearby residential property values.
2009	CAM Solutions GBCSA	Based on various companies annual sustainability reports evaluated the financial impact on productivity in terms of the total average sick-days per person per year.	The specific company used revealed a total cost of R282 million per year, paid to 37,828 employers (average of R1250 per day), taking 6 days leave (average per person per year) due to illness. This proves the financial burden within the company due to the sickness of employers.

Source: Adopted and extended from Active living research (2010:14).

It can thus be concluded from the abovementioned studies listed in Table 9, that all things being equal, most people are willing to pay more for a home close to a green-area, the green space being reason for an increase in the market value (emphasising impact on residential property values). Green spaces do create a favourable image for a place, boost retail sales, attract tourism (Woolley *et al.*, 2003), enhance inward investment in the area (CABE Space, 2005), and encourage employment (emphasising the impact on production values). These increases in property and production values, consequently also increase tax returns to local authorities.

Property tax is also an important source of revenue to local governments (metropolitan, district, and local councils), in South Africa, as these fees have been the largest source of the municipal revenue. It is anticipated, that the introduction of new directions for the provision of water and electricity in South Africa will affect the profits on these services and the municipal revenues, implying that property taxes will likely become more significant in the future (Worldbank, 2003:2).

With this in mind, the value of green spaces needs to be strengthened and expressed in monetary terms in order to stand against the financial revenue figures drawn from urban developments. In this way, the marginal principle will realises at the level of the development activity where the marginal development benefit equals the marginal development cost. Consequently green spaces will have more weight in the decision-making processes (Luttik, 2000:161-162), and might be able to survive against the susceptibility to urban pressures (More *et al*., 1988).

On these grounds the value of urban green space should be emphasised and promoted in terms of the direct, financial contribution it can offer cities in terms of competitiveness and economic development (Arvanitidis, 2007:2). Local authorities (especially in South Africa) need to grasp this issue (and benefits) of green-planning and green-revenue. It is these same government interventions that are currently constraining this approach, due to uninformed decision-making and the incapability of measuring future development values, that has an impact on the future value of urban land and green spaces and thus creating a vicious circle.

3.5 Factors that have an impact on the value of green spaces

Government interventions affect land-use outcomes in cities around the world. This is also the case with green spaces, as these spaces are predominantly planned, and provided, by local authorities. These interventions are often well meant and designed to achieve results that are thought to be socially desirable. However, since urban environments are complex systems, land-use interventions often generate subsidiary effects that are unanticipated by policy makers (Brueckner, 2007:2). These effects can be undesirable, offsetting the benefits that the interventions were intended to capture, and can have an impact on the value of urban space, and particularly green spaces. The following is a summary of the basic government land-use interventions that affect urban spaces and thus also the value of green space. The nature of the interventions, as well as an economic impact with regard to space is captured.

- **Urban growth boundaries:** Urban growth boundaries (or urban edge as referred to in the South African context) are a policy initiative where the government effectively draws a ring around a city and outlaws urban development outside this ring. The resulting urban growth boundary (UGB) may be allowed to expand over time in response to population growth, but its presence nevertheless prevents conversion of rural land that would otherwise occur (Brueckner, 2007:4). Within the South African context, the urban edge divides urban and rural areas and consequently has an impact on the land-values connected to the relevant zoning.

  Figure 7 (a and b) can be used to analyse the effect of an urban growth boundary (Brueckner, 2007:4-8). Suppose a particular city, denoted city 1, is not subject to a UGB, with its border located at x^*. Then consider an otherwise identical city, denoted city 2, whose development is governed by a UGB, which fixes the city's border at $x_{ugb} < x^*$. Suppose that a UGB is hypothetically imposed at distance x_{ugb} in city 1. This UGB would

unrealistically require the city's area to shrink, with some land returned to rural use. Thus, the differences between the original city 1 and the hypothetical post-UGB city can be used to predict the differences between two existing cities (1 and 2), one with, and one without a UGB. In Figure 7 (a), hypothetical imposition of the UGB in city 1 causes the land between x_{ugb} and x^* to be returned to rural use. While the original supply of housing in the city was adequate to house its population, this loss of developed land creates a situation of excess demand, with the demand for housing exceeding the now-smaller supply. In response to this excess demand, the price p per unit of housing rises throughout the city, causing the p curve in Figure 7 (b) to shift up to p_{ugb} (recall that, like r, p declines with x). This housing price increase in turn raises the profits of housing developers, causing them to compete more vigorously for the city's land. More competition then bids up the land rent r at each location in the city, causing the land-rent curve in Figure 7 (a) to shift up to r_{ugb}. In response to the higher land rent, developers build taller buildings. In addition, with the housing price higher, the city's residents choose smaller dwellings. With buildings taller and the dwellings within them smaller, population density rises throughout the city.

It can thus be concluded that a city that does have a UGB is spatially smaller, has housing that is more expensive, higher land rents, taller buildings, and smaller dwellings. Unless there are offsetting benefits, a UGB is a counterproductive land-use intervention that leaves consumers worse off (Brueckner, 2007:9).

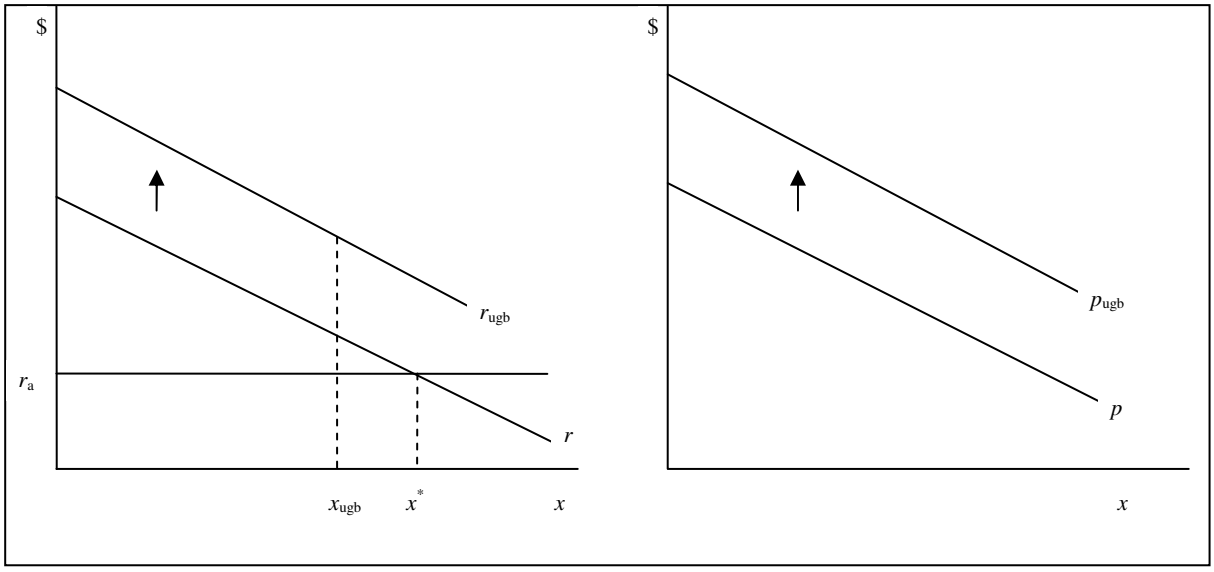


Figure 7: UGB impact.

Source: Brueckner (2007:30).

Imposition of an urban growth boundary can be justified if the process of urban expansion involves particular kinds of market failures. This includes the reduction in green space surrounding (and within) a city, because of urban spatial expansion, leading to loss of social capital and environmental sensitivity. This loss must then be considered part of the cost of urban development, over and above the agricultural land rent that is forgone when development occurs.

As a result, in determining the socially optimal spatial size for the city, urban rent r must be set equal to the agricultural opportunity cost r_a plus an amount equal to the per-acre amenity value of green space. Since urban rent then exceeds r_a at the optimal urban boundary, the situation is like that shown in Figure 7 (a), with the optimal boundary in a position like x_{ugb}, closer to the centre than the free-market boundary x^*. As a result, the optimal spatial size for the city can be generated by an appropriately chosen UGB, although a development tax set equal to the land's amenity value works equivalently (Brueckner, 2007:22). Urban growth boundaries can play a beneficial role to the extent that they discourage scattered, non-contiguous development, rather than serving as binding limits on the total amount of land available for conversion to urban use (Brueckner, 2007:26).

- **Floor area ratio (FAR) restrictions:** The regulation of development densities is another form of land-use intervention, realising in the restriction of lot-sizes, or building-height limits. FAR restrictions often "follow the market," providing a way for urban planners to ensure that the character of development does not greatly diverge from the norm in a given area. Theoretically, FAR limits tend to raise housing prices in cities where they are imposed (Brueckner, 2007:5). In the South African context, FAR restrictions are imposed through town planning schemes, as conducted individually for each city.

  "The impact of an FAR limit can be analysed using a thought experiment similar to the one above." (Brueckner, 2007:7.) A new FAR limit is hypothetically imposed on a city without one, and the various adjustments required to restore the land-use equilibrium are analysed. The features of the post-FAR-limit city can then be used to predict the characteristics of a city that always had an FAR limit in place. Figure 8 (a) shows the declining building-height contour (denoted H) for the pre-FAR-limit city, as well as the flat line corresponding to the limit. Since buildings taller than the limit, which are located near the centre, must be (hypothetically) rebuilt at a lower height when the limit is imposed, the FAR limit reduces housing supply in the area out to distance $x^{\#}$ in Figure 8 (a). This supply loss creates excess demand for housing, which pushes up the housing price p throughout the city, just as in Figure 1b. Being unable to develop land to its highest and best use inside $x^{\#}$, where the FAR limit is binding, developers in this area offer less for the land than before, causing land rent r to decrease. This effect is shown by the drop in the r curve inside $x^{\#}$ in Figure 8 (b). But since higher housing prices raise developer profits, more competition occurs for land throughout the city. As a result, land rent tends to rise at all locations, partly reversing the decline near the centre. This effect is shown by the higher r_{far} curve in Figure 8 (b). Note that, even with this shift, land rent remains lower near the centre. Higher land rent, in turn, raises desired building heights. But since developers remain constrained by the FAR limit, building heights can only rise in the outer part of the city, as seen in Figure 8 (a) (the H_{far} curve shows the new heights). This leads to an increase in housing prices, and in addition, the city expands spatially. As in the case of a UGB, imposing an FAR limit in the absence of offsetting benefits is a counterproductive policy that harms consumers (Brueckner, 2007:11).

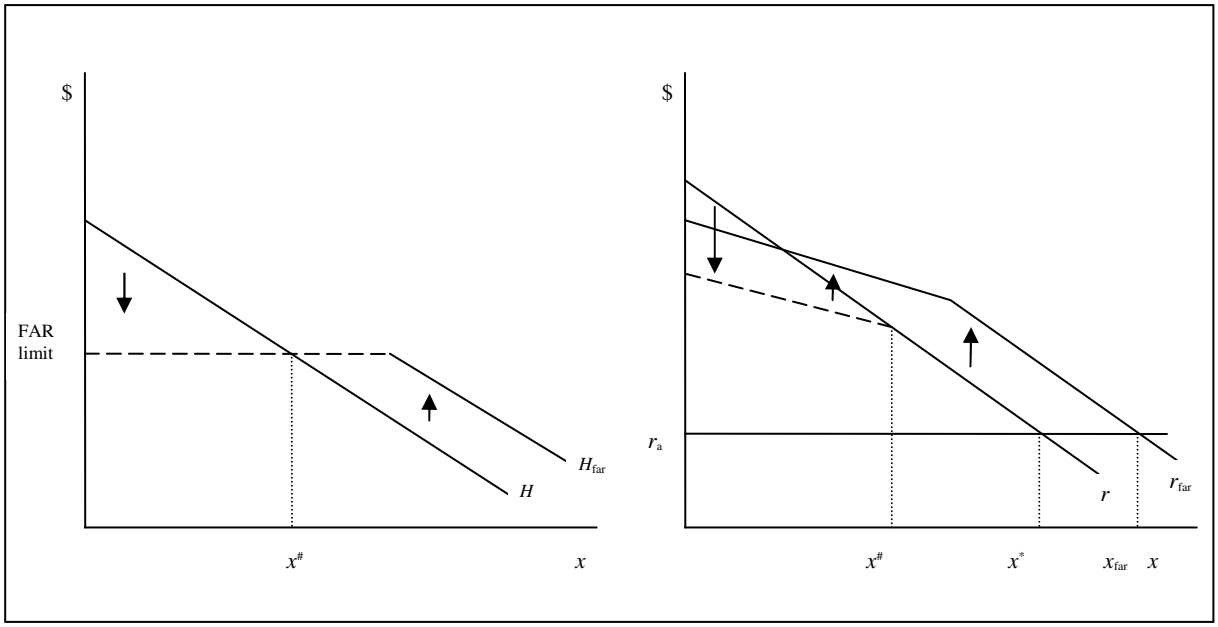


Figure 8: FAR impact.

Source: Brueckner (2007:31).

FAR limits are mostly aesthetically motivated. As explained above, theory predicts that these FAR limits raise housing prices and thus reduce the standard of living in the two cities. However, it is impossible to judge whether the associated aesthetic benefits justify these losses. However, the density regulations (including FAR limits) that are usually part of zoning ordinances can foster orderly land-use by ensuring uniformity of development in an area.

- **Cost-increasing regulations:** This category of land-use interventions is more broad-based, including a variety of interventions that may raise the cost of development, due to required development regulations including road widths standards, provision of services and requirements for community facilities in new developments. A key aspect of the impact is an increase in the price of housing, as the burden of the interventions is passed on to consumers (Brueckner, 2007:6). The South African context enforces this intervention by means of compulsory Environmental Impact Studies (EIA's), Traffic Impact Studies, Geotechnical Investigations and Public Participation Processes, as part of the application for development.

  Since a higher cost of development reduces the amount the developer is willing to pay for the land, the land-rent curve shifts down to *r'*, as seen in Figure 9. With this shift, developers can no longer outbid farmers for the land between x^* and *x'*, causing this land to be returned (hypothetically) to rural use. The resulting shrinkage of housing supply then creates a situation of excess demand, which again leads to an increase in the housing price *p*, as illustrated in Figure 9. The increase in *p* once again leads to higher land rental as developers compete more vigorously for the land, shifting the *r* curve upward in Figure 9. The final land rent curve is given by the r_{cost} curve in the Figure. Building heights rise throughout the city in response to higher land rental, and combined with

the drop in dwelling sizes, the result is higher population density in all locations. Thus, a city facing higher development costs due to various government interventions, has higher housing prices, smaller dwellings, taller buildings and a smaller spatial area than a city without such interventions. Because of higher housing prices, city residents are once again worse off (Brueckner, 2007:11).

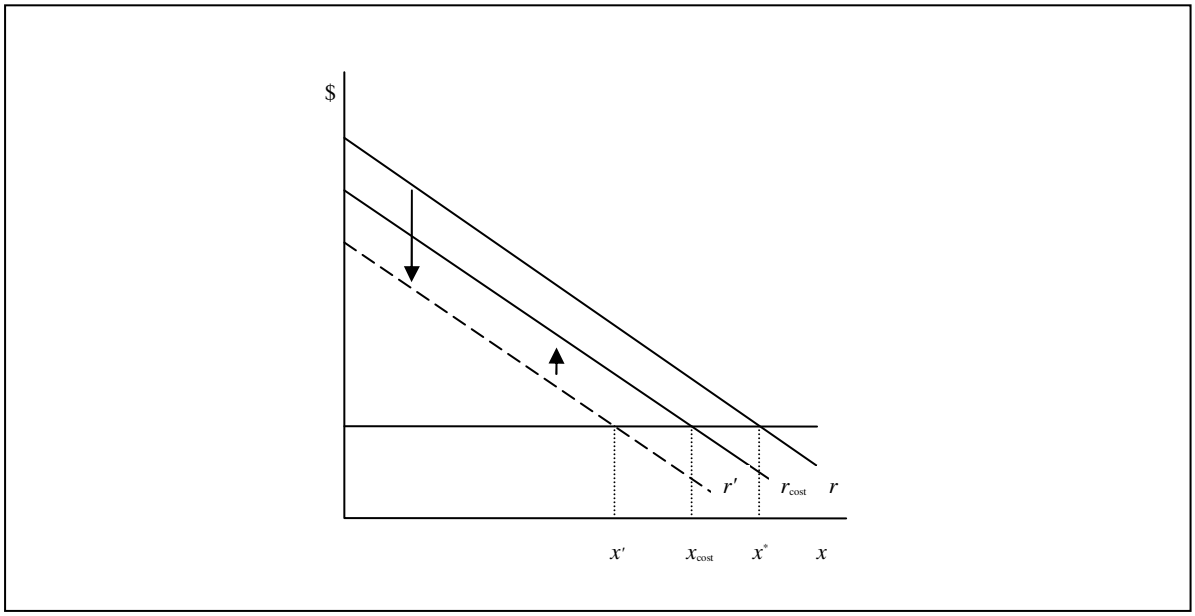


Figure 9: Cost Increase impact.

Source: Brueckner (2007:32).

The various types of cost-increasing land-use interventions discussed above, by contrast, are consciously designed to improve land-use from the perspective of urban planners. The question, of course, is whether the gains in habitability of housing developments that result from such regulations are worth the higher costs, and thus the higher housing prices, that they generate. Despite this view, government interventions that are designed to foster orderly urban development are useful. Western-style zoning laws' main purpose is to segregate different land uses with the goal of limiting negative externalities, are beneficial.

Well-meaning interventions that cause land-use outcomes to diverge substantially from free-market outcomes run the risk of generating net social losses and impact negatively on space values. The problem is that the expected benefits from large interventions may be swamped by unanticipated losses, which may be overlooked by government officials who act with an incomplete understanding of the operation of real estate markets (Brueckner, 2007:26), urban environments, and the related green spaces. With this in mind, the role and importance of spatial analysis methods are emphasised to guide and direct future urban planning.

3.6 Spatial analysis methods to determine green space value

Spatial analysis has traditionally been strongly influenced by methodologies drawn from the natural sciences (Nijkamp & Wrigley, 1984:693). A summary of the most common qualitative data methods used to conduct spatial analysis is presented in the following table.

Table 10: Summary of some qualitative data methods.

Indirect methods	Statistical methods for qualitative data	Statistical methods for nominal data	Explanatory models with qualitative data
• Proxy variables • Dummy variables • Path models • Fuzzy set analysis	• Rank correlation analysis • Original principal components analysis • Qualitative cluster analysis • Multidimensional scaling analysis	• Contingency table analysis • Log-linear analysis	• Logit analysis • Probit analysis • Scaling analysis • Generalized linear models

Source: Nijkamp and Wrigley (1984:694).

For purposes of this research, relevant spatial analysis models were selected for discussion based on the variables included in the method and the applicability to the abovementioned arguments about green space values. These methods are summarised accordingly:

3.6.1 The Probit Model

Probit models are often used to analyse the influence of environmental quality on residential relocation. To relocate or not is seen as a binary choice that can be predicted by variables that capture spatial interactions (Van Lierop & Rima, 1984:533). A spatial interaction in this sense is defined as the connections between human activities in geographical space. The analysis of spatial interaction therefore focuses on the study of location patterns, traffic and transportation flows and the choice of neighbourhood to live. It is furthermore subject to the specific society and their needs that stands within a functional relationship with the environment, due to actions and impacts at the micro level as illustrated in the following figure.

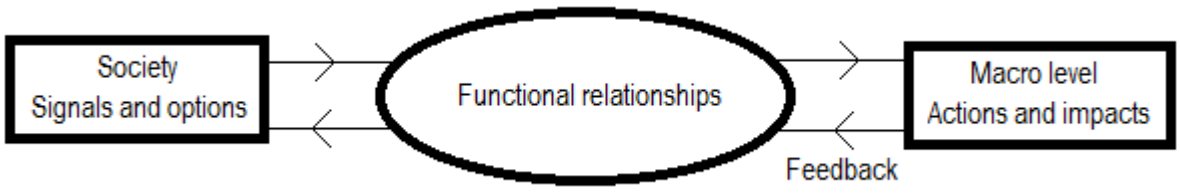


Figure 10: Actions because of signals and options.

Source: Van Lierop & Rima (1984:534).

Specially defined instrument variables may help policy-makers and planners to influence these actions of individuals and groups. This will require an assessment of all relevant cause-effect relationships in a spatial interaction system, as well as predicting the changes of actions due to changes in signals or options in society in order to provide a behavioural foundation for modelling real-world spatial interactions (Van Lierop & Rima, 1984:535). If a specific spatial interaction analysis contains two dimensions, an economic dimension (encompassing utility), and a socio-psychological dimension (including search), it is needed to create a research model composed of basic elements from utility models and search models for an analysis of functional relationships between the relevant signals and options in the society on the one hand, and the actions and impacts on the other. An assessment on micro and macro level is needed, as illustrated in the following figure.

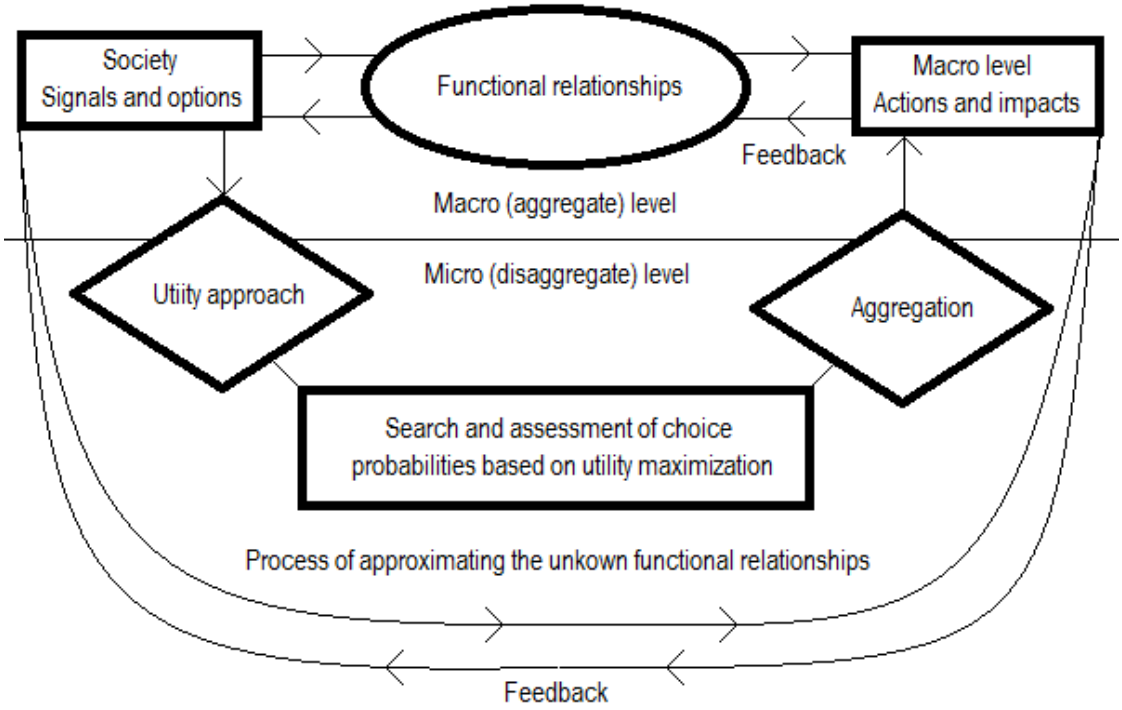


Figure 11: Combination of utility and search models for forecasting macro actions and impacts.
Source: Van Lierop and Rima (1984:534).

In a study conducted by Van Lierop and Rima (1984:541), based on the Probit Model, it was illustrated that policy makers and planners who want to influence human settlement processes will try to find objective measures for various aspects of environmental quality in order to define adequate instrument variables (variables that predict relocation patterns). The same environmental aspects will, however, be weighed in a subjective way by individual households who consider moving and in that sense the results still represent a regression to the mean.

The model thus contained different values for various aspects of environmental quality. The empirical analysis illustrated the influence of environmental quality in terms of willingness-to-move, thus related to how the areas were valued. This model thus focuses on the social aspects and needs of societies and the relation to environmental considerations, although economic benefits were not considered.

3.6.2 The Gravity Model

Gravity models are a mathematical theory that can be used to predict the amount of interaction between two places, in relation to the distance between them. It is based on Newton's second law of gravitation and is one of the cornerstones of modern science. The law states, "every particle in the universe attracts every other particle with a force that varies directly as the product of the masses of the two particles and inversely as the square of their distance apart". The direction of the force is along the straight line joining the two particles (Fowles, 1970:139). The gravity model creates a parallel between human behaviour and the behaviour of atomic particles. The importance of movement in social phenomena inspired the development of these models, similar to those developed by physicists (Reyes-Geurroro, 1986:33).

Gravity models have been mainly designed for use as predictive and descriptive tools. The mathematical expression of the model varies according to the predictive or descriptive objectives. Two of the most common equations include (Reyes-Geurroro, 1986:34):

- Migration model: The migration Tij between an origin 'i' and a destination 'j' is directly proportional to the product of the sizes of the areas Oi and Dj and inversely proportional to the distance dij between them, raised to some power 'n'.

  $Tij = k\ Oi\ Dj\ (dij)^{-n}$

- Interaction model: The interaction between zone 'i' and 'j' is directly proportional to the product of the 'mass terms' Wi and Wj associated with the zones and inversely proportional to a measure of distance or cost of travel, raised to some power 'n'.

  $Tij = k\ Wi\ Wj\ (Cij)^{-n}$

The migration or interaction models can also be used to determine the impact of green spaces upon willingness-to-move or locate in a different area. It is based on the reasoning that the number of migrants from any point within a city to another area is directly related to the number of opportunities (because of the green space) within that area and inversely related to the number of opportunities between the originating point and the other area. In the gravity model that includes this notion it is assumed that the relationship of intervening opportunity is similar to that of a distance. The model can then be expressed as:

$Tij = k\ Oi\ Dj\ (dij)^{-n}\ Pij$, where Pij is the intervening opportunity (Reyes-Geurroro, 1986:38).

This model thus focuses on the migration patterns to determine the value of an area, based on measurable data (for example travel costs and the number of people moving) but do not consider "soft" data and details as to why people chose a different location above another.

Studies conducted by Kong *et* al (2010:12) concluded that the green space network developed in combination with the gravity model, simplify and systematise the complex real landscape and help to identify the relative significance of each green space, and guide urban green space planning.

3.6.3 Other Models

It is evident that the different models all have unique features that will result in specific outcomes and values. Due to the complexity of the urban environments, multiple models are often needed to determine values of spaces. Other models that are often used in this regard include:

- Random utility models and search models.
- Behavioural models: In contrast to purely statistical, econometric, and psychometric modelling strategies, these models are based on the notions of stress and dissatisfaction, or disequilibrium (Clark & Van Lierop, 1986:123).

Based on the diversity of these models, approaches were created to determine the value of green spaces, incorporating and considering more than one model within an approach. The different approaches are described in the following section.

3.7 Approaches to determine the economic value of green spaces

Various methods exist to assess the value of land in terms of the highest and best use of the site, estimating the value by current appraisal theory, and reconciling to a final estimate of value. There are three standard approaches to estimate market value that form the foundation for the current appraisal theory (Gwartney, 2010):

- The cost approach, based upon the principle that the informed purchaser would pay no more than the cost to produce a substitute property with the same utility as the subject property.

- The sales comparison approach, utilises prices paid in actual market transactions of similar properties to estimate the value of the site.

- The income capitalisation approach, widely applied in appraising income-producing properties.

The economic value of specifically urban green space is difficult to quantify since from an economic perspective, these spaces are classic public goods without a market price. “Their lack of value expressed in monetary terms,

prevents these spaces from being properly evaluated in cost-benefit analyses of public policy." (Dunse *et al*., 2007:10.) Nevertheless, in an attempt to determine the economic value of open spaces, economists use two broad methodological approaches: stated and revealed preference. The stated preference approach relies on survey techniques to elicit individual preferences and values for environmental goods. An example of a stated preference technique is "contingent valuation", where individuals are asked their maximum willingness-to-pay for an environmental good or benefit. The revealed preference approach uses observed market choices that individuals make to reveal their underlying preferences and to estimate their values of goods and services (Freeman, 1993). The 'price' of amenities for which markets do not exist (like green spaces) is thus inferred from observing and analysing the price of goods for which markets do exist. An example of a revealed preference method is hedonic pricing models, based on the concept that a residential property is a heterogeneous good with various characteristics contributing to the sales-price of the good (including environmental attributes such as green spaces). "Regressing transacted house price against these characteristics captures the value of the environmental attribute that is capitalised in the price of the house and hence estimate the "private" benefits of the green space." (Dunse *et al*., 2007:11.) A literature review identifies four main approaches as summarised in Table 11 (based on the abovementioned methodologies) to value green space based on the findings of Sutton (2008:20-30), Fausold and Lilieholm (1999), Luttik (2000), Maruani and Amit-Cohen (2007), Meadows (1999), Schmidt (2008), and Thompson (2002), in terms of: (1) the economic approach, (2) the development approach, (3) the ethical or moral approach and (4) the utilitarian approach, described in the following table.

Table 11: Approaches to determine the value of green spaces.

	Details
Economic approach	This approach views green space in terms of the economic benefits it can provide to society, and values it accordingly. These economic benefits are determined through direct valuation methods. Green space is considered a nonmarket environmental resource, implying the values are more complex and difficult to measure, in contrast to the relative straightforwardness of the economic costs and benefits of development. Economic or monetary benefits of green space include market values, competitive values, and natural systems values. These values can have an impact on local communities and economies in terms of fiscal impacts on municipal budgets, impacts from employment and tax revenues, as well as impacts from expenditures on activities while using green spaces. It can furthermore have an impact on municipal savings with regard to the provision of utilities and infrastructure to mitigate storm water and air pollution. It is therefore focussed on direct benefits of green spaces.

Development approach	The development approach views green spaces as options for future development. This approach is linked to the economic approach, as the monetary benefits of development are valued. Green space can be highly valued by developers, but it is usually for a very different reason than, for instance, than ecologists would value it. To developers, preserving green space is done in order to increase the real estate value of the adjacent land by enhancing the aesthetic appeal of the surrounding landscape. Although preservation of green spaces may be advocated in a development approach in order to increase real estate value, it is more often the case that the economic benefits of developing green spaces outweigh these considerations. Development is irreversible and can depreciate in value over time. In contrast, permanently preserved green space is a non-depreciating asset with increasing benefits over time. Although there has been some limited success in environmental pricing, there is an inherent difficulty in attempting to price environmental services such as providing recreational opportunities, enhancing cultural places, or strengthening therapeutic values of green space. This approach is focussed on the indirect benefits (especially social benefits) of green spaces.
Ethical / moral approach	This approach views nature as having value independently of any utility to people. It is an approach that views the non-human life forms, such as animals, plants and other eco-system components, as having rights to exist and that should be respected regardless of the services they provide to people. With the ethical approach, by definition, natural values are invaluable, and therefore many authors argue that it would be morally wrong to attempt to place a monetary value on them. An additional aspect of the ethical approach is the view that contact with nature may have spiritual or metaphysical dimensions. This raises important challenges to other views, because these things are unquantifiable and intangible. This more ecocentric view of the environment urges a primary and deep respect for nature and eco-systems. Although the ethical/moral approach is not often used exclusively in urban planning and management, components of this approach are accepted by many (sense of place studies) and it has relevance to the ways in which green space planning is approached. This method is focussed on the indirect benefits (specifically environmental benefits) of green spaces.
Utilitarian approach	The utilitarian approach is one that values green space exclusively according to the benefits and services that it can provide to society. It views green spaces as service providers, and emphasizes the need to conserve a basic level of green space in order to continue the provision of these benefits and services. This link with the natural systems values. Because green spaces support eco-system functions with numerous direct and indirect benefits, such as micro-climate regulation and flood protection, this should serve as a justification for their preservation. However, although it is very difficult to assign a value to green space benefits and services, it can be argued that because humans cannot survive without them, the total value of eco-system and green space benefits is infinite. This approach to viewing green space is not likely to lead to comprehensive protection and maintenance of these spaces, simply because many green space values are not fully understood, and are not exclusively human benefits. This approach focus on the indirect benefits (specifically future benefits) of green spaces.

Source: Based on Sutton (2008:20-30), Fausold & Lilieholm (1999), Luttik (2000:31), Maruani & Amit-Cohen (2007), Meadows (1999:55), Schmidt (2008), Thompson (2002:2).

3.8 Conclusion

During the last couple of years economists have tried to determine the value of green spaces based on the abovementioned approaches. However, most of these studies were conducted in developed countries. It should still be clarified whether these approaches are also relevant in developing countries who has limited (to none) municipal budget allocated for green-development. The overall city planning is conducted from a different perspective in developing countries, as the focus is mainly on providing adequate houses, basic services and accessibility. Green-planning, green economics and green spaces did until now, not really received the needed attention. Mainly because the different community needs (in comparison to European countries), the budget constraints, but also the lack of value (in monetary terms) that prevent urban green space from being properly evaluated in cost-benefit analyses. Chances are good that when local governments do enhance green-planning, it will support the current core issues of planning – assisting with basic service provision (refer to the environmental benefits with regard to water retention and air pollution), and creating a liveable environment (with reference to social benefits). It is however, a matter of convincing local governments that it is worth investing in green spaces, as the spin-offs is not always clear. Accordingly, this research attempted to determine the value of green spaces locally, based on a compilation of the abovementioned approaches, manifesting as an integrative approach. With the objective of this study (to determine the economic, measurable value of green spaces) the focus was placed on the Economic approach, as the other approaches mainly value green spaces in terms of indirect, unmeasurable benefits, although some relevant issues were included. The proposed integrated approach to determine the value of green spaces is captured in Table 12.

Table 12: Integrated approach to determine green space value locally.

Benefits	Value	Community benefit	Local Municipality benefit
Indirect benefit	Human value	Health Social Environmental	Attractive spaces Quality environments Marketability Community relations
Direct benefits	Market value	Capital value	Land prices
	Competitive value	Lease and resale potential	Payback (Taxes)
	Natural systems value	Costs of future upgrades Energy efficiency	Capital costs Energy efficiency Operating costs Life cycle costs Water conservation Pollution minimisation Biodiversity enhancement Pressure on facilities Productivity enhancement

Source: Own creation based on GBCSA (2009).

This approach was used in a local case study (Potchefstroom, in South Africa) to determine the value of green spaces, as described in the following chapter.

Chapter 4: Case study Potchefstroom

"The measure of any great civilisation is in its cities, and a measure of a city's greatness is to be found in the quality of its public spaces, its parks, and its squares."
- John Ruskin –

4.1 Introduction

The previous chapter placed the economic value of green space in perspective by firstly clarifying the concept of 'common good' and the role of green spaces as a 'common good'. It furthermore explained the value of green spaces, in terms of the indirect and direct benefits of green spaces, as a means to understand the value, importance, and contribution that green spaces can offer to an urban environment and communities. Factors that influence the value of green spaces were evaluated, followed by methods and approaches as how to determine the exact value (measurable value) of green space. This chapter builds on these methods and approaches by evaluating it within a local South African context. Potchefstroom was used as a case study to illustrate and determine the link between economic value and green spaces locally, by means of desktop studies, surveys and new data collection methods with regard to the latest Tlokwe municipal valuation figures.

4.2 The case-study

Potchefstroom is a small university town in the North West Province of South Africa, located within the Tlokwe Local Municipality (TLM). The TLM covers an area of 2673 km², which includes the following areas: Potchefstroom, Ikageng, Mohadin and Promosa; as well as rural villages and commercial farming areas. Potchefstroom is the main urban area of the TLM, one of the fastest growing and investment areas within the North West Province and one of the leading local municipalities in South Africa, when measured in terms of a sustainability-focus (NW DACERD, 2009:12). Figure 12 illustrates the location of the study area.

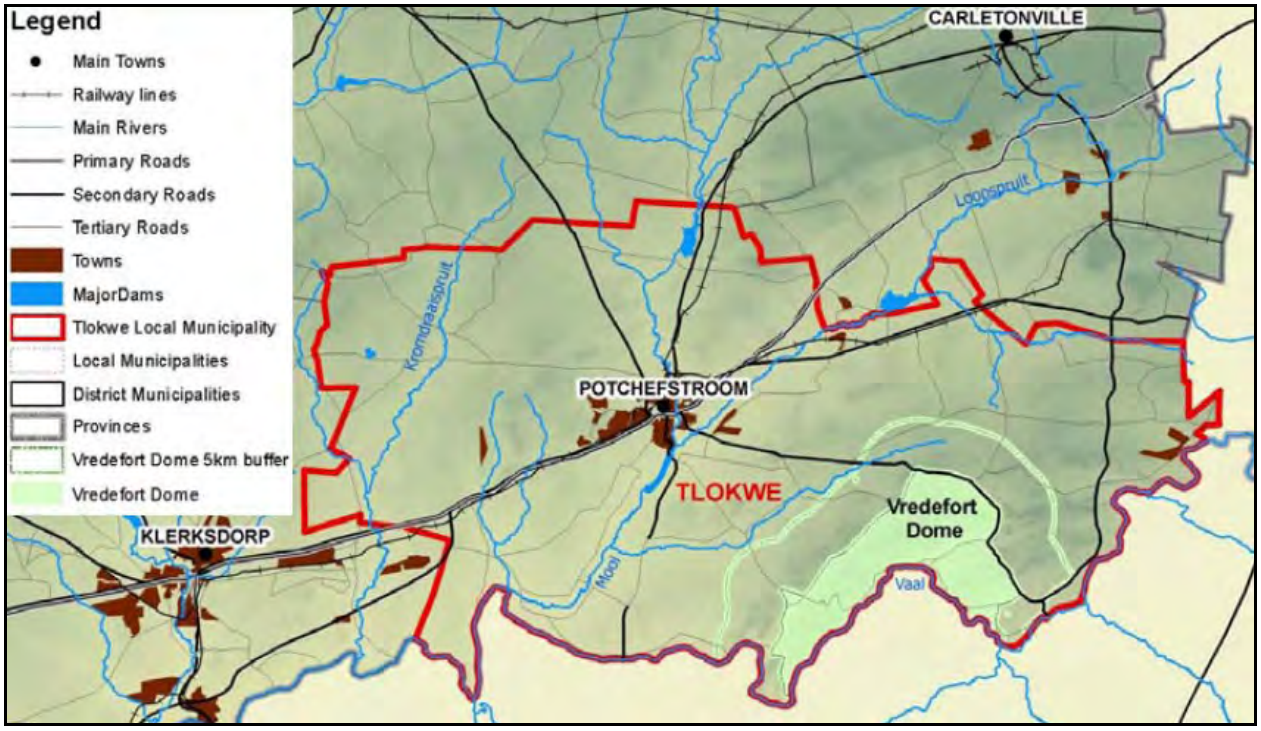


Figure 12: Location of the study area.

Source: NW DACERD (2009:11).

Potchefstroom has always been a known as a significant and historical educational centre and currently still hosts the North West University, major secondary and tertiary schools. Its cultural, educational, and recreational characteristics are part of the success of the city, and reason why urban expansion pressures are increasing. Apart from the qualitative lifestyle that the city offers, it also has many opportunities in terms of green spaces, especially when compared with other South African cities. The well-known Akkerlaan (a street with Oak trees) are symbolic to the green character of the city, along with the Botanical gardens, Golf Course, and the Potchefstroom Dam area. The university grounds also contain various qualitative green spaces, public gardens, sport fields, and walking trails, relevant to this study. These spaces are believed to have social, aesthetic, and environmental value, but the economic value of these spaces have never been calculated. With expanding pressures for urban development, the local government needs to recognise the economic value captured within these green spaces, in order to plan for the protection and enhancement thereof, and furthermore create more such qualitative spaces in new urban developments, to gain the benefits it has to offer, as stated in the literature review. The spatial vision set in the SDF of the municipality reads, “To reconstruct the urban framework of Tlokwe to create an integrated and sustainable city by focusing in the inherent economic potential the area has to offer” (NW DACERD, 2009:15). Potchefstroom, with its commitment to becoming a “green city”, was selected by the International Council for Local Environmental Initiatives (ICLEI) as a model city, which was showcased during the World Summit on Sustainable Development held in Johannesburg in 2002 (Tlokwe Local Municipality, 2009a:48). Potchefstroom, although located in a developing country, has many of the qualitative characteristics of European cities (where previous studies of green spaces were conducted) and great development potential, and was therefore chosen as case study.

4.3 Integrated approach to determine the value of green spaces

The green spaces in Potchefstroom were assessed in this dissertation in terms of the integrated approach as described in the previous chapter (guided by the criteria of direct economic benefit). The assessment was not conducted comprehensively, due to time and input limitations, however, the desktop studies and surveys conducted were adequate to reveal the perceptions of authorities and communities with regard to green spaces, as well as providing an estimate of the value of the green spaces in Potchefstroom. The empirical evaluation was conducted in two phases (Figure 13):

- Desktop studies: Evaluating local policy documents, development frameworks, and maps to determine the current reality with regard to the planning (and priority) of green spaces. Core studies included the Spatial Development Framework (SDF) (revealing the spatial planning of spaces on a regional level), the Land Use Management Schemes (LUMS) (revealing the spatial planning of spaces on a local level), the Integrated Development Plan (IDP) (revealing the local budget with regard to planning), the Eskom manual (revealing the South African situation with regard to energy costs), Environmental Impact Assessments (EIA) and specialised studies with regard to the water-situation in Potchefstroom and lastly detailed studies with regard to property price valuation and the influence of green spaces.

- Surveys: Conducted by means of questionnaires completed by authorities (involved in urban planning and environmental management) and community members (users of the green spaces) respectively. The input of both parties were of importance in order to compare current reality with regard to the community view (demand) versus the authority view (supply) of green spaces, and the future reality with regard to community willingness-to-pay for green spaces and authority willingness-to-invest in green spaces.

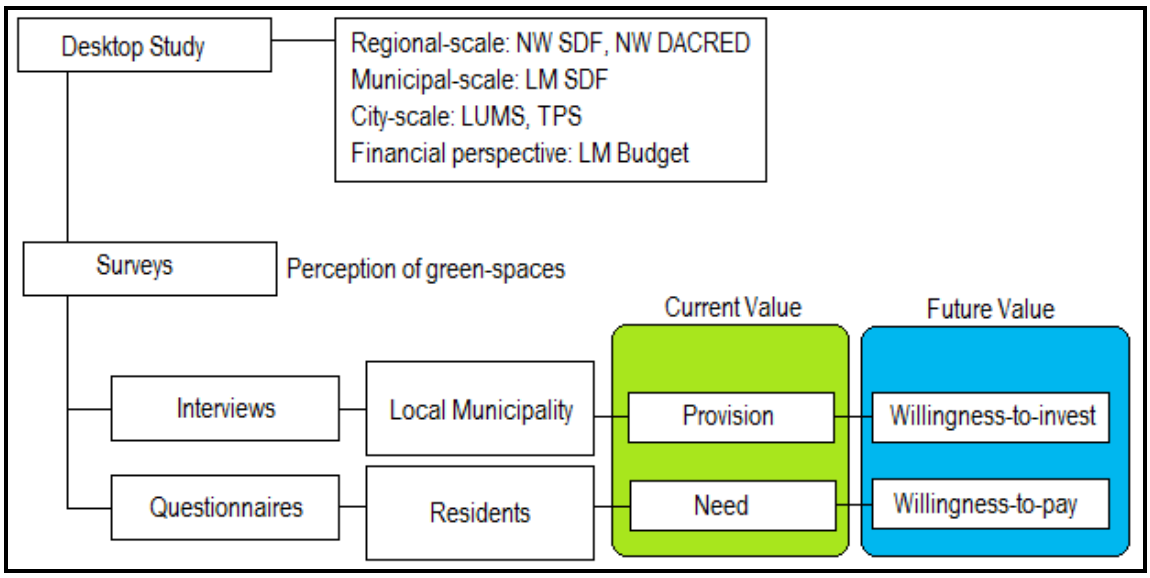


Figure 13: Structure of empirical research.

Source: Own creation (2010).

Findings were categorised in terms of indirect benefits and direct benefits (market value, competitive value, and natural systems value) as proposed in Table 12 in the previous chapter. The desktop studies and surveys (together with findings) will be explained accordingly.

4.4 Desktop studies

Desktop studies included direct valuation methods, based on the current reality (captured in policy frameworks and planning documentation) with the aim to determine the market value, competitive value, and natural systems value as applicable to communities and authorities respectively.

4.4.1 Regional-scale perspective (NW SDF, NW DACRED)

The spatial rationale for the North West Province as captured in the North West Spatial Development Framework (North West Provincial Government, 2005) was based on the Strategic Environmental Assessment process, the National Spatial Guidelines (NSDP), and provincial guidelines for Spatial Development Frameworks in the Land Use Management Bill, 2002. Within this basis, a development plan indicating development zones was compiled as a spatial tool to guide provincial capital expenditure and multi-sectoral programmes (North West Provincial Government, 2005:10). Tlokwe Local Municipality (TLM) was identified as a development node within the province, experiencing significant growth and development pressure, in terms of urban development, a backlog in infrastructure provision, and demand for housing (NW DACERD, 2009:11). Potchefstroom was identified as an area within the North West Province with high economic potential, according to the Provincial Spatial Development Framework (North West Provincial Government, 2005:11), due to the location of the municipal area and its positive physical attributes (NW DACERD, 2009:11), as well as its growing population, economic growth rate (0.17 percent between 1996 and 2001 per annum) and urbanisation rate (87.3 percent), as illustrated in Figure 14. Given the high economic potential of Potchefstroom, any investment is likely to result in a great return, both social and economically (North West Provincial Government, 2005:13) and therefore this area was earmarked as a 'priority 1' investment area for the North West Province.

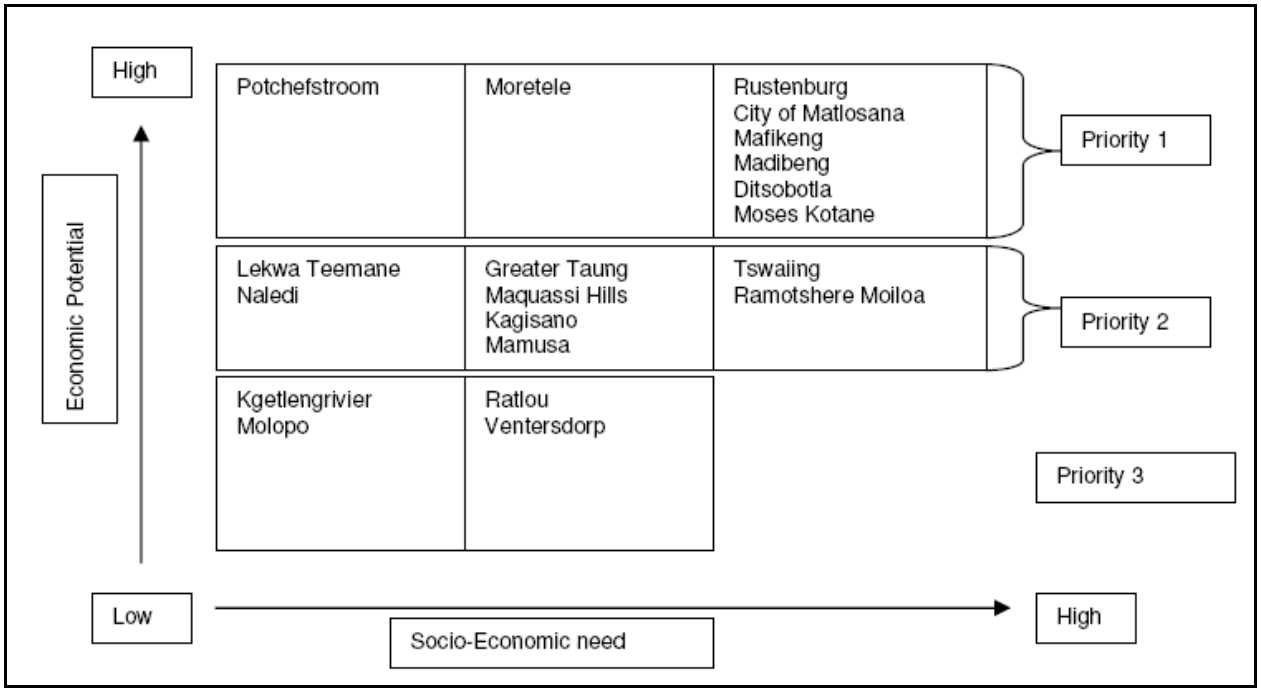


Figure 14: Priority investment areas matrix for NW Province.

Source: North West Province (2007:214).

The provincial SDF further aimed to ensure the integration of environmental sustainability into the planning and decision making processes, by developing an instrument, a provincial environmental management plan (EMP), to regulate and manage development by means of conditions, regulations, procedures and programmes (North West Provincial Government, 2005:18). The environmental management plan (EMP) was set to defined natural areas in terms of specific zones of each of the local areas, including Potchefstroom, and distinguish between formal protected areas, proposed protected areas, cultural and heritage sites, conservancies, dolomite aquifers and dolomite eyes, ridges, wetland areas, areas of high biodiversity and agriculture (North West Provincial Government, 2005:23), prioritising these green spaces within the regional perspective.

However, the rationale of giving priority to green spaces on regional level was not motivated in these frameworks, and it was assumed that the core drive was the environmental benefit factors. Even though regional authorities did not calculate the economic value that these green spaces might offer, they still felt compelled to plan for green spaces because of the obvious savings in terms of life cycle costs.

4.4.2 Municipal-scale perspective (LM SDF)

The Spatial Development Framework, as stated in chapter 2, facilitates development within the local municipality in context of the metropolitan region in which it functions. It thus reveals the development trends, proposed future urban areas, and proposed green-planning initiatives. The Tlokwe Local Municipality Spatial Development Framework (LM SDF) was revised during 2008, as a revision of the 2002 SDF and as part of the broader Integrated Development Plan (IDP) process (NW DACERD, 2009:33). The SDF offers an overview of the demographic, spatial development and development planning character of Tlokwe Local Municipality and Potchefstroom, and highlighted certain issues relevant to this study; starting with the current land cover categories as captured in Table 13.

Table 13: Land-cover categories in the Tlokwe Local Municipality.

Land Use Category	Percentage Coverage
Cultivated temporary/ commercial dry land	20,3
Cultivated temporary/ commercial irrigated	0,64
Forest and woodland	5,19
Forest plantations	0,45
Mines and quarries	0,15
Thicket and bush land	3,28
Unimproved grass land	66,15
Urban/ built up land	3,52
Wetlands	0,05
TOTAL	**100**

Source: Tlokwe Local Municipality (2008).

These figures are illustrated in the following maps and imply that the greater Tlokwe municipal area is predominantly characterised by green open spaces.

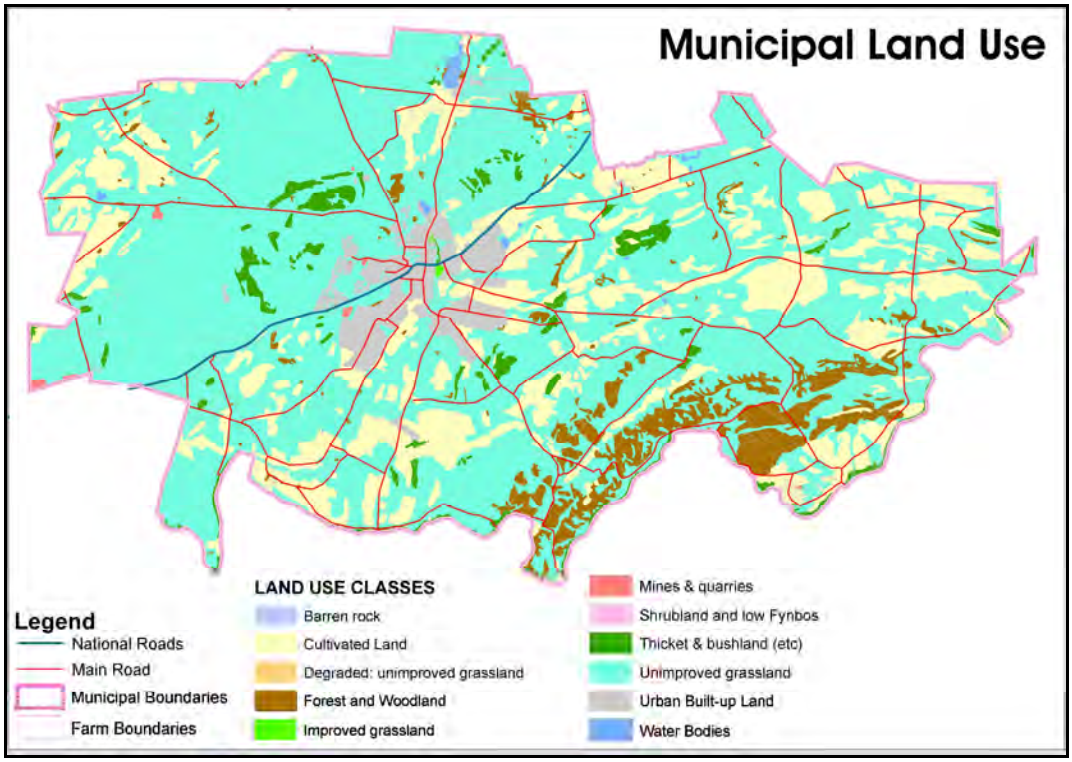


Figure 15: Municipal land use.

Source: Tlokwe Local Municipality (2008).

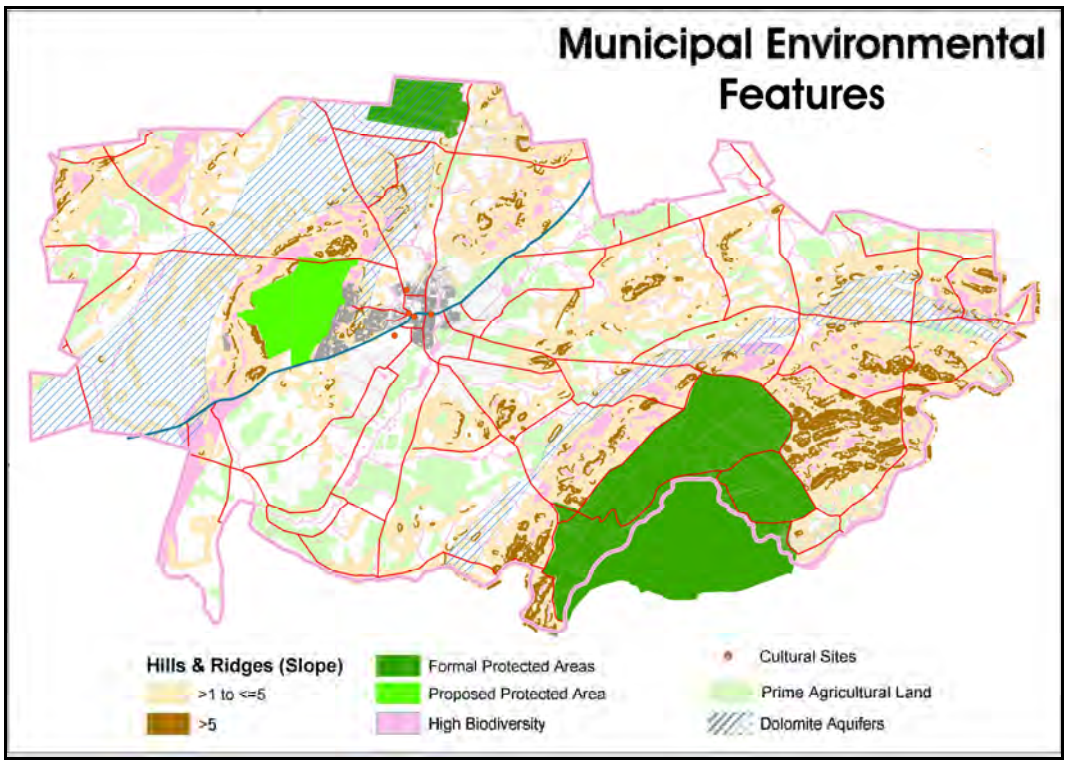


Figure 16: Municipal environmental features.

Source: Tlokwe Local Municipality (2008).

The SDF further contained a detailed swot-analysis, which identifies strengths, weaknesses, constraints and opportunities with regard to various land-uses, but for the purpose of this study, the open spaces as captured in Table 14, are emphasised.

Table 14: SWOT-analysis of open space for Tlokwe City Council.

Focus	Finding
Strengths	66 percent of the land area is classified as unimproved grassland
Weaknesses	The open space areas are fragmented and encroached upon by development
Opportunities	Scope exists for the creation of an open space system that functions ecologically and at the same time provides the area with essential eco-system services
Threats	Fragmented open spaces rapidly deteriorate in the absence of management. Pristine grassland in optimal locations are generally valuable land for development
Objective	The municipal open space system (MOSS) must be defined before development is allowed

Source: Own creation based on the SDF (Tlokwe Local Municipality, 2008).

Within this setting of open spaces, the Tlokwe SDF (Tlokwe Local Municipality, 2008: 60) defined a municipal open space system (MOSS) in the urban areas as: "The municipal open space system (MOSS) is intended to function as a series of interconnected parks, open spaces and natural areas which collectively serve as recreation, environmental, functional and historical corridors and areas. Degradation of natural systems or open spaces must not be permitted as a motivation for urban development. These areas should be rehabilitated, thereby raising the quality and amenity value of the open space and contributing to the functioning of the system as a whole". This is particularly important when considering the threats of green spaces as listed in the abovementioned table, as well as the current backlog in land and housing consisting of 12 199 informal units, 4 130 informal backyard units and 2 283 units that are not on formalised stands, which translates into a spatial area of 442ha that is required for new housing projects. This is comparable to another study conducted by the Housing Sector Plan (HSP) identifying a need for 2801 units, equating to 280ha (NW DACERD, 2009:35). Furthermore, most of the land in Tlokwe is in private hands (87,34 percent), as compared to a relatively minor portion in municipal ownership, namely 3,44 percent. The remainder of 9,22 percent is designated as state land, limiting the number of possible sites to address urban development and protection of green spaces as governed by the local authorities and government. Based on the realisation of these limitations and development pressures, the 2008 SDF placed a strong emphasis on the generation of land management guidelines that would protect environmentally sensitive areas (NW DACERD, 2009:60), and was incorporated in the proposed future spatial development plan (refer to the following figure). The light green area represents the municipal open space system (MOSS) and the darker green area the proposed Highveld National Park.

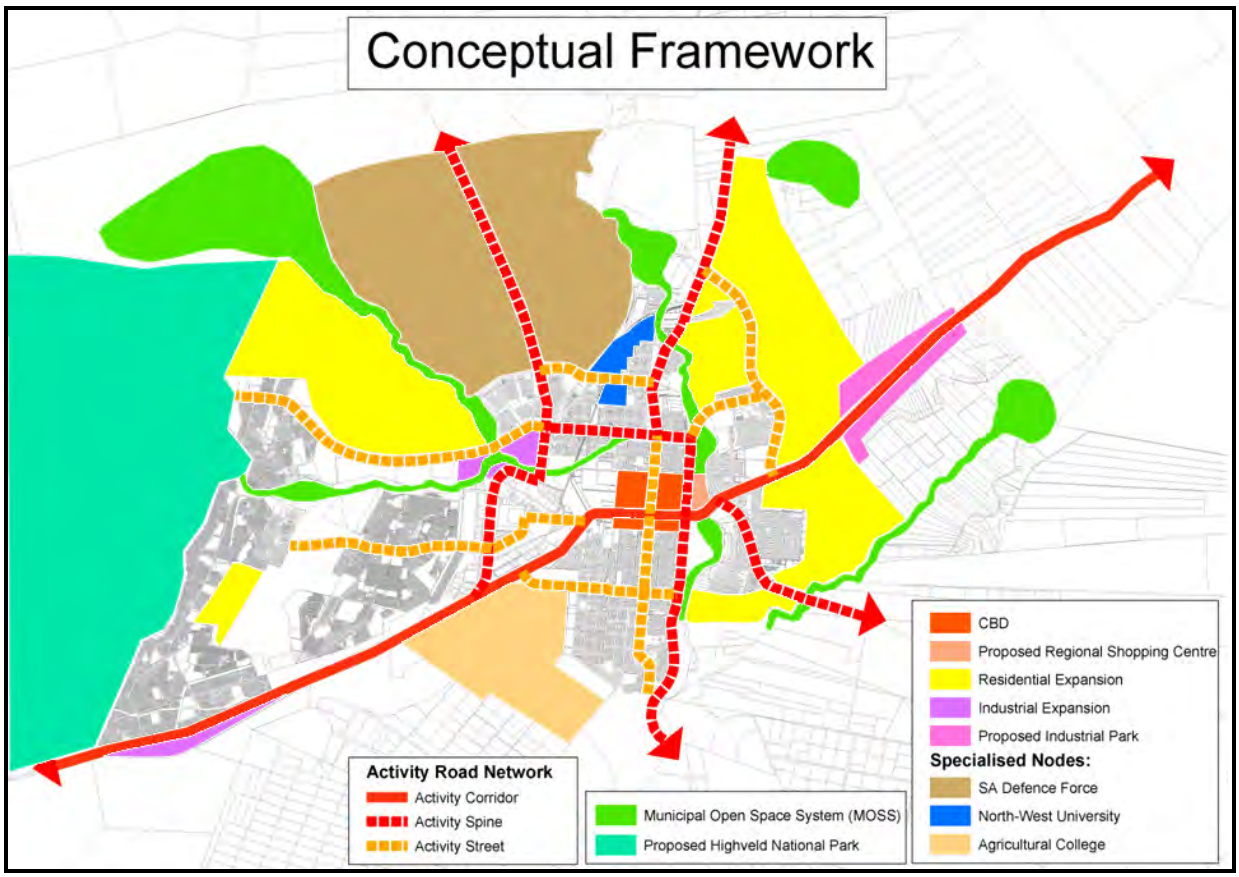


Figure 17: LM SDF conceptual framework.

Source: Tlokwe Local Municipality (2008).

4.4.3 City-scale perspective (LUMS and Town Planning Scheme)

The city-scale reveals the current zoning and land-use within the greater urban area, as captured in the land use management scheme (LUMS), the town planning scheme of Potchefstroom and the Potchefstroom Residential Policy (Potchefstroom, 2007). This city-scale reveals a different picture when compared to the regional-scale that was dominated by green spaces. The land-uses within the greater urban area of Potchefstroom are predominately developed (residential, business, industrial and educational), with very limited and fragmented areas of green spaces. The open green spaces are located on the outer parts of the greater urban area, as the Land Use Management Scheme illustrates in Figure 18.

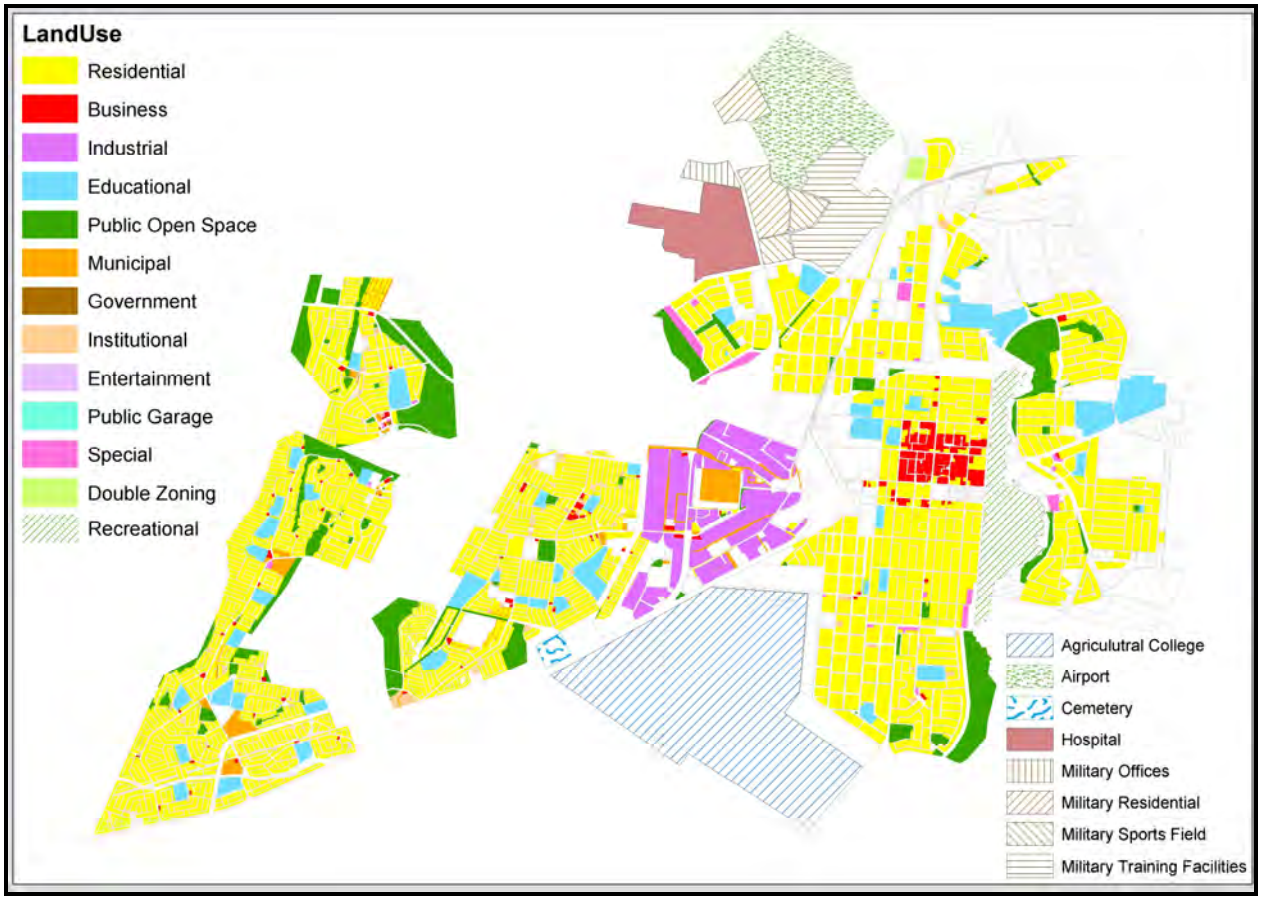


Figure 18: Potchefstroom land-use.

Source: Tlokwe Local Municipality (2008).

As for the core CBD area (refer to Figure 19), dominated by businesses, a decline has been experienced over the past ten years in terms of losing key anchor tenants, experiencing an increase in crime, increases in congestion, pollution and a reduction in the number of service-sector firms operating. The CBD also experienced an increase in informal traders, whilst new business premise creation moved away from the CBD into suburban shopping centres and malls, resulting in an inner-city decline and overall CBD degeneration. Recently initiatives for revitalisation have been adopted to ensure the redevelopment of qualitative spaces within the core CBD and address this problem of degeneration. These initiatives were captured in the Potchefstroom Revitalisation Study (Southern District Municipality, 2006:22).

The Potchefstroom Revitalisation Study (Southern District Municipality, 2006:22) identified the detailed land-uses within the CBD (refer to Figure 20), the quality of buildings within the CBD, based on their appearances and on their surrounding area (refer to Figure 21), and the property prices in the CBD, based on the quality of infrastructure, visual aspects, and attractiveness focussed on the specific sites and their harmony within the surrounding areas (refer to Figure 22).

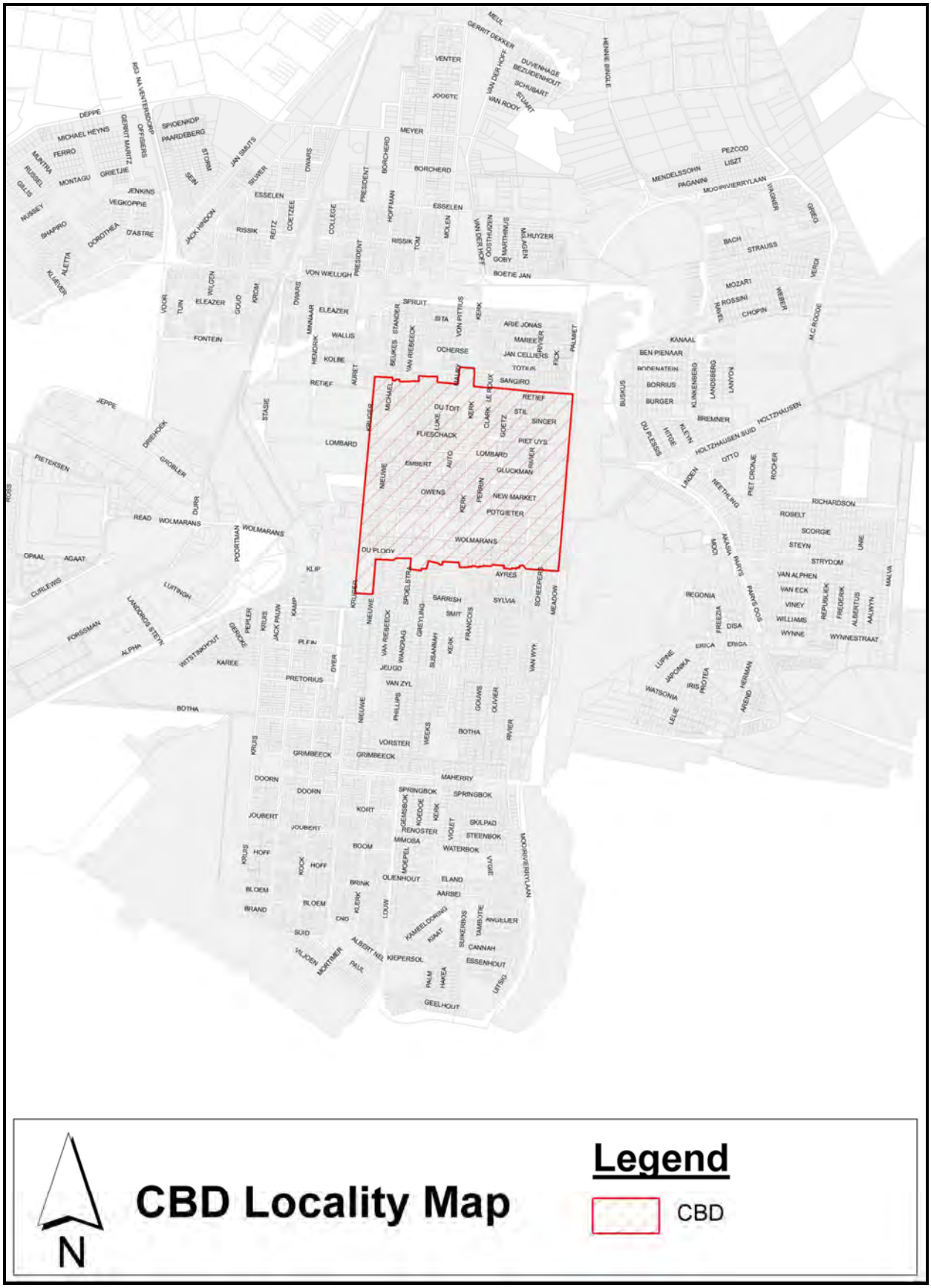


Figure 19: Demarcation of the Potchefstroom CBD area.

Source: Southern District Municipality (2006:8).

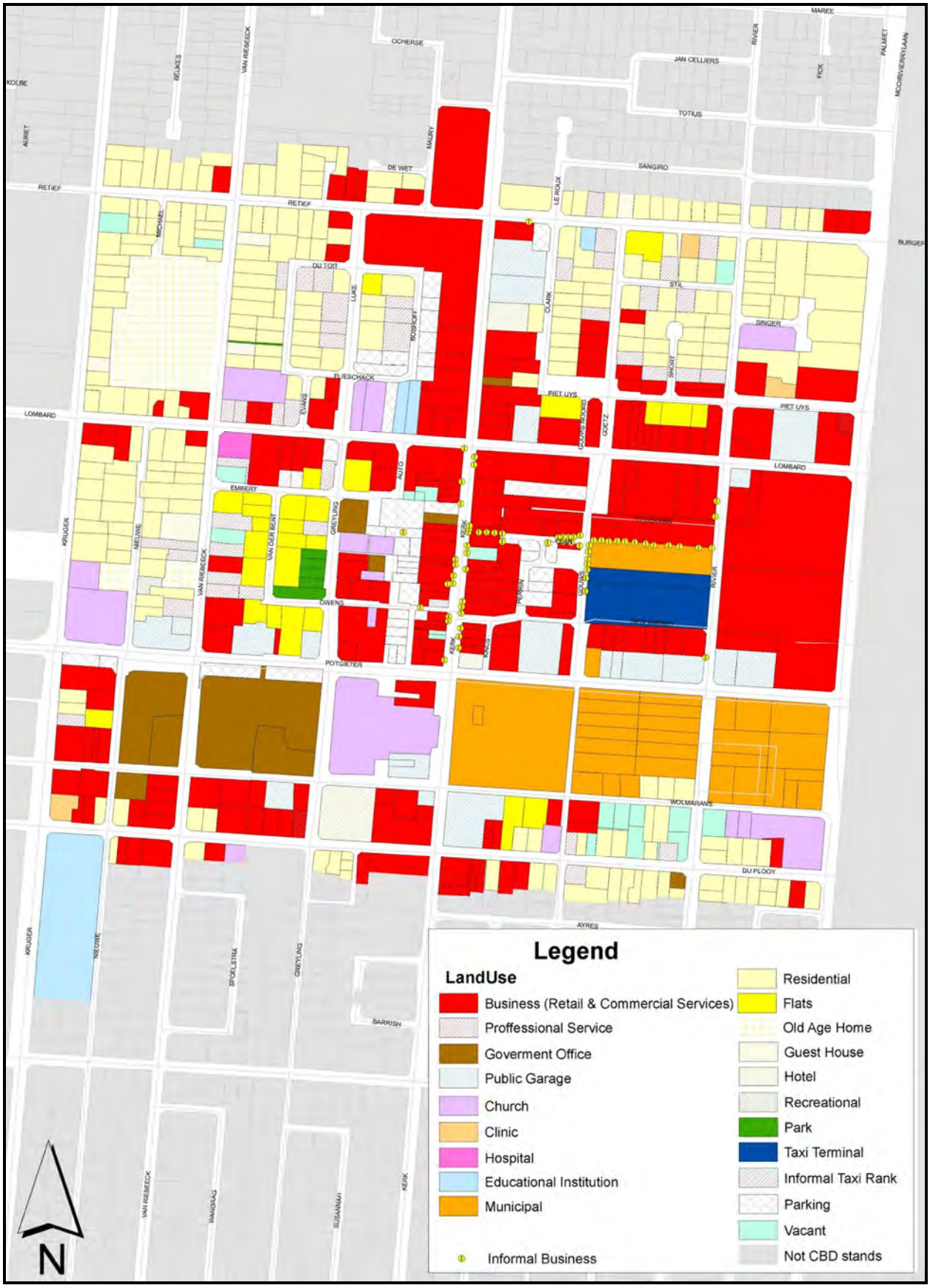


Figure 20: Land-uses in the CBD.

Source: Southern District Municipality (2006:12).

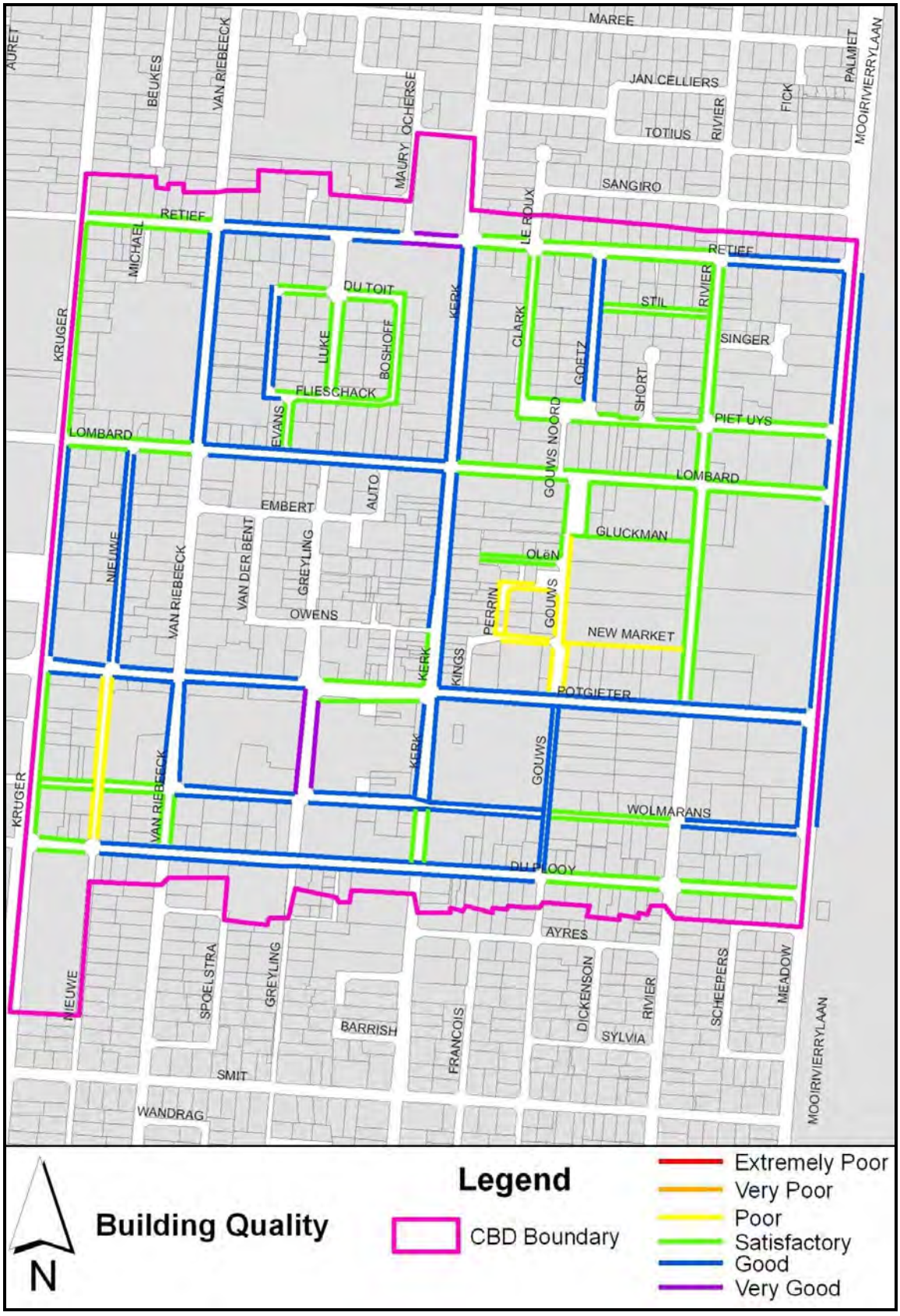


Figure 21: Valuation of buildings in the CBD.

Source: Southern District Municipality (2006:24).

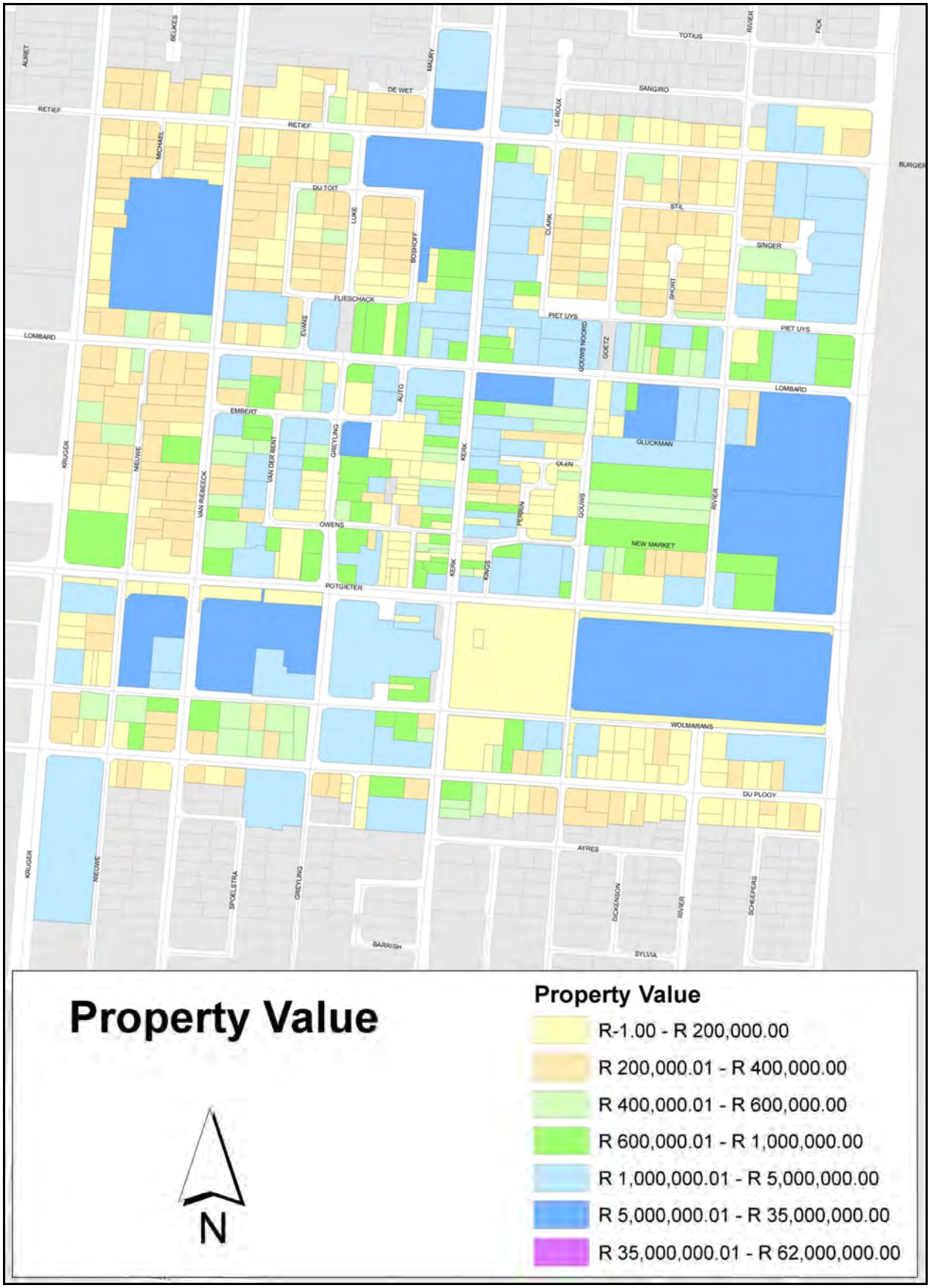


Figure 22: Property values in the CBD.

Source: Southern District Municipality (2006:24).

Based on these maps, this study questioned the poor quality and relatively low property prices as a result of the development-dominated planning (resulting in a lack of qualitative green spaces). These issues were addressed in the surveys (part two of the empirical research) as mentioned later on in this document.

4.4.4 Financial perspective (LM BUDGET)

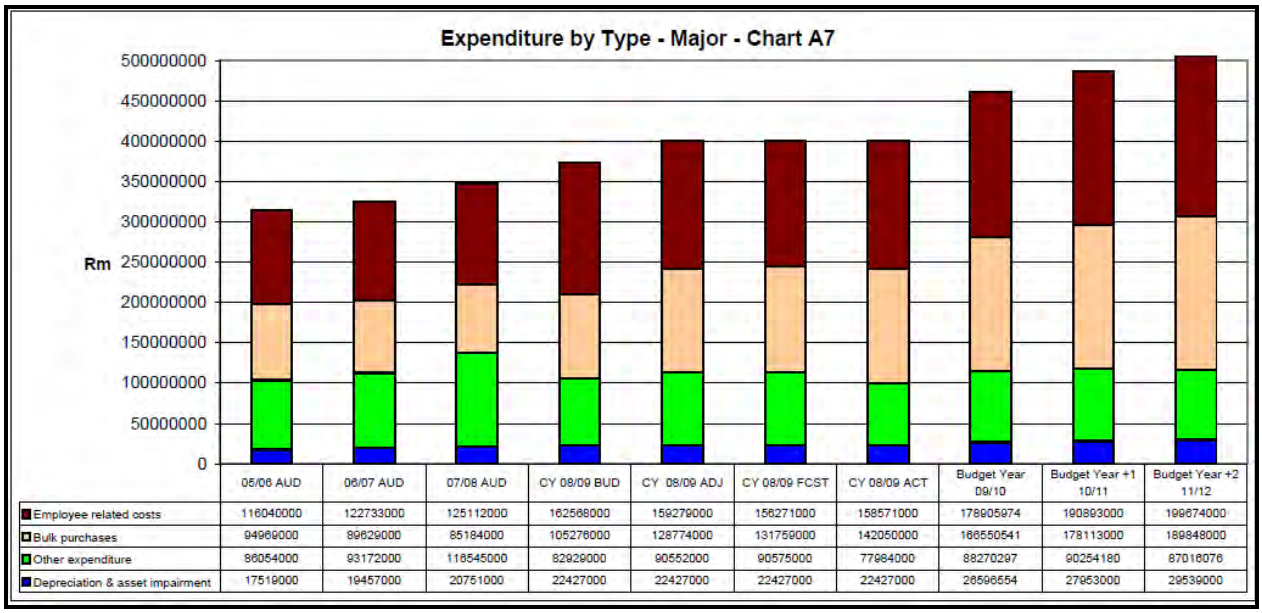
The local municipal budget reveals the actual reality within the local area, as it is a mirror of the implementation of the goals set in the SDF and IDP. The 2009/2010 budget is divided into two main categories namely, capital and operating budget. It comprises (Tlokwe Local Municipality, 2009:5) of capital projects (R122,5 million) and operational costs (R 565,1 million). The IDP document informs the roll out of the capital projects. The major projects included in the budget were:

- Construction of a water network, sewer connection, roads, and storm water in Ikageng Extension 12.
- Construction of the Thusong Service Centre in Ikageng (Ward 18)
- Establishment of community markets, empowerment projects and waste management project in Ikageng
- Construction of the cultural village along the N12 road
- Construction of the access road as well as electricity supply to the Barolong bo Modiboa in Matlwang
- The promotion and marketing of the Vredefort Dome as a tourist destination of choice.
- On a five to ten year time horizon the IDP will focus on the following major economic developmental projects:
    - An industrial park at the eastern entrance to Potchefstroom.
    - Extension of the current industrial area northwards.
    - A techno park close to the university adjacent to Mooi River Avenue.
    - An educational node (NW University) and military node in the northern section of the town.
    - A node in the area of the railway station and the PUK McArthur sport complex.
    - Provision for a hierarchy of business nodes

It is evident that no green space projects are included in the objectives, implying that the provincial goals and local municipal objectives for development are not realised in practice. This is further enhanced by the budget breakdown (Tlokwe Local Municipality, 2009:9) in terms of expenditure and revenue:

- Expenditure: The total operating expenditure for the city in 2009/2010 is estimated at R 565,1 million (refer to Figure 23). The Personnel expenditure amounts to R 178,9 million or 31,7 percent of the expenditure budget. Capital expenditure for the 2009/2010 financial year will amount to R 122.5 million. The greatest part of the money allocated for the capital expenditure will be spent on infrastructure, namely R 112.5 million. The distribution of the total amount for infrastructure are:

- Roads, pavements and bridges: R 19,5 m
- Electricity Reticulation: R 40,0 m
- Water Reticulation: R 9,0 m
- Sewage Purification: R 19,0 m
- Other Infrastructure: R 25,0 m



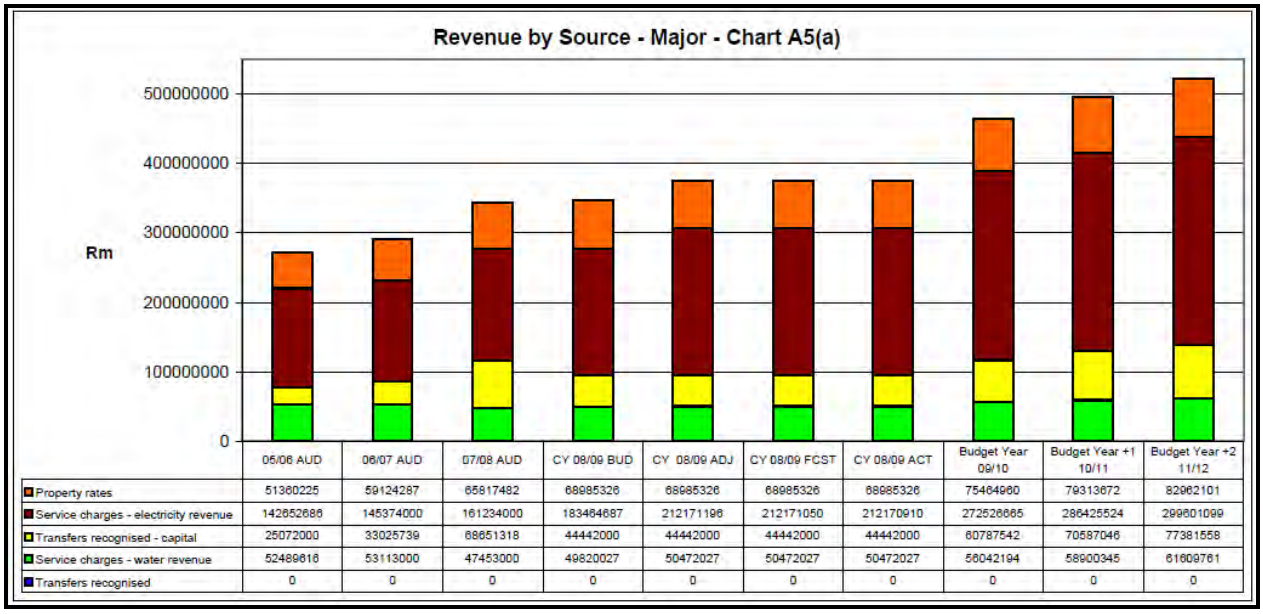
	05/06 AUD	06/07 AUD	07/08 AUD	CY 08/09 BUD	CY 08/09 ADJ	CY 08/09 FCST	CY 08/09 ACT	Budget Year 09/10	Budget Year +1 10/11	Budget Year +2 11/12
Employee related costs	116040000	122733000	125112000	162568000	159279000	156271000	158571000	178905974	190893000	199674000
Bulk purchases	94969000	89629000	85184000	105276000	128774000	131759000	142050000	166550541	178113000	189848000
Other expenditure	86054000	93172000	118545000	82929000	90552000	90575000	77984000	88270297	90254180	87016076
Depreciation & asset impairment	17519000	19457000	20751000	22427000	22427000	22427000	22427000	26596554	27953000	29539000

Figure 23: Potchefstroom expenditure by type.

Source: Tlokwe Local Municipality (2009:109).

- Revenue: In terms of S74 of the Municipal Systems Act, the local government adopted a tariff policy on 24 May 2005 with the objective to ensure that the tariffs on the municipality comply with the legislation prevailing at the time of implementation, that the municipal services are financially sustainable, affordable, and equitable, and that the needs of the indigent are taken into consideration. The policy was drawn in line with the principles as outlined in the Municipal Systems Act (Tlokwe Local Municipality, 2009:29). The revenue budget for 2009/2010 is based on this tariff policy and will derive its income from the following major sources (refer to Figure 24):

    - Electricity: 48.2 percent
    - Assessment rates: 13.4 percent
    - Grants: 10.7 percent
    - Water: 9.9 percent
    - Sanitation: 5.7 percent
    - Refuse removal: 4.5 percent
    - Interest on debtors: 1.7 percent
    - Interest on investments: 1.6 percent
    - Traffic fines: 1.1 percent
    - Other: 3.2 percent



	05/06 AUD	06/07 AUD	07/08 AUD	CY 08/09 BUD	CY 08/09 ADJ	CY 08/09 FCST	CY 08/09 ACT	Budget Year 09/10	Budget Year +1 10/11	Budget Year +2 11/12
Property rates	51360225	59124287	65817482	68985326	68985326	68985326	68985326	75464960	79313672	82962101
Service charges - electricity revenue	142652686	145374000	161234000	183464687	212171196	212171050	212170910	272526665	286425524	299601099
Transfers recognised - capital	25072000	33025739	68651318	44442000	44442000	44442000	44442000	60787542	70587046	77381558
Service charges - water revenue	52489616	53113000	47453000	49820027	50472027	50472027	50472027	56042194	58900345	61609761
Transfers recognised	0	0	0	0	0	0	0	0	0	0

Figure 24: Potchefstroom revenue by source.

Source: Tlokwe Local Municipality (2009:106).

As these are the only sources of income for the city, tariff increases are unavoidable. The local government proposed the following tariff increases for the 2009/2010 financial year:

- Electricity: 34 percent
- Water: 6 percent
- Sewerage: R 77.96 (for households)
- Refuse removal: R 30 basic plus 6 percent
- Property rates: As per the new rates policy
- Sundry revenue: 6 percent

The exact costs of these services (to be paid by individual residents per site) were determined by the evaluation of properties in terms of the Municipal Property Rates Act, based on the market valuation in 2009/2010. “Section 3(1) of the Local Government Municipal Property Rates Act, 2004 (Act 6 of 2004) and Section 62(1)(f) of the MFMA determines that a City Council must adopt and implement a rates policy on the levying of rates on rateable properties.” (Tlokwe Local Municipality, 2009:29.) Properties were assessed in terms of the market value of land and buildings (which had substantial gains in value), and resulted in an increase in the rates levied, in comparison to previous years (Tlokwe Local Municipality, 2009:19). The local government levied different rates for different categories of property (the rate randage for the said financial year for the Tlokwe City Council, was levied for residential categories at 0,0033 cents in the Rand). Accordingly, rates as determined per site are captured in the following table, according to the annual and monthly rates applicable in 2009/2010.

Table 15: Current municipal rates.

Property value (R)	Annual Rates (R)		Monthly Rates (R)	
	General	Indigent	General	Indigent
20 000	0	0	0	0
120 000	333,00	165,00	27,50	13,75
200 000	594,00	297,00	49,50	24,75
400 000	1 254,00	627,00	104,50	52,25
500 000	1 584,00	792,00	132,00	66,00
750 000	2 409,00	1 204,50	200,75	100,34
1 000 000	3 234,00	1 617,00	269,50	134,75
1 250 000	4 059,00	2 029,50	338,25	169,13
1 500 000	4 884,00	2 442,00	407,00	203,50

Source: Tlokwe Local Municipality (2009:43).

The increase in rates in Potchefstroom is in line with the national increase as described in the Eskom Annual report with regard to energy costs, as captured in Figure 25, the energy costs predictions in South Africa for the next 18 years.

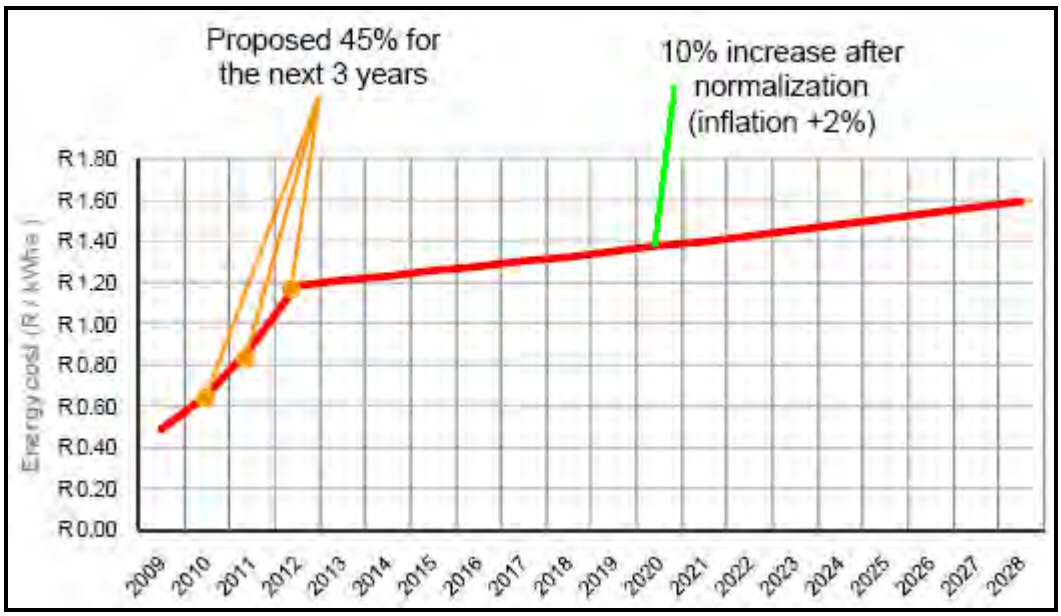


Figure 25: Energy cost predictions in South Africa.

Source: GBCSA (2009).

The following figure illustrates the current energy costs in South Africa in comparison to the average energy costs worldwide. The costs is furthermore related to m^2, indicating the impact it will have on residents, businesses and commercial areas.

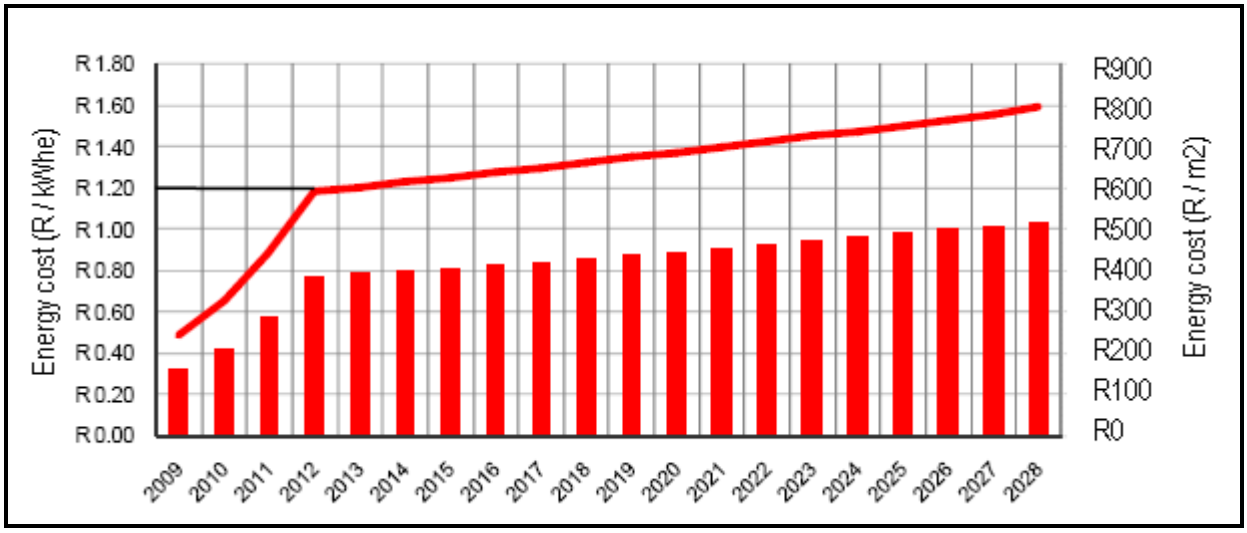


Figure 26: Energy cost predictions of South Africa in comparison to the world average.

Source: GBCSA (2009).

The Eskom Annual Report (Eskom, 2009) capture these figures on a graph illustrating the current energy costs in South Africa, in comparison to various world cities in terms of the current reality and the proposed situation within three years, refer to Figure 27. From this figure, it can be seen that the energy costs will be a great financial burden, influencing the development of South African urban areas, and stress the need to rethink and incorporate ways to address energy saving by means of natural features. The benefits that green spaces offer are no longer a luxury, but a necessity.

An increase in tariffs is unavoidable and stresses the need to minimise costs through the use of natural resources. This is also the case when thinking about water concerns in local municipalities, with Tlokwe not being any exception. There was however, an increase in the water service delivery from 30.2 percent in 2001 to 62.6 percent in 2007 for piped water inside a dwelling (Statistics South Africa, 2007), however, the quality of water is being questioned in recent studies stating that "water management challenges in the Mooi River catchment are becoming increasingly complex due to an increase in the demand of water users combined with the current and historic negligent pollution of water. In this regard, the illegal discharge of effluent by major water users, especially the gold mines, is the most prominent. A clear demonstration of the growing complexity and urgency of the situation in the Mooi River catchment, is the existing memorandum of understanding (MOU) between the Gauteng regional office of the Department of Water Affairs and Forestry (DWAF) and the Potchefstroom Local Municipality" (Le Roux, 2005:1). This, along with the lack of sufficient waste and refuse disposal contributes to the polluted environment.

Figure 27: Current energy costs in South Africa in comparison to other world cities.

Source: GBCSA (2009).

The Tlokwe local municipality introduced the '*clean green project'* as part of the Cities for Climate Change Initiative, which is a community-driven project for cleaning and waste collection. Although only a small section (approximately 8000 households) of the community was affected by the project (Tlokwe Local Municipality, 2009), it testified of an attempt to address the planning and enhancement of green spaces. However, the urgent need to address the water- and environmental problems remain, and might continue to remain, especially when considering the Tlokwe City Council budget of 2008/2009, which illustrated that environmental management were included in the budget, but zero rand were allocated for this objective. The local government and relevant authority members should, as a point of departure to enhance green spaces, realise the critical importance and function of green spaces (and related environmental management objectives), and include it in the planning and budget process.

Table 16: Tlokwe City Council Budget 2008/2009.

RECONCILIATION OF IDP & REVENUE BUDGET							
Strategic Objectives	Implementation & Management Plan		MTREF Current Year		Medium Term Revenue and Expenditure Framework		
		2006/2007	2007/2008		2008/2009	2009/2010	2010/2011
		Aud. Actual	Appr. Budget	Adj. Budget	Budget Year	Bud. Year+1	Bud. Year+2
Sustainable Service	Water Purification	49,881,105	60,569,178	46,889,278	**50,253,027**	52,866,184	55,562,360
Sustainable Service	Electricity Distribution	145,889,467	155,184,901	165,979,901	**185,017,837**	194,638,765	204,565,342
Sustainable Service	Sanitation Reticulation	27,878,665	32,597,358	27,657,258	**28,965,058**	30,471,241	32,025,274
Sustainable Service	Waste Management	11,956,059	13,482,180	13,482,180	**14,139,576**	14,874,834	15,633,450
Sustainable Service	Primary Health Services	2,448,160	0	0	**2,862,831**	3,011,698	3,165,295
Sustainable Service	Environmental Health	1,882,040	3,700,000	3,700,000	**0**	0	0
Infrastructure	Roads & Stormwater	307,344	312,250	332,250	**414,000**	414,728	415,479
Infrastructure	Cemeteries	668,742	673,884	783,884	**675,600**	710,731	746,978
Infrastructure	Housing	2,492,408	1,507,194	2,070,694	**1,885,372**	1,983,411	2,084,565
Infrastructure	Sports & Resorts	2,500,337	3,418,657	3,401,722	**2,928,859**	3,081,160	3,238,299
Infrastructure	Parks	261,414	347,943	347,943	**173,300**	182,312	191,609
Infrastructure	Community Centres	191,805	175,017	185,017	**174,630**	183,711	193,080
Finance & Administrative Management	Support Services	36,784	17,500	21,500	**1,400,000**	1,576,000	739,000
Finance & Administrative Management	Integrated Planning & Development	0	0	0	**0**	0	0
Finance & Administrative Management	Budget & Financial Management	109,160,041	113,240,375	123,469,810	**133,246,576**	149,305,014	167,864,131
Finance & Administrative Management	Human Resources Management	251,831	471,500	671,500	**472,000**	496,544	521,868
Environmental Management	Environmental Management	500,000	0	0	**0**	0	0
Economic Development	Local Economic Development	100,317	4,000	254,000	**254,000**	267,208	280,836
Social Development	Library & Culture Promotion	152,221	148,708	158,708	**58,097**	61,118	64,235
Social Development	Political Office Bearers	0	0	0	**1,200**	1,262	1,327
Community Safety & Security	Road Safety	16,365,252	14,883,110	11,323,110	**11,633,110**	12,238,032	12,862,171
Community Safety & Security	Fire Safety	336,835	263,040	268,040	**263,040**	276,718	290,831
Community Safety & Security	Disaster Management	0	0	0	**0**	0	0
Community Safety & Security	Public safety	0	0	0	**0**	0	0
TOTAL OPERATING REVENUE		373,260,827	400,996,795	400,996,795	**434,818,113**	466,640,671	500,446,130

Source: Tlokwe Local Municipality (2009).

4.5 New data collection, interviews and surveys

To verify the results of the desktop studies and to determine how authorities and communities view the green spaces, what value they connect to it, and how they see the future planning thereof, interviews and surveys were used to collect data. Seven core areas were identified in Potchefstroom, based on their location (relation to green spaces) and their shared characteristics (all being upper-class residential areas). The areas were compared to each other, in order to determine the influence of green spaces in close proximity to residential properties, and included:

- Van Der Hoff Park: Upper-class residential area in Potchefstroom without significant green spaces
- Baillie Park: Upper-class, but older, residential area in Potchefstroom with open (vacant) green spaces
- Dam area: Upper-class residential area, adjacent to the Potchefstroom Dam, Mooi River and Botanical gardens
- Heilige Akker: Upper-class, older, residential area, adjacent to the Cricket fields and Mooi River
- Grimbeek Park: Upper-class residential area adjacent to the Golf Course
- Mooivallei Park: Upper-class residential area adjacent surrounded by open (vacant) spaces
- Potchefstroom Central: Residential areas located in the CBD of Potchefstroom without significant green spaces

The following maps illustrate the area with identified cases study areas and their location with regard to the core green spaces as incorporated in the surveys. The first map (Figure 28) illustrates the greater Potchefstroom area as based on the map used in the Residential Policy for Potchefstroom (Potchefstroom, 2007), and the second map (Figure 29) is a more detailed representation of the study areas, illustrated in the aerial photograph, modified from Google earth maps (Potchefstroom, 2010).

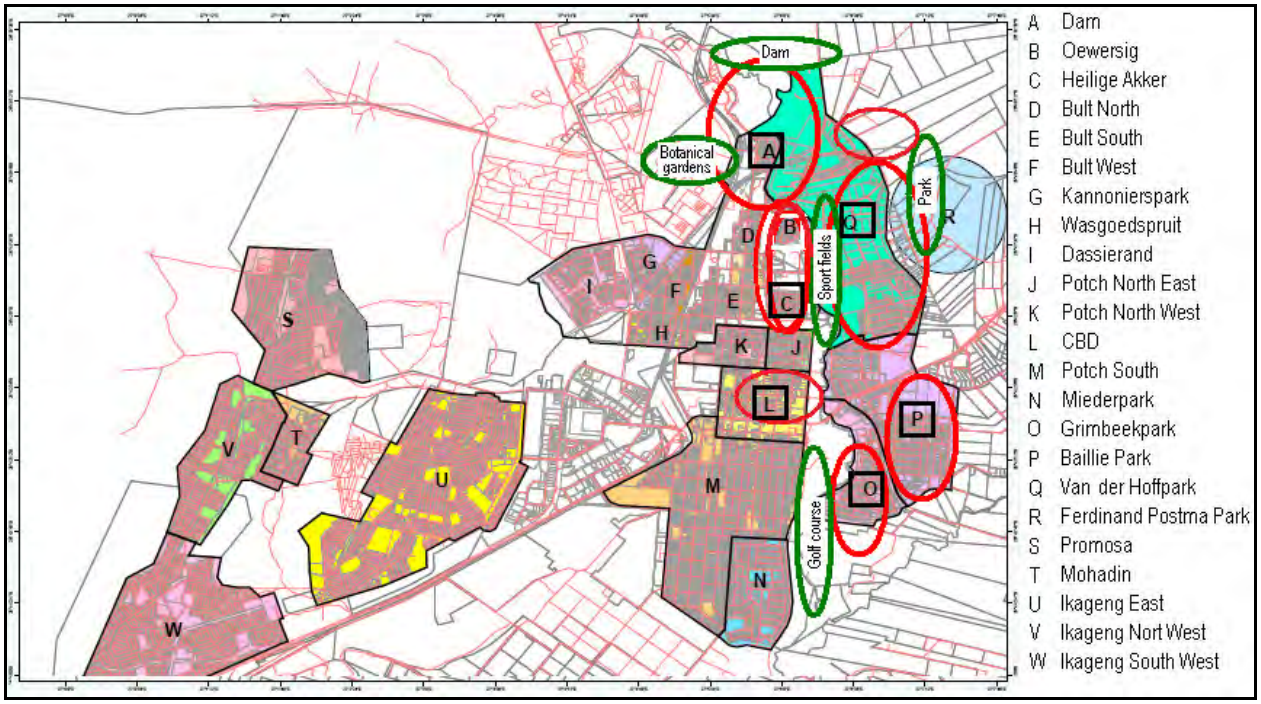


Figure 28: Areas within Potchefstroom as selected for the survey

Source: Based on the Residential policy for Potchefstroom (2007)

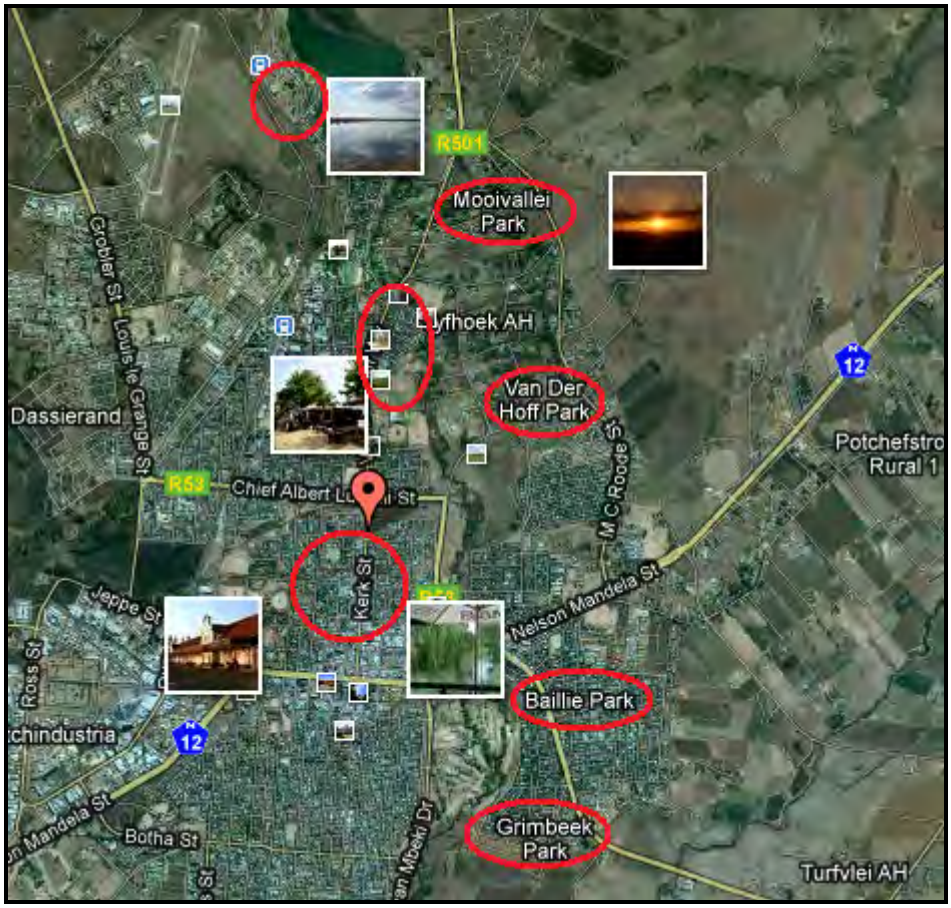


Figure 29: Potchefstroom aerial photograph of selected areas.

Source: Modified from Potchefstroom (2010).

New data was collected within these areas. New data included the latest Potchefstroom Municipal valuations (representing municipal value in comparison to market value), interviews held with local authorities and urban planners, currently practicing in Potchefstroom, surveys determining the community views, projects of final year urban planning students of the North West University, and evaluations of previous surveys conducted within the case study area. The findings are presented accordingly.

4.5.1 New data collection and evaluation

People can never fully comprehend the quality and the circumstances of a city until they experience a significant part of their life living in that city (Berliant & Yu, 2009:2). The valuing of urban-spaces is subjective. However, information about life in a city is also reflected in the demand for and thus the price of housing in the city. Since people are rational in understanding and using the relationship associating a specific state of nature with a specific equilibrium price, depending on what model people have in mind for how equilibrium prices are determined, the price of housing can be a signal for people in choosing a city best suited to their life style. Therefore, in urban economics, "the equilibrium price of land reflects only the ex ante valuation and the information of the household with the highest willingness-to-pay for a location" (Berliant & Yu, 2009:3).

Willingness-to-pay can again be derived from the market price and land-valuations as conducted by local authorities. This part of the empirical study was based on this assumption and thus derived from the market price and municipal valuation price of properties in Tlokwe. Figure 30 illustrates the distribution of market values within Potchefstroom and the specific case study areas, based on the 2010 municipal valuations of Tlokwe, and illustrates that the selected case study areas have a high land value, in comparison to other areas within Potchefstroom. The objective was to determine why these areas have a higher valuation, and if there were any correlation between the higher values and close proximity of green spaces within these areas.

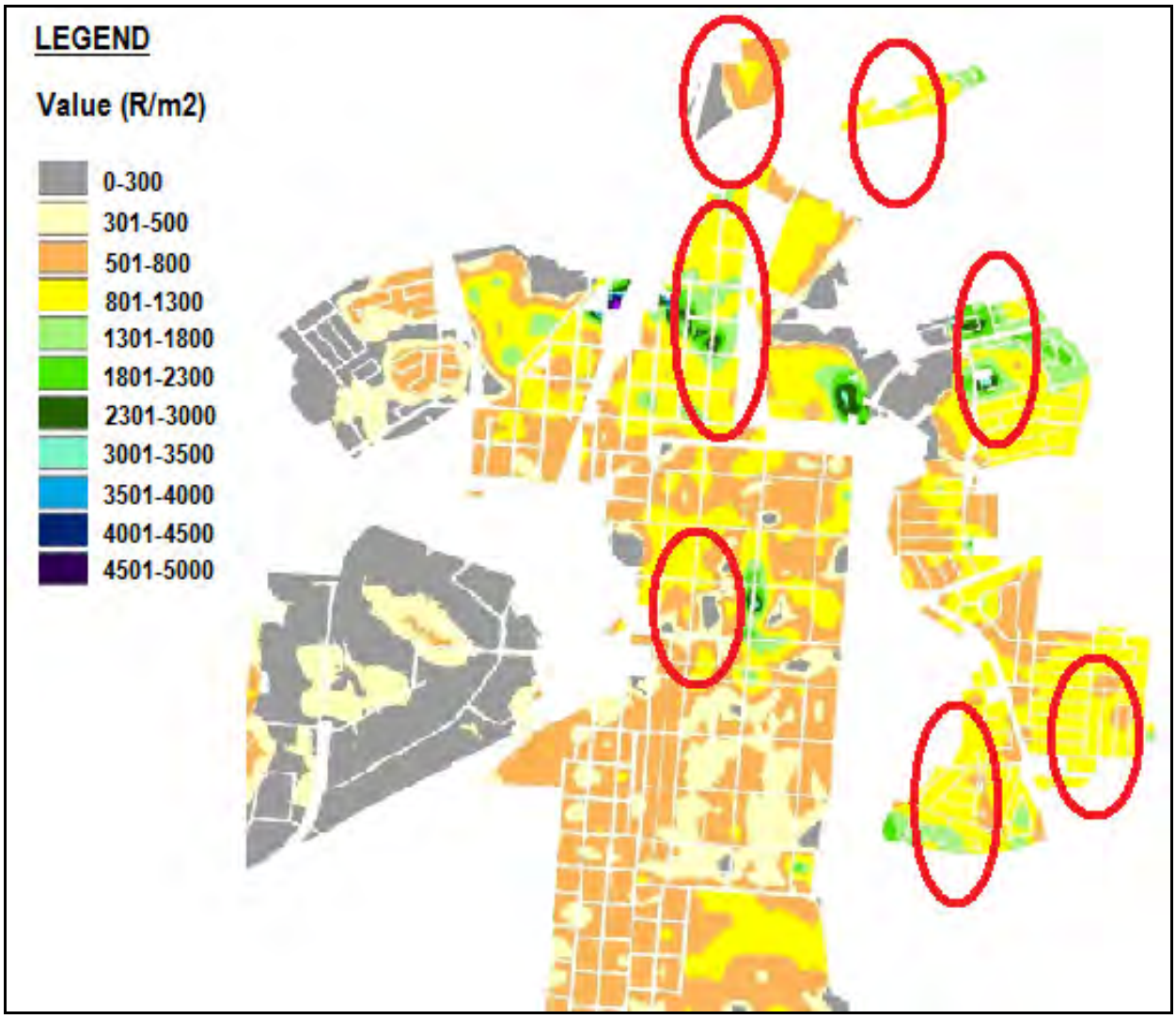


Figure 30: The distribution of Tlokwe's market values based on the municipal valuations.
Source: Based on Roux (2010:69).

Accordingly, an individual breakdown (4.4.1.1 Individual area evaluation) of these selected areas and the latest municipal valuation data (applicable to one selected street within the area, chosen based on its relation to an identified green space), will be presented by means of tables (indicating the specific captured municipal valuation data), and aerial photographs modified with GIS illustrating specific locations and green space (based on a street-scale), followed by a holistic comparison (4.4.1.2 Collective area evaluation) of all areas (based on a city-scale).

4.5.1.1 Individual area evaluation (Street-scale)

- **Baillie Park:**

This area was selected based on its zoning (residential 1) and characteristics (an upper class, older, residential area in Potchefstroom). Frederick Street was used as a case study, due to its close proximity to a green space, as illustrated in Figure 31. The selected street is illustrated by red block and the green space by the green-block.

Figure 31: Baillie Park aerial photograph.

Source: Modified from Potchefstroom (2010).

This green space is a vacant site, and the objective was to determine if this green space increased or decreased the property values of properties located in Frederick Street. The following figure illustrates the selected stands (land portions / individual sites) (illustrated by the blue lines) that were used in the data analysis. Table 17 is a summary of the municipal valuation data of 2010, applicable to these stands. Stand 766 is the green space (vacant site), within close proximity.

Figure 32: Baillie Park.

Source: PlanCentre, based on the Tlokwe Valuations (2010).

Table 17: Baillie Park Municipal Valuations 2010.

GIS_AREA	BOUNDARY	ADDRESS	SITE NR	SIZE	ZONING	VALUE	R/m^2
1239.1348	BAILLIE PARK	FREDERICK ST 12	761	1239	1	R 1 250 000.00	R 1 008.88
1239.1525	BAILLIE PARK	FREDERICK ST 11	712	1239	1	R 980 000.00	R 790.96
1239.2955	BAILLIE PARK	FREDERICK ST10	762	1239	1	R 1 200 000.00	R 968.52
1239.3234	BAILLIE PARK	FREDERICK ST 9	711	1239	1	R 1 200 000.00	R 968.52
1239.1530	BAILLIE PARK	FREDERICK ST 5	709	1239	1	R 900 000.00	R 726.39
1239.3011	BAILLIE PARK	FREDERICK ST 8	763	1239	1	R 1 700 000.00	R 1 372.07
1239.3192	BAILLIE PARK	FREDERICK ST 7	710	1239	1	R 1 000 000.00	R 807.10
1239.1249	BAILLIE PARK	FREDERICK ST 6	764	1239	1	R 1 350 000.00	R 1 089.59
1372.4213	BAILLIE PARK	FREDERICK ST 4	765	1372	1	R 1 100 000.00	R 801.75
1372.5809	BAILLIE PARK	FREDERICK ST 3	708	1372	1	R 900 000.00	R 655.98
AVERAGE	**BAILLIE PARK**	**FREDERICK STREET**		**1266**	**1**	**R 1 158 000.00**	**R 914.69**

Source: Modified from the data of PlanCentre, based on the Tlokwe Valuations (2010).

The data in the table is sorted from stands furthest away from the green space, to stands nearest to the green space. Stand 708 and 765 are located the nearest to the green space. The table indicates that there is a decrease in the R/m^2 value when distance from the green space are minimised, implying that the green space might actually have a negative effect on the property value (recognising that there are other factors that will also influence the market price, but are not included in this empirical study).

The Baillie Park area is represented by the following data, derived from the street average:

- Stand (individual site) size: 1266m^2
- Average value: R1158000.00
- Price/m^2 : R914.69

Based on the values derived from the data applicable to Frederick Street, the green space (in this case vacant stand), has a negative to insignificant impact on the property values.

- **Dam Area:**

This area was selected based on its zoning (residential 1) and characteristics (an upper-class, older, residential area in Potchefstroom). Postma Street was used as a case study, due to its close proximity to the Potchefstroom Dam, Mooi River and Botanical gardens (as green spaces within this area), as illustrated in the following figure. The selected street is illustrated by red block and the green spaces by the green-blocks.

Figure 33: Dam Area aerial photograph.

Source: Modified from Potchefstroom (2010).

The nearby green space is a represented by the Potchefstroom Dam and Mooi River located at the backside of Postma Street, and the Botanical Gardens located in close proximity. The objective was to determine if these green spaces increased or decreased the property values of properties located in Postma Street. The following figure illustrates the selected stands (land portions / individual sites) (illustrated by the blue lines), with reference to four stands directly adjacent to the green spaces, and 4 stands on the other side of the road, that were used in the data analysis. Table 18 is a summary of the municipal valuation data of 2010, applicable to these stands.

Figure 34: Dam Area.

Source: PlanCentre, based on the Tlokwe Valuations (2010).

Table 18: Dam Area Municipal Valuations 2010.

GIS_AREA	BOUNDARY	ADDRESS	SITE NR	SIZE	ZONING	VALUE	R/m2
1871.6847	DAM	POSTMA ST 14	-20/2661	1870	1	R 1 400 000.00	R 748.66
1558.7755	DAM	GOEDEHOOP ST 2	19/2661	1559	1	R 1 500 000.00	R 962.16
1557.4655	DAM	POSTMA ST 10	-17/2661	1559	1	R 1 350 000.00	R 865.94
1504.2077	DAM	POSTMA ST 12	-18/2661	1507	1	R 1 250 000.00	R 829.46
1807.6639	DAM	POSTMA ST 3	-3/2661	1808	1	R 1 450 000.00	R 801.99
1851.9144	DAM	POSTMA ST 9	-6/2661	1852	1	R 1 500 000.00	R 809.94
1843.2351	DAM	POSTMA ST 5	-4/2661	1843	1	R 1 550 000.00	R 841.02
1937.6862	DAM	POSTMA ST 7	-5/2661	1937	1	R 900 000.00	R 464.64
AVERAGE	**DAM**	**POSTMA STREET**		**1742**	**1**	**R 1 362 500.00**	**R 782.15**

Source: Modified from the data of PlanCentre, based on the Tlokwe Valuations (2010).

The data in the table is sorted from stands furthest away from the green space, to stands nearest to the green space. Stand -3/2661, -4/2661, -5/2661, -6/2661 are located adjacent to the green space. The table indicates that there is a decrease in the R/m^2 value when distance from the green space are minimised, implying that the green space might actually have a negative effect on the property value (recognising that there are other factors that will also influence the market price, but are not included in this empirical study). The average value of stands located directly adjacent to the green space, is R715.80 per m^2, in comparison to the average value of the stands located across the street of the green space, with a price per m^2 of R846.67.

This dam area is thus represented by the following data, derived from the street average:

- Stand (individual site) size: 1742m^2
- Average value: R1362500.00
- Price/m^2 : R782.15

Based on the values derived from the data applicable to Postma Street, the green space (in this case the Potchefstroom Dam and Mooi River), has a negative impact on the property values.

- **Grimbeek Park**

This area was selected based on its zoning (residential 1) and characteristics (an upper class, residential area in Potchefstroom). Lupine Street was used as a case study, due to its location adjacent to the Golf Course (the green space in this case), as illustrated in the following figure. The selected street is illustrated by red block and the green space by the green-block.

Figure 35: Grimbeek Park aerial photograph.

Source: Modified from Potchefstroom (2010).

The green space represented by the Potchefstroom Golf Course, and the objective was to determine if this green space increased or decreased the property values of properties located in Lupine Street. The following figure illustrates the selected stands (land portions / individual sites) (illustrated by the blue lines) that were used in the data analysis. Table 19 is a summary of the municipal valuation data of 2010, applicable to these stands. Stand 1/163 represents the Golf Course, within close proximity.

Figure 36: Grimbeek Park.

Source: PlanCentre, based on the Tlokwe Valuations (2010).

Table 19: Grimbeek Park Municipal Valuations 2010.

GIS_AREA	BOUNDARY	ADDRESS	SITE NR	SIZE	ZONING	VALUE	R/m2
1746.1986	GRIMBEEK PARK	LUPINE ST 44	77	1727	1	R 1 700 000.00	R 984.37
1459.3281	GRIMBEEK PARK	LUPINE ST 42	78	1459	1	R 2 200 000.00	R 1 507.88
1415.8623	GRIMBEEK PARK	LUPINE ST 40	79	1416	1	R 1 750 000.00	R 1 235.88
1392.6087	GRIMBEEK PARK	LUPINE ST 38	80	1393	1	R 1 900 000.00	R 1 363.96
1392.6271	GRIMBEEK PARK	LUPINE ST 36	81	1393	1	R 1 950 000.00	R 1 399.86
1392.9371	GRIMBEEK PARK	LUPINE ST 34	82	1393	1	R 1 450 000.00	R 1 040.92
1392.7844	GRIMBEEK PARK	LUPINE ST 32	83	1393	1	R 2 000 000.00	R 1 435.75
1392.8222	GRIMBEEK PARK	LUPINE ST 30	84	1393	1	R 1 550 000.00	R 1 112.71
1449.7418	GRIMBEEK PARK	LUPINE ST 28	85	1450	1	R 1 450 000.00	R 1 000.00
1472.5388	GRIMBEEK PARK	ERICA ST 22	86	1472	1	R 1 500 000.00	R 1 019.02
	GRIMBEEK PARK	**LUPINE STREET**		**1449**	**1**	**R 1 745 000.00**	**R 1 204.28**

Source: Modified from the data of PlanCentre, based on the Tlokwe Valuations (2010).

The data in the table is sorted from stands furthest away from the entry point of the green space (Golf Course), to stands nearest to the entry point of the green space. The table indicates that there is no significant increase or decrease in the R/m^2 value of properties located in Lupine Street, implying that the green space have a similar effect on all of these properties (recognising that there are other factors that will also influence the market price, but are not included in this empirical study). However, this data will also be used in comparison with an area lacking green spaces, as to determine the collective impact of this green space.

The Grimbeek Park area is represented by the following data, derived from the street average:

- Stand (individual site) size: 1449m^2
- Average value: R1745000.00
- Price/m^2 : R1204.28

Based on the values derived from the data applicable to Lupine Street, the green space (in this case the Golf Course), had so significant impact on the property values of properties located in the same street.

- **Heilige Akker:**

This area was selected based on its zoning (residential 1) and characteristics (an upper class, older, residential area in Potchefstroom). Johannes Dreyer Street was used as a case study, due to its close proximity to a green space (the Potchefstroom Cricket Grounds, North West University Sport Fields and Mooi River), as illustrated in the following figure. The selected street is illustrated by red block and the green space by the green-block.

Figure 37: Heilige Akker aerial photograph.

Source: Modified from Potchefstroom (2010).

The objective was to determine if these green spaces increased or decreased the property values of properties located in Johannes Dreyer Street. The following figure illustrates the selected stands (land portions / individual sites) (illustrated by the blue lines), with reference to four stands directly adjacent to the Sport Grounds, and six stands on the other side of the road that were used in the data analysis. Table 20 is a summary of the municipal valuation data of 2010, applicable to these stands.

Figure 38: Heilige Akker.

Source: PlanCentre, based on the Tlokwe Valuations (2010).

Table 20: Heilige Akker Municipal Valuations 2010.

GIS_AREA	BOUNDARY	ADDRESS	SITE NR	SIZE	ZONING	VALUE	R/m^2
1086.1828	HEILIGE AKKER	MC LAGEN ST 5	-36/2529	1087	1	R 1 600 000.00	R 1 471.94
1095.3249	HEILIGE AKKER	MARTHINUS WESSEL ST 6	-31/2529	1096	1	R 1 150 000.00	R 1 049.27
957.7777	HEILIGE AKKER	JOHANNES DREYER ST 12	-34/2529	958	1	R 1 250 000.00	R 1 304.80
966.0970	HEILIGE AKKER	JOHAN DREYER ST 14	-33/2529	966	1	R 1 200 000.00	R 1 242.24
1058.2237	HEILIGE AKKER	MC LAGEN ST 3	-35/2529	1058	1	R 1 000 000.00	R 945.18
1059.7140	HEILIGE AKKER	MARTHINUS WESSEL ST 4	-32/2529	1060	1	R 1 650 000.00	R 1 556.60
1221.1024	HEILIGE AKKER	JOHANNES DREYER ST 13	-9/2529	1219	1	R 1 200 000.00	R 984.41
1220.6174	HEILIGE AKKER	JOHANNES DREYER ST 11	-10/2529	1219	1	R 1 850 000.00	R 1 517.64
1223.8758	HEILIGE AKKER	JOHANNES DREYER ST 9	-11/2529	1222	1	R 1 300 000.00	R 1 063.83
1227.3707	HEILIGE AKKER	JOHANNES DREYER ST 7	-12/2529	1226	1	R 1 400 000.00	R 1 141.92
	HEILIGE AKKER	**JOHANNES DREYER**		**1111**	**1**	**R 1 360 000.00**	**R 1 227.78**

Source: Modified from the data of PlanCentre, based on the Tlokwe Valuations (2010).

The data in the table is sorted from stands furthest away from the green space, to stands nearest to the green space. Stand -9/2529, -10/2529, -11/2529, -12/2529 are located adjacent to the green space, in this case, the North West University Sport Fields. The table indicates that there is a decrease in the R/m^2 value when distance from the green space are minimised, implying that the green space might actually have a negative effect on the property value (recognising that there are other factors that will also influence the market price, but are not included in this empirical study). The average value of stands located directly adjacent to the green space, is R1202.08 per m^2, in comparison to the average value of the stands located across the street of the green space, with a price per m^2 of R1261.05.

This area is thus represented by the following data, derived from the street average:

- Stand (individual site) size: 1111m^2
- Average value: R1360000.00
- Price/m^2 : R1227.78

Based on the values derived from the data applicable to Johannes Dreyer Street, the green space (in this case the University Sport Fields), has a negative impact on the property values.

- **Mooivallei Park:**

This area was selected based on its zoning (residential 1) and characteristics (an upper class, new build, residential area in Potchefstroom). Bokmakierie Street was used as a case study, due to its close proximity to green spaces (vacant sites), as illustrated in the following figure. The selected street is illustrated by red block and the green spaces by the green-blocks.

Figure 39: Mooivallei Park aerial photograph.

Source: Modified from Potchefstroom (2010).

These green spaces are vacant sites, and the objective was to determine if these spaces increased or decreased the property values of properties located in Bokmakierie Street. The following figure illustrates the selected stands (land portions / individual sites) (illustrated by the blue lines) that were used in the data analysis. Table 21 is a summary of the municipal valuation data of 2010, applicable to these stands. Stand 875/428 is a vacant space, within close proximity.

Figure 40: Mooivallei Park.

Source: PlanCentre, based on the Tlokwe Valuations (2010).

Table 21: Mooivallei Park Municipal Valuations 2010.

GIS_AREA	BOUNDARY	ADDRESS	SITE NR	SIZE	ZONING	VALUE	R/m^2
2136.8845	MOOIVALLEI PARK	KOKKEWIETLAAN 40	361	1217	1	R 1 000 000.00	R 821.69
954.5539	MOOIVALLEI PARK	BOKMAKIERIELAAN 2	360	955	1	R 1 850 000.00	R 1 937.17
962.3293	MOOIVALLEI PARK	BOKMAKIERIELAAN 6	358	962	1	R 1 100 000.00	R 1 143.45
967.8109	MOOIVALLEI PARK	BOKMAKIERIELAAN 8	357	969	1	R 1 300 000.00	R 1 341.59
968.5369	MOOIVALLEI PARK	BOKMAKIERIELAAN 10	356	969	1	R 1 200 000.00	R 1 238.39
967.4695	MOOIVALLEI PARK	BOKMAKIERIELAAN 12	355	969	1	R 1 050 000.00	R 1 083.59
AVERAGE	**MOOIVALLEI PARK**	**BOKMAKIERIELAAN**		**1007**	**1**	**R 1 250 000.00**	**R 1 241.31**

Source: Modified from the data of PlanCentre, based on the Tlokwe Valuations (2010).

The data in the table is sorted from stands furthest away from the green space (in this case the vacant stands), to stands nearest to the green space. Stand 355 is located adjacent to the green space. The table indicates that there is a decrease in the R/m^2 value of properties located in Bokmakierie Street, implying that the green space have a negative effect on these properties (recognising that there are other factors that will also influence the market price, but are not included in this empirical study).

The Mooivallei Park area is represented by the following data, derived from the street average:

- Stand (individual site) size: 1007m^2
- Average value: R1250000.00
- Price/m^2 : R1241.31

Based on the values derived from the data applicable to Bokmakierie Street, the green space (in this case the vacant stands), had a negative impact on the property values of properties.

- **Potchefstroom Central:**

This area was selected based on its zoning (residential 1) and characteristics (located in the Potchefstroom CBD, without significant green spaces). Retief Street was used as a case study, as it is one of the few streets within the CBD that is still (mainly) zoned for residential usage. The selected street is illustrated by red block, as captured in the following figure.

Figure 41: Potchefstroom Central aerial photograph.

Source: Modified from Potchefstroom (2010).

The objective was to determine if the lack of green space had an influence on the property values of properties located in the CBD (derived from the findings based on Retief Street). The following figure illustrates the selected stands (land portions / individual sites) (illustrated by the blue lines) that were used in the data analysis. Table 22 is a summary of the municipal valuation data of 2010, applicable to these stands.

Figure 42: Potchefstroom Central.

Source: PlanCentre, based on the Tlokwe Valuations (2010).

Table 22: Potchefstroom Central Municipal Valuations 2010.

GIS_AREA	BOUNDARY	ADDRESS	SITE NR	SIZE	ZONING	VALUE	R/m²
1014.7487	CENTRAL	SANGIRO ST 20	RG/-2/149	1015	1	R 750 000.00	R 738.92
967.572	CENTRAL	SANGIRO ST 22	-9(-/-3)149	968	1	R 720 000.00	R 743.80
994.647	CENTRAL	RETIEF ST 37	RG/-3/149	995	1	R 770 000.00	R 773.87
948.9405	CENTRAL	SANGIRO ST 18	-7/149	949	1	R 830 000.00	R 874.60
1028.3525	CENTRAL	RETIEF ST 33	RG/-1/149	1028	1	R 1 000 000.00	R 972.76
726.7353	CENTRAL	LE ROUX ST 10	RG/149	693	1	R 815 000.00	R 1 176.05
660.6269	CENTRAL	RETIEF ST 39	-11/149	694	BUS	R 1 350 000.00	R 1 945.24
AVERAGE	**CENTRAL**	**RETIEF STREET**		**906**	**1**	**R 890 714.29**	**R 983.13**

Source: Modified from the data of PlanCentre, based on the Tlokwe Valuations (2010).

The data in the table is sorted from the lowest R/m² value to the highest R/m² value of residential properties located within the CBD (Retief and Sangiro Street). It was evident that properties located in Retief Street, had a higher R/m² price than the other stands in this specific case study (Sangiro and Le Roux Street). This can be a result of better accessibility (as Retief Street is a corridor road, connecting various nodes within the CBD), and therefore a greater willingness-to-buy, increasing the overall property R/m² price. Values were not related to proximity of green spaces, as there are not any significant green spaces nearby. However, this data is useful for comparison with other areas where green spaces are found, in order to determine the value that green space might have on residential property prices (recognising that there are other factors that will also influence the market price, but not included in this empirical study), as to determine the collective impact of this green space.

The CBD area is represented by the following data, derived from the street average:

- Stand (individual site) size: 906m²
- Average value: R890714.29
- Price/m² : R983.12

Due to the lack of green spaces within this are, no conclusion could be drawn with regard to property prices in the CBD and the proximity to green spaces, and therefore the impact is stated as insignificant. However, the R/m² data will be compared with other areas to access the greater (city-scale) impact of green spaces.

- **Van Der Hoff Park:**

This area was selected based on its zoning (residential 1) and characteristics (an upper class, new build, residential area in Potchefstroom). Bizet Lane was used as a case study, as illustrated in the following figure. The selected street is illustrated by red block and the green space, illustrated by the green-block, represents a park in close proximity, but too far away from Bizet Lane for a significant linkage.

Figure 43: Van Der Hoff Park aerial photograph.

Source: Modified from Potchefstroom (2010).

The objective was to determine if this green space (Ferdinand Postma Park) increased or decreased the property values of properties located in Bizet Lane. The following figure illustrates the selected stands (land portions / individual sites) (illustrated by the blue lines) that were used in the data analysis. Table 23 is a summary of the municipal valuation data of 2010, applicable to these stands.

Figure 44: Van Der Hoff Park.

Source: PlanCentre, based on the Tlokwe Valuations (2010).

Table 23: Van Der Hoff Park Municipal Valuations 2010.

GIS_AREA	BOUNDARY	ADDRESS	SITE NR	SIZE	ZONING	VALUE	R/m^2
1279.4584	VD HOFF PARK	BIZETLANE 15	94	1280	1	R 1 000 000.00	R 781.25
1288.4229	VD HOFF PARK	BIZETLANE 11	96	1289	1	R 1 250 000.00	R 969.74
1274.301	VD HOFF PARK	BIZETLANE 5	99	1275	1	R 1 300 000.00	R 1 019.61
1279.1335	VD HOFF PARK	BIZETLANE 7	98	1279	1	R 1 450 000.00	R 1 133.70
1293.2379	VD HOFF PARK	BIZETLANE 13	95	1293	1	R 1 550 000.00	R 1 198.76
1283.6203	VD HOFF PARK	BIZETLANE 9	97	1284	1	R 1 550 000.00	R 1 207.17
1269.4176	VD HOFF PARK	BIZETLANE 3	100	1270	1	R 1 550 000.00	R 1 220.47
1537.5113	VD HOFF PARK	KLINKENBERGSTR 56	101	1538	1	R 2 100 000.00	R 1 365.41
AVERAGE	**VD HOFF PARK**	**BIZET LANE**		**1313.5**	**1**	**R 1 468 750.00**	**R 1 118.20**

Source: Modified from the data of PlanCentre, based on the Tlokwe Valuations (2010).

The data in the table is sorted from the lowest R/m^2 value to the highest R/m^2 value of residential properties located within Bizet Lane. Although no real conclusion could be drawn from this data as the R/m^2 are distributed randomly within this street, stand 101 and 100 had the highest R/m^2 value. This can be a result of better accessibility (as Klinkenberg Street is a corridor road, connecting various nodes within the greater Potchefstroom area), and therefore a greater willingness-to-buy, increasing the overall property R/m^2 price. Values were not related to proximity of green spaces, as there are not any significant green spaces nearby. However, this data is useful for comparison with other areas where green spaces are found, in order to determine the value that green space might have on residential property prices (recognising that there are other factors that will also influence the market price, but not included in this empirical study), as to determine the collective impact of this green space.

This area is represented by the following data, derived from the street average:

- Stand (individual site) size: 1313.5m^2
- Average value: R1468750.00
- Price/m^2 : R1118.20

Due to the lack of green spaces within this are, no conclusion could be drawn with regard to property prices in this area and the proximity to green spaces, and therefore the impact is stated as insignificant. However, the R/m^2 data will be compared with other areas to access the greater (city-scale) impact of green spaces.

- **Conclusions to individual case study areas:**

It was concluded that most properties located directly adjacent to green spaces had less value in comparison to properties in close proximity to the green space, but not located directly adjacent to the green space itself. This is opposite to the situation in Europe, where almost any green space drastically improves the value of adjacent residential properties (Bervaes and Vreke, 2004; Arvanitidis *et al.,* 2009, Berveas, 2009). The decrease in property value in the case studies conducted in Potchefstroom can probably be explained by further studies (Thompson, 2002) that have shown there can be feelings of insecurity associated with open areas, due to fears of crime and vandalism. This is especially the case with green spaces in the form of vacant stands and open neglected fields (as illustrated in the case studies of the Dam, Baillie Park and Mooivallei Park), and understandable when considering South Africa's crime rate. Another issue might be the limited space in Europe (Verzandvoort *et al*., 2009:11), resulting in smaller residential stands and a bigger need for public green spaces for social and recreational purposes, in comparison to the South African situation where most high-income residential properties even has a private swimming pool and adequate green space. The need for public space is not as high and green spaces has a lower value connected to it, influencing individual stands in a minimalistic way. The green spaces does, however, contribute to the overall feeling and character of an area, which can result in higher residential property values, based on the location itself. The impact of green spaces on the value of the entire residential neighbourhood should thus also be evaluated.

4.5.1.2 Collective area evaluation (City-scale)

The following figure illustrates the 3D summary of the above mentioned municipal valuations of 2010 for the Potchefstroom area and selected case study areas, in terms of the property value (R/m^2) of the specific sites. Geographical Information Systems (GIS) were used to create this figure, by means of a spatial analyst tool of interpolation (Roux, 2010:61). Interpolation is the prediction of values for cells in a raster from a limited number of sample data points to form a continuous surface. It can predict unknown values for any geographic point data. Interpolation is viable as it spatially distributes objects that are spatially correlated (ESRI, 2008). The property values were interpolated to visualise the patterns caused by the distribution of the different land values, as determined by the municipal valuations, as Figure 45 illustrates. This figure provides a basic overview of the individual areas and their values (R/m^2) in comparison to one another.

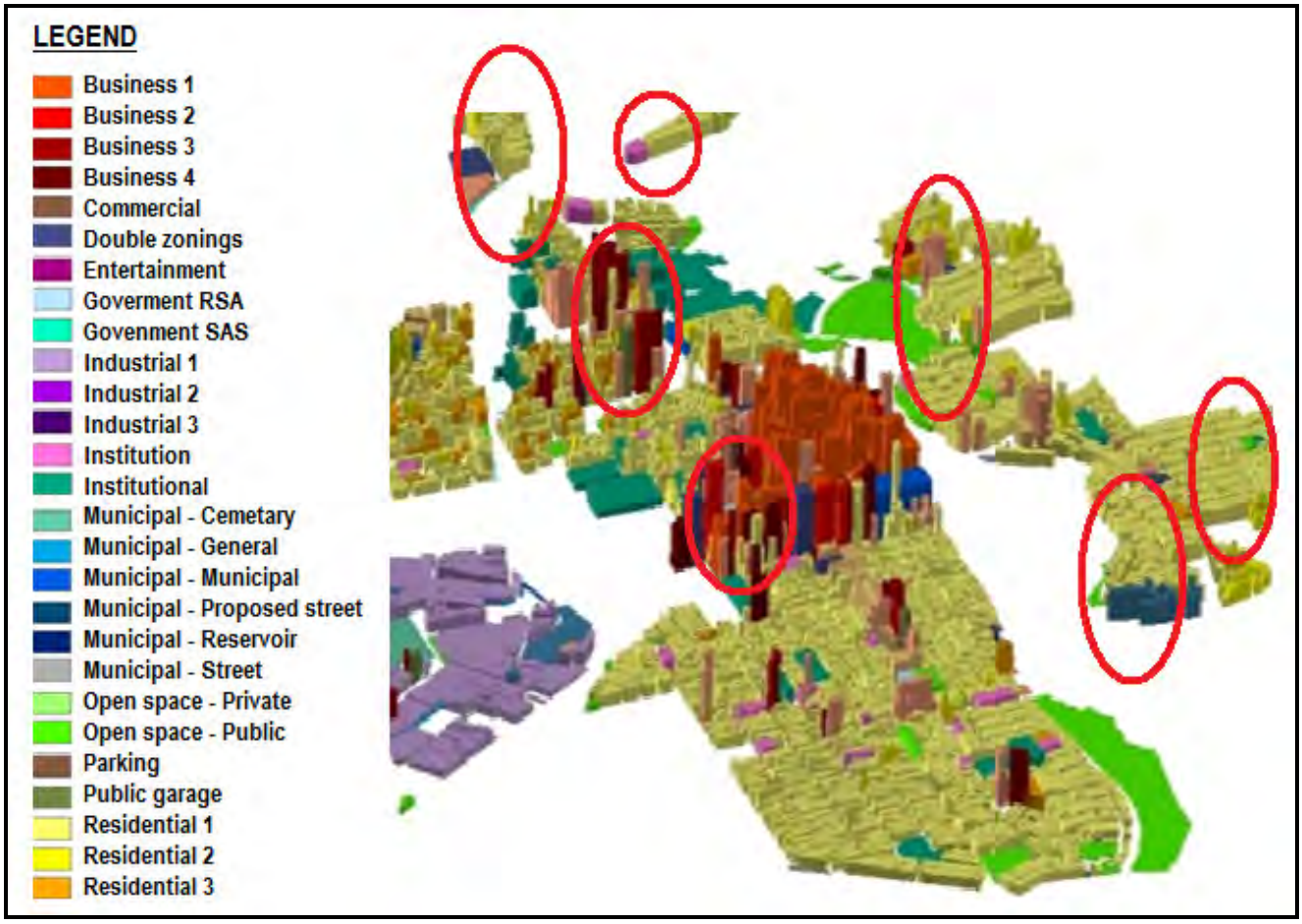


Figure 45: Three-dimensional representation of Tlokwe's land values within the selected areas.

Source: Based on Roux (2010:63).

The following table summarizes the core data derived from the individual selected case study areas (Figure 31 to Figure 44 and Table 17 to Table 23) to illustrate the possible impact of green spaces on property values for the entire residential area (collective area), based on the proximity to the green space, the type of green space, the level of safety in the area and the function of the green space. The area was evaluated in terms of the core green space located in the specific area (or the lack of green space if no significant green space were located in the area) and its specific type (dam, river, sport fields, open stand). The quality of the green spaces was determined based on visual appearance and frequency of usage, on a scale of low, medium and high. The overall safety of the area was also determined on a scale of low, medium, and high, based on visibility, adequate lightening, and the actual design of the green space within the residential area. The possible impact of the green space was derived by the average property value (R/m^2) of the specific area, in comparison to the other individual areas.

Table 24: Data applicable to selected areas.

Stands (Individual sites)			Green space			
Area	Ave size	R/m^2	Type	Quality	Safety	Function
DAM	1742	R 782.15	Dam, River	Medium	Low	Recreational, social
BAILLIE PARK	1266	R 914.69	Vacant site	Low	Low	None (future development)
CENTRAL	906	R 983.12	None	None	Medium	None
VD HOFFPARK	1313	R 1 118.20	None	None	Medium	None
GRIMBEEK PARK	1449	R 1 204.28	Golf Course	High	High	Recreational, social
HEILIGE AKKER	1111	R 1 227.78	Sport Fields	High	High	Recreational
MOOIVALLEI	1007	R 1 241.31	Vacant site	Low	Medium	None (future development)

Source: Own creation based on real-estate data and GIS-data (2010).

The data in the table is sorted per area average, from the lowest R/m^2 value, to the areas with the highest R/m^2 value. The following conclusions were derived from this sorting:

- The Dam area has the lowest R/m^2 value, although the area has the biggest stands of all the case study areas. The lower value can possibly be due to safety concerns (as mentioned previously and revealed in the studies of Chiesura, 2004 and Thompson, 2002) and a lack of quality within the green space.
- The Mooivallei Park area has the highest R /m^2 value, in spite of the vacant stands surrounding this area. This is probably because Mooivallei Park is a high-income residential area, with very limited space for future expansion, thus increasing willingness-to-buy within this area. The green space (vacant stands surrounding the area) thus increases the area value (on city-scale); in contradiction to the negative impact it has on individual properties (on street-scale).
- Another two areas ranked high in terms of R/m^2 is the Heilige Akker and Grimbeek Park, and both of these areas has high quality green spaces, offering recreational opportunities in a secure area.
- It is seen that the other areas (Baillie Park area, Central CBD and Van Der Hoff Park) are all lacking significant green spaces, and all valued less than the areas with qualitative green spaces (Heilige Akker and Grimbeek Park). In this way, qualitative green spaces can be concluded to contribute to the overall character and sense of place, resulting in higher area (neighbourhood) values, in comparison to a lack of qualitative green spaces, which can result in lower area (neighbourhood) values on a city-scale.
- Green space are not the only factor that influence the market price and valuation value, but based on these case studies, it is believed that a qualitative, secure green space (with a relevant function) can impact positively on the overall R/m^2 value of an area, within a city-scale.
- The value of green space is subjective as will differ between people, between communities and between areas. In order to determine the current value of green spaces in Potchefstroom, the community "need" should be determined, based on the community "willingness-to-pay" for green spaces in comparison to the authority "willingness-to-invest", revealing the "provision" of green spaces as a means of determining the way authorities value green space.

4.5.2 Interviews and new surveys

Surveys were conducted with authorities (via means of interviews) and community members (via means of questionnaires) respectively, in order to determine the "willingness-to-pay" for green spaces in comparison to the authority "willingness-to-invest" (cross reference Figure 46).

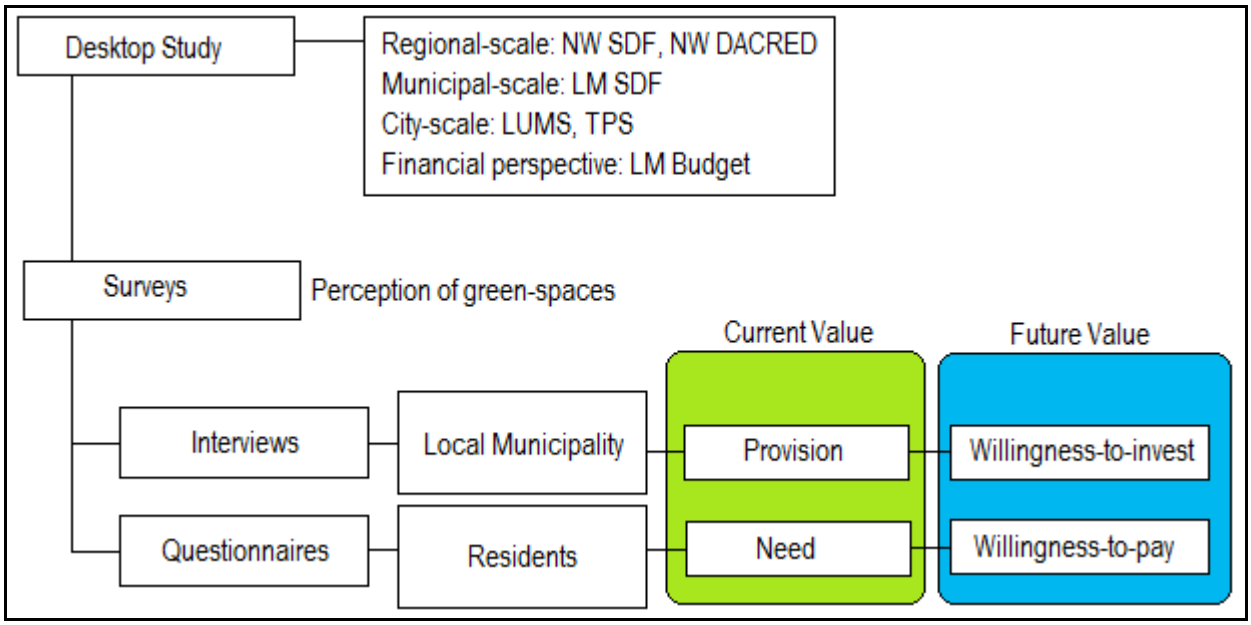


Figure 13**Figure 46: Survey methodology.**

Source: Own creation (2010).

Accordingly, the results of interviews as conducted with authorities will be presented, followed by the surveys as completed by residents.

4.5.2.1 Interviews with authorities

In an integrated approach to determine the direct economic value of green spaces in Potchefstroom as perceived by authorities, interviews (refer to Annexure A) were held with specific authorities confronted with the planning of urban development and green spaces on a day-to-day basis, including municipal urban planners, municipal council members, companies and urban planners appointed by local government with regard to the planning of green spaces, property developers and other parties of interest. These authorities have no personal gain but are planning for the greater community benefit. By interviewing these authorities, the current value of green spaces could be evaluated in terms of the current "provision" of green spaces, and the future value could be evaluated with regard to the authorities "willingness-to-invest", or in other words, "willingness-to-plan" for the green spaces. Five interviews were conducted (including professional Urban Planners, Municipal Planners and Council members, working within the Tlokwe local municipality environment). s.

Table 25 is a summary of the results as captured from the interviews conducted with the authorities.

Table 25: Summary of findings of interviews held with local authorities.

Market value
• Current trends within urban areas do not necessarily favour developments near open spaces, due to limited space. However, on the outer parts of the city (even outside the urban development boundary) the eco-estate concepts are gaining interest. Although many of these eco-developments are already approved and some already developed, the communities are still hesitant to occupy within these areas. • The natural environment influences the price of adjacent properties positively, if it is a qualitative green space, with adequate security support and recreational options. Vacant spaces however, decrease the value of properties, because of crime issues. • There are no different tax-scales for areas located adjacent to open spaces.
Competitive value
• The local government draws insignificant amounts of revenue (or even no revenue) from current green spaces. • The local government does not draw any direct revenue from international athletes training on the NWU sport fields, however the university and local businesses do. The marketing benefits and social spin-offs can be related to financial benefit, but further studies would be needed to determine the exact amounts. • The success of Aardklop is not linked to the natural environment in which in functions, although the area does contribute to the overall sense of place of Potchefstroom.
Natural systems value
• There are no specific amounts allocated in the municipal budget for green space planning in Potchefstroom, but there are funds allocated for recreational development. • Green spaces are considered when evaluating a development-application, but mainly when it impacts on the urban development boundary (urban edge). • The local government does favour the planning of green spaces in concept, although no subsidies are provided.

Source: Own creation from interviews conducted (2010).

4.5.2.2 Surveys completed by residents

In an integrated approach to determine the direct economic value of green spaces in Potchefstroom as perceived by residents, a questionnaire (refer to Annexure B) was given to residents, currently residing or working in the selected areas. These residents are the actual users of the green spaces on a day-to-day basis, and can be regarded as "experts" with regard to the functionality of the specific green spaces. The residents have a personal connection to the space, and will thus answer the questions to ensure personal gain. By questioning these residents, the current value of green spaces could be evaluated in terms of the current "demand" of green spaces, and the future value could be evaluated with regard to the authorities "willingness-to-pay", to use these spaces. 27 surveys were completed and received.

Table 26 is a summary of the results as captured from the completed surveys received back from the residents.

Table 26: Summary of findings of questionnaire completed by residents.

Market value					
House prices (Rank from 1 to 5, 5 being the best)	Vd Hoff	Baillie Park	Dam area	Heilige Ak	Grimbeek
The most used green space is located in:	2	1	4	3	5
Market value for residential properties are highest in:	4	1	5	3	2
Market value for commercial properties are highest in:	5	2	1	4	3
Preference				**Yes**	**No**
Current trends favour developments near open spaces (parks, sport fields, dam, and golf course)?					X
Offices are migrating out of the CBD to locations that offer more open space?				X	
The natural environment influences the price of houses?				X	
The natural environment influences the price of office space?					X
Tax is higher in areas located adjacent to open spaces (parks, fields, dam, and golf course)?				X	
Competitive value					
Tourism				**Yes**	**No**
Tourists prefer Potchefstroom because of green spaces (parks, sport fields, dam, golf course)				X	
Aardklop are successful because of the natural environment it can function in?				X	
Income (Rank from 1 to 5, 5 being the best option)	Golf Course	Botanic garden	Dam	Sport fields	Walking trail
Users will pay entrance to:	5	2	3	4	1
Users use this area most:	5	1	3	4	2
Use	**Functionality (recreation, sports, activities)**			**Experimental (visual qualities, rest)**	
Users visit green spaces in Potchefstroom mainly for:	X				
Users will pay entrance fees for green space that offer:	X				
Users prefer living adjacent to an area with:				X	
Users prefer working adjacent to an area with:				X	
Users Potchefstroom offers more green spaces of:	X				
Natural systems value					
Perspectives				**Yes**	**No**
Potchefstroom is known for its green-areas					X
The natural environment in Potchefstroom can be upgraded				X	

The findings of this questionnaire as completed by the residents are summarised accordingly in terms of market value, competitive value and the natural systems value:

- Market value

The survey illustrated that the area with the least green space (Baillie Park) is also the area with the lowest value in terms of residential property prices (refer to Figure 47). It can be assumed that the lack of green spaces do play a part in these figures, as it also correlates to the answer in the following section, where most respondants stated that the natural environment does influence the price of houses. Accordingly, most respondants stated that the natural environment does not influence the price of office space, which also reflected in the graph where the area with the 2nd greatest green space, has the lowest commercial market value. This area, the dam, offers a variety of green spaces (the dam and the adjacent botanical gardens), but does not offer a business climate, and the variety of green spaces in this area cannot compromise for this. However, most respondants stated that offices are currently migrating out of the CBD to locations that offer more open space. From this survey it can be concluded that green space has a greater influence on the market value of residential properties, and this influence is also becoming more relevant in the commercial market.

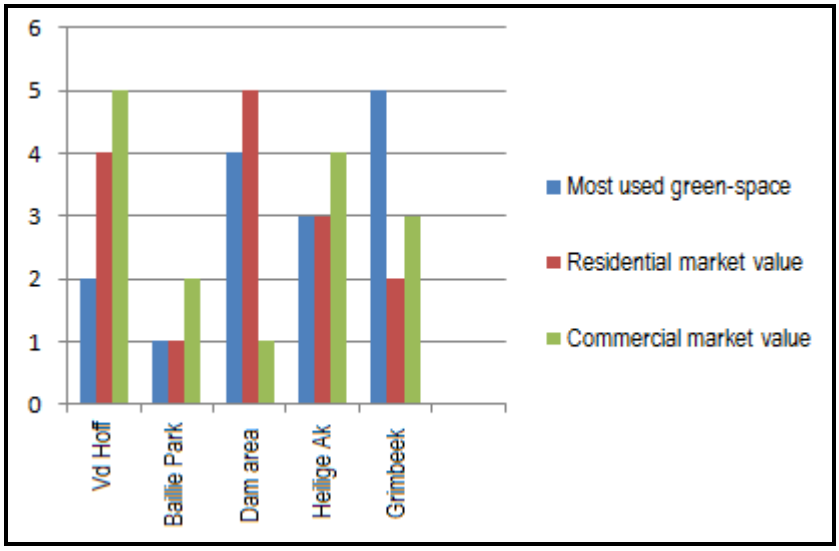


Figure 47: Market value survey.

Source: Own creation (2010).

- Competitive value

The survey revealed that users use the Golf Course and Sportfield green spaces the most, and would pay to visit these areas for recreational purposes. Green spaces that offer only visual or social qualities are less visited and residents are less enthusiastic to pay entrance to such areas, but prefer to live and work nearby these areas (refer to Figure 48). Potchefstroom is valued for its green spaces, with reference to tourists visiting the green-attractions (dam, botanical gardens and Akkerlaan), international athletes preferring to train at the NWU sport fields on a yearly basis, and Aardklop being accommodated in the green spaces of Potchefstroom. Potchefstroom offers more functional green spaces, focussed on recreation, sports, and outdoor activities.

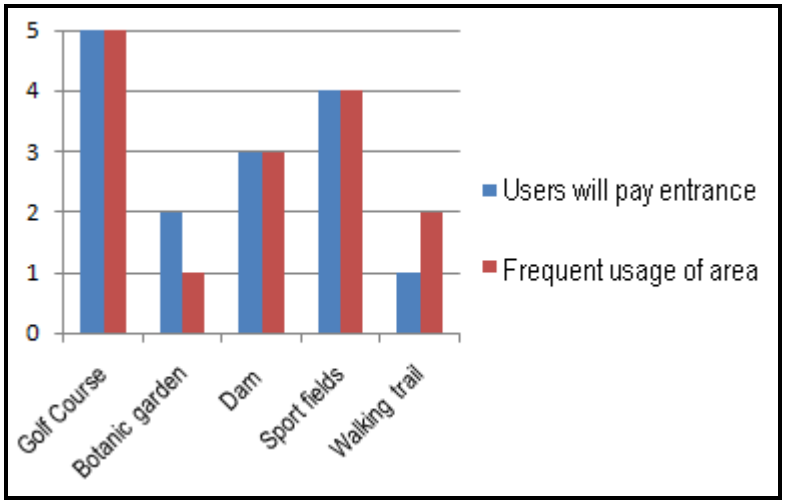


Figure 48: Competitive value survey.

Source: Own creation (2010).

- Natural systems value

Most respondents stated that Potchefstroom is not known for its green spaces, although it does contribute to the character and the spirit of the place. The current green spaces and natural environment can be upgraded.

4.5.3 Surveys completed in previous studies

The abovementioned surveys were compared to previous surveys conducted (as part of various other studies) in Potchefstroom (based on factor conditions – refer to Annexure C) when respondents were asked to rank the quality of each element of the competitiveness driver in Potchefstroom on a five-point scale (SDM, 2006:35-36). These qualities were then ranked qualitatively from "very poor", to "poor" to "fair" to "good" to "very good". If a competitiveness driver was evaluated overall as "poor" it indicated that the particular driver was lowering or hindering competitiveness in Potchefstroom and conversely if it was evaluated as "good" or "very good". The results are shown in figures below.

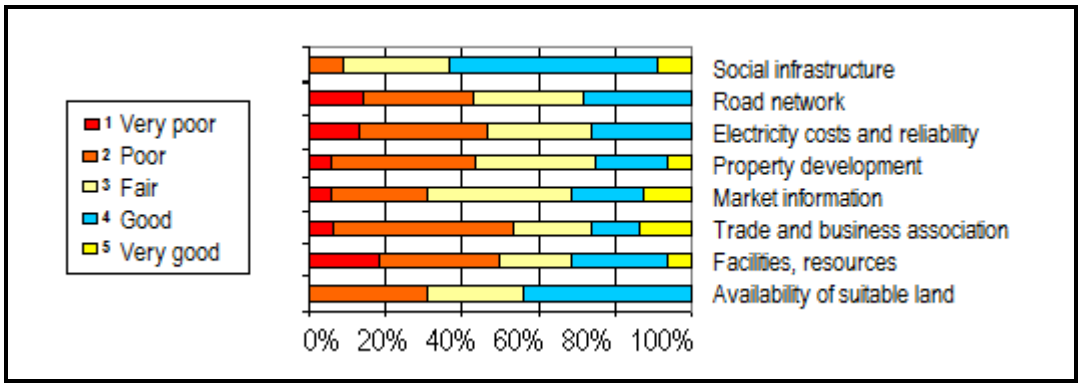


Figure 49: Assessment of resources (factors of production) in Potchefstroom.

Source: SDM (2006:35-36).

Social infrastructure was concluded to be the best driver of competitiveness in Potchefstroom, followed by the availability of suitable land, implying that Potchefstroom has development potential and the supporting infrastructure, but simultaneously enhancing the importance of qualitative planning to ensure the realisation of these objectives. As far as the quality of the environment is concerned, Figure 50 illustrated that respondents felt in general relatively more positive about the overall quality of environment in Potchefstroom (SDM, 2006:40), although respondents in Potchefstroom also felt concerned about the cost of compliance to standards.

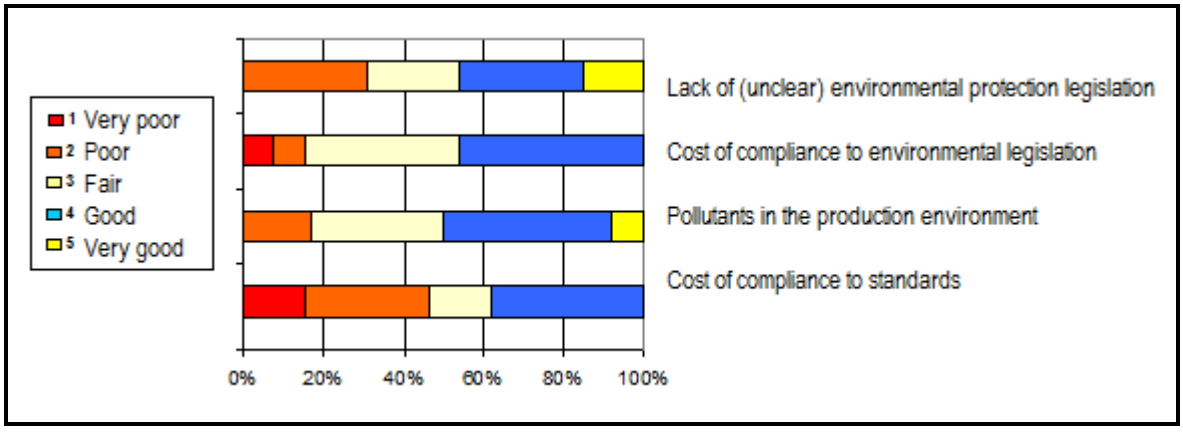


Figure 50: Assessment of the quality and environment in Potchefstroom.

Source: SDM (2006:40).

A swot-analysis of the environmental quality in Potchefstroom was also conducted as part of the Potchefstroom Revitalisation study (SDM, 2006:174), and the results are captured accordingly in Table 27.

Table 27: Swot-analysis of the environmental quality in Potchefstroom.

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Environmental Quality	Satisfactory appearance of infrastructure	Lack of green space, landscaping and attractive buildings, urban decay in transitional zones	Climate and richness of vegetation diversity to be used for beautification of the CBD	Capital flight due to neglect of the CBD with regard to environmental care (waste management)

Source: Based on Southern District Municipality SDM (2006:174).

The revitalisation study emphasised the objective to improve the image of the CBD by maximising the potential of existing natural features. This included the specific visual features (paths, edges, districts, nodes, and landmarks) currently present in the CBD that could contribute substantially to the legibility (readability by means of visual experience, understanding of the area) of the urban landscape, which needed to be articulated by the built environment in such a way that physical and visual accessibility was enhanced.

It furthermore concluded that future development needed to be sensitive towards the existing features as part of the underlying design structure in the CBD (Southern District Municipality, 2006:73). The core findings of the previous conducted surveys are accordingly summarised in terms of:

- Market value

Market value as derived from land prices and the capital value of properties are increased because of the availability of land in Potchefstroom and the current property development trends occurring in this area. This is seen in the residential property prices that are much higher in Potchefstroom, in comparison to adjacent urban areas like Klerksdorp or Stilfontein.

- Competitive value

The social infrastructure was one of the issues ranked very well by the participants of the surveys. This infrastructure provides the setting to increase lease potential and resale potential accordingly. This correlates with the high property values, and the impact of qualitative spaces (including greens-areas) can be linked to this phenomenon.

- Natural systems value

Based on these surveys, the needed infrastructure are in place, however, the natural systems value is not high, due to the lack of adequate policies to manage, enhance and protect the green spaces, as well as the high costs of compliance to these policies and standards.

4.5.4 Surveys completed by urban planning students

In an integrated approach to determine the current indirect value of green spaces of the selected areas in Potchefstroom, final year urban planning students were asked to evaluate certain aspects within the current reality. These students were asked to evaluate the spaces in comparison to local and international best practices, with the aim to eventually create a swot-analysis of the land-use in Potchefstroom as a point of departure to plan for future developments. The 42 students were divided into six groups, and the collective results of these findings that were received back, are presented accordingly in Table 28. The columns illustrate the number of groups that chose the specific factor. The total of each factor was then summarised and multiplied by the factor weight (as subjectively given to each specific factor based on the impact), allocated as follows: Good: Factor 6, Average: Factor 4, Poor: Factor 1, Very poor: Factor -2, Fail: Factor -4.

Table 28: Results based on student surveys.

Factor	Good	Average	Poor	Very poor	Fail
Accessibility	1	4	1		
Access roads	2	2	2		
Thoroughfare	2	3		1	
Alternative roads	2	2	1	1	
Balance between pedestrians and cars			4	1	1
Costs to improve road network			5	1	
Planning of road network		1	4	1	
Development planning		1	3	2	
Scale of activities	2	4			
Parking provision			2	2	2
Pedestrian facilities			3	3	
Walking distances	2	4			
Compact urban form	4	2			
Placing of offices	2	2	2		
Commercial function	4	2			
Choice to buyers	4	2			
Physical aspects		1	4	1	
Expansion policy	1	1	3		1
Placing of magnets	1	2	1	2	
Visual impact		2	4		
Quality environment		1	5		
Heritage	1	2	2	1	
Type of buildings		1	4	1	
Urban ecology			4	1	1
Total	28	39	54	17	5
Total in accordance to factors	168	156	54	-34	-20

Source: Own creation based on surveys (2010).

The conclusion drawn from this survey was that Potchefstroom is (holistically) valued positively, and the indirect value is believed to be high. It furthermore illustrated the strong points and issues that are in urgent need of attention (from a spatial planning perspective). Accordingly, the students were asked to identify issues that would increase property value and identify issues that would decrease property value, based on real cases in Potchefstroom (mainly residential sites within the CBD area).

Possible issues that would increase property value included accessibility, walking distances to nodes, quality environment, visual quality, pedestrian friendly environments, choices and opportunities, green spaces, green-areas within walking distances and balance between activities (scale). Possible issues that would decrease property value included road layout, safety, extension potential, limited parking and adjacent land-uses.

Based on these findings, a SWOT analysis was conducted to summarise the current situation in Potchefstroom, with reference to the urban green spaces and contribution thereof to stimulate the economy and related spheres.

Table 29: SWOT analysis of Potchefstroom.

Strengths	**Weaknesses**
Compact city resulting in qualitative spaces	Limited parking provision
Accessibility	Congestion within CBD
Provide choice to users	Not pedestrian orientated
Diversity of functions	Lack of maintenance of public facilities
Opportunities	**Threats**
Pedestrian friendly developments	Safety
Create focus points	CBD decay
Vertical expansions	Urban ecology decrease
Urban renewal	Lack of qualitative environments
Enhancement of multi-nodality	Buying power
Incorporation of green spaces	Space for extension

Source: Own creation based on surveys (2010).

The SWOT analysis revealed the strengths of Potchefstroom to be captured in the compactness of the city itself, the accessibility and choice that if offers to residents, as well as the great diversity of functions. In contrast, the weaknesses correlate to the movement network, including limited parking, increasing congestion and the fact that the area is not pedestrian friendly. Various issues were noted as threats, including safety issues, the urban decay, the lacking urban ecology, the limited space for extension and thus decreasing urban environment. Opportunities to bypass these threats can be explored in terms of the urban renewal strategies, incorporating green spaces and multi-nodality in the urban layout. There are scope to create focus points and enhance the overall sense of place, while addressing pedestrian needs. Opportunities can also be explored by means of vertical expansion, in contrast to the current horizontal expansion policies.

4.6 Conclusion

Table 30 is a summary of the findings of the empirical study (desktop studies, new surveys, and previous surveys conducted) in terms of the integrated approach to value green spaces (as described in the previous chapter). The table illustrates the applicable value and impact of green spaces, as currently manifesting in Potchefstroom, and states the additional contribution of green spaces, according to the above findings.

Table 30: Summary of findings of the empirical investigation.

Value	Impact: Reality in Potchefstroom	Additional contribution of green space
Human value	Social focus: Sport fields, the dam and golf course act as public engagement points.	Specific public spaces will enhance social capital and cohesion
	Environmental focus: No legislative plan to protect or enhance green spaces.	Reinstate importance and function of green spaces
	Attractive spaces: Functional spaces preferred.	Enhance functionality and visual quality to create spin-offs
	Quality environments: Overall good quality, none specific green space magnets.	Sport fields to be further promoted among international athletes
	Marketability: Cultural, sport, educational nodes supported by green spaces.	Define urban areas and strengthen the spirit of the place
Market value	Capital value: Higher neighbourhood values due to qualitative character of green.	Further increase due to additional benefits as listed
	Land prices: MOSS in competition with 442 ha of needed land for development.	Stimulate integrative planning initiatives
Competitive value	Lease potential: Higher due to social infrastructure.	Can be further increased if linked to a qualitative environment
	Resale potential: Higher due to high economic potential.	Create qualitative, functional spaces
	Payback (Taxes): Comparable to adjacent municipalities.	Increase tax according to defined green-zones, additional income for LM
Nature value	Capital costs: R122.5mil	Incorporating green spaces might increase initial capital costs
	Energy efficiency: Cost increasing with 34% annually	Cost savings due to climate control
	Operating costs: R565.1mil	Lower costs of future upgrades
	Life cycle costs: Increasing due to fragmentation	Functional green space to minimise these costs
	Water conservation: Reticulation costs R9mil, R77 per household/m increase.	Cost savings due to natural solutions (e.g. storm water etc.)
	Pollution minimisation: Currently not planned for	Due to biological function of green spaces (CO_2)
	Biodiversity enhancement: No legislative measure in place	Due to core function of green spaces

Source: Own creation (2010).

The various values were categorized in terms of human value, market value, competitive value and nature value.

The human value has certain focuses, including a social focus where green spaces act as social engagement points to enhance social capital and cohesion, an environmental focus to protect or enhance green spaces, while reinstating the importance and function of green spaces. In terms of human value, it is important to create attractive spaces that will enhance visual quality to create spin-offs, as well as quality environments that are also marketable. It was found that functional, qualitative green spaces contribute positively to the human values connected to green spaces.

The market value was captures as capital value and land prices. Capital value were increased due to higher neighbourhood values, as a direct result of green spaces. Land prices of green spaces were found to be in constant conflict with urban spaces, as profit is gained from urban developments. The need to stimulate integrative planning initiatives were stressed.

Competitive value were revealed in terms of the lease potential and resale potential, that were both higher due to the social infrastructure provided by the green spaces and qualitative environment. It was found that property taxes could be levied according to defined green-zones, providing additional income to Local Municipalities.

Nature value were determined through the savings that green spaces might have on current urban infrastructure costs. It was found that capital costs, energy costs, operating costs, life cycle costs, water conservation costs, pollution costs and biodiversity enhancement costs can be limited or lowered by incorporation of green spaces, mainly due to the function of the green space itself (acting as a buffer to storm water, a natural cooling system around houses, demanding less maintenance).

Although the empirical investigation could not reveal comprehensive results with regard to the value of green spaces, it did reveal a positive link between economics and green spaces.

Chapter 5: Conclusions

"The city is the place where everything affects everything else"
- Werner Hirsch –

5.1 Introduction

The previous chapters focused on the issues of sustainability, bridging 'pro-environment planning approaches' and 'pro-development planning approaches' by means of determining the economic value of green spaces as a tool to guide future spatial planning (and decision-making) processes. Based on the literature and empirical studies, the following primary research questions could be answered:

- Can green spaces enhance the current sustainable development approach? (see 5.2)
- Can the economic value of green spaces be determined? (see 5.3)
- Is there scope in the South African context (Potchefstroom) to enhance green space planning? (see 5.4)

5.2 Green spaces and the sustainable development goal

Can green spaces enhance the current sustainable development approach?

Urban green spaces can contribute to the overall sustainability within a city, based on the context as captured by Veenhuizen (2006), and illustrated in Figure 51. Urban green spaces can, according to the diverse function thereof, be divided into three core groups: subsistence orientated urban green spaces, multifunctional urban green spaces and market orientated urban green spaces. These groups are directly linked to the three core dimensions of sustainable development (environmental, economic and social), as described earlier in this document.

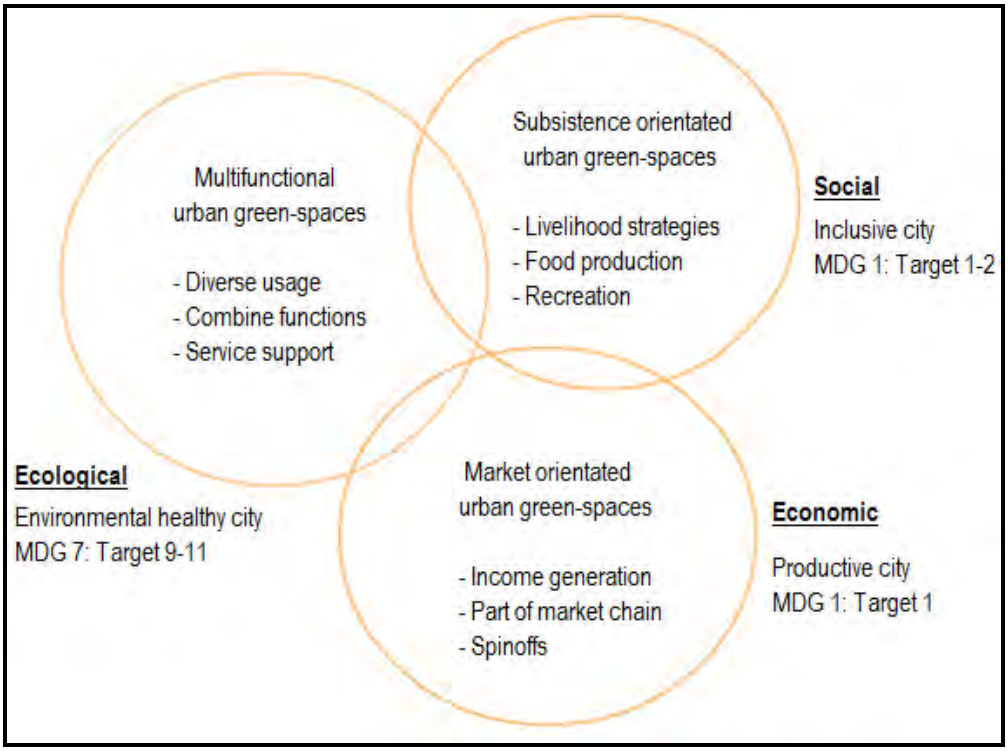


Figure 51: Dimensions and types of urban green spaces.

Source: Own creation based on Veenhuizen (2006) and RUAF (2006).

Subsistence orientated urban green spaces are linked to the social dimension of sustainable development, as urban green spaces are used within the urban environment to enhance livelihood strategies (quality of life approaches, creating a sense of place or social inclusion), address poverty alleviation (enhance food production) and create recreational opportunities for citizens (functional urban green space). It addresses the millennium development goal number one "eradicate extreme hunger and poverty", especially target one (halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day) and target two (halve, between 1990 and 2015, the proportion of people who suffer from hunger), as it acts as catalyst to ensure an inclusive city with social benefits (based on Veenhuizen, 2006 and RUAF, 2006).

Multifunctional urban green spaces are linked to the ecological (environmental) dimension of sustainable development, as urban green spaces are diverse and can therefore contribute to different urban habitats, different needs, and different functions within the city. The multifunctional green spaces provide the setting to combine the core functions in the city (social, economic, transport and recreational) by providing green-linkages that not only integrate the city as a whole, but also support facilities (water retention, sewerage and storm water management) and minimise the ecological footprint. Urban green spaces thus contribute to the millennium development goal number seven, "ensure environmental sustainability", especially target nine to eleven (integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources), by creating an environmentally healthy city (based on Veenhuizen, 2006 and RUAF, 2006).

Market orientated green spaces, although being neglected from a planning perspective, hold the most benefit, as it caters for direct economic revenue, and are therefore linked to the economic dimension of sustainable development. Urban green spaces used in this way provide opportunities for income generation (entrance fees, selling of products, local economic development within green spaces, employment generation, enterprise development, marketing) as it forms part of the market chain. Market orientated green spaces has many direct benefits and spin-offs, to various parties. It thus addresses the millennium development goal number one, especially target one (based on Veenhuizen, 2006 and RUAF, 2006), as it contributes to a productive city.

Green spaces, although not the only determining factor, can surely contribute to sustainable development and the sustainable development goals. However, reality reveals that green spaces are often sacrificed due to urbanisation or urban development pressures. However, as urban green space decreases, its value will increase, as will efforts to conserve and preserve it (Fausold & Lilieholm, 1999: 307). With this being said, it should be realised that some factors of green spaces are changeable and some are unchangeable (refer to

Table 31), and while there is scope to enhance the entire approach to green space planning, authorities and planners should seek to address (as a point of departure) the changeable factors, in an attempt to re-introduce green spaces in current urban environments, with the objective to create inclusive, environmental healthy and productive cities.

Table 31: Factors of green spaces.

Unchangeable factors	Changeable factors
• Completed developments and approved projects • Location in relation to green spaces • Distance from green spaces	• Zoning • Future use • Market (house) retail value • Environmental characteristics and quality • Quality and function of green spaces

Source: Own creation based on literature review (2010).

The social, environmental and economic function and contribution of green spaces can no longer be ignored and need to be integrated in the current spatial planning approach. A holistic approach to spatial planning is needed, incorporating “development” and “environment” in order to control the nature and speed of urban growth, along with ensuring sustainable development. This can be realised when the economic value of green spaces are known, and compared to the revenues of an urban development project. In this sense, qualitative, functional green spaces can manage the constant conflicts between ‘pro-development approaches’ and ‘pro-environment approaches’, in terms of a balanced spatial planning approach, guided by the economic value of the green spaces.

5.3 The value of green spaces

Can the economic value of green spaces be determined?

Evaluating green space is not limited to determining the economic and monetary benefits green spaces can bring to humans. It is about attributing a value to all kinds of benefit for humans and nature, including religious values, social values, environmental values (biodiversity, climate change, intrinsic value …), aesthetic values, economic values, and many others. All these values are good, as it can contribute to a structure and define an area. The challenge is to determine priorities according to local realities, for the benefit of both humans and nature. It requires an *ad hoc* approach (Lambert, 2003:10), unique to each location and local context.

In developing countries, where life is not always easy for most people, the economic value tends to dominate the other values (social and environmental). This has to be taken into consideration carefully to ensure there is a strong poverty alleviation component in any development and management plan. In developed countries, economic valuation may be less relevant, especially if the economic benefits are marginal compared to aesthetic or recreational values.

It remains, however, difficult to translate sustainable development (including developmental and environmental issues) in economic terms. Literature revealed the dominance of the developmental sector over the environmental considerations in terms of municipal planning and budgeting, due to the economic value (hard, measurable data) connected to the developmental sector.

Economic valuation methods are not perfect yet and some are even controversial, but they are certainly good enough to be used to give valuable information, which people often do not perceive. The production of goods and services is closely linked to the functioning of the eco-systems (hydrology, soil, water quality) and the economic valuation has to consider this reality at every stage (Lambert, 2003:10). Green spaces do provide cost savings and do generate income, and these benefits have to be enhanced and optimised through informed, local authority decision-making processes.

5.3.1 Cost savings due to green spaces

As derived from the previous literature studies and empirical research, short-term cost savings due to green spaces is realised in terms of the following issues:

- Spatial planning costs: The costs of spatial planning processes will be lowered when different stakeholders are brought together to discuss certain values of green space (economic, social, ecological and cultural). Participatory planning processes are proven to result in qualitative planning, leading to overall future sustainable development and community support.

- Maintenance costs: The maintenance costs refer to the municipal costs within an urban space after the initial development has been completed. The local government is usually responsible for this public space and the maintenance thereof, regardless of gaining the financial revenue from the development. Green spaces are minimising maintenance costs, as the natural systems are cheaper to maintain, whilst simultaneously creating a qualitative environment.

- Energy consumption costs: Qualitative green spaces can minimise these costs, referring to trees along housing areas that create additional shade, saving on heating and/or cooling energy costs.

- CO_2 emissions costs: The "CITY green" project conducted in the EU investigated the direct link between trees and the potential pollution removal, and thus costs saving related to the mentioned, as local governments can estimate the reduction in costs applicable to the CO_2 emission rights that have been assigned to them.

- Storm water costs: Minimisation of costs as natural systems contribute and support the man-made features and implemented infrastructure to control storm water runoff. This amount is variable from municipality to municipality, according to the physical environment and local challenges.

Longer-term benefit will also be realised as a result of the qualitative green spaces. This benefit can be explained by the model of Turton (2009:1), illustrating future remediation costs of current development, that are never brought into the equation when planning these projects or determining the feasibility thereof, but that leaves a huge future (financial) burden on the environment and thus also on the local government and communities. This phenomenon of the remediation costs are illustrated in Figure 52, based on the mining sector as experienced in South Africa. Urban development projects are usually evaluated based on the initial cost (capital investment, running costs and management costs) versus the expected revenue to be drawn from the development itself. This is similar to the situation of mining development in South Africa (refer to Figure 52).

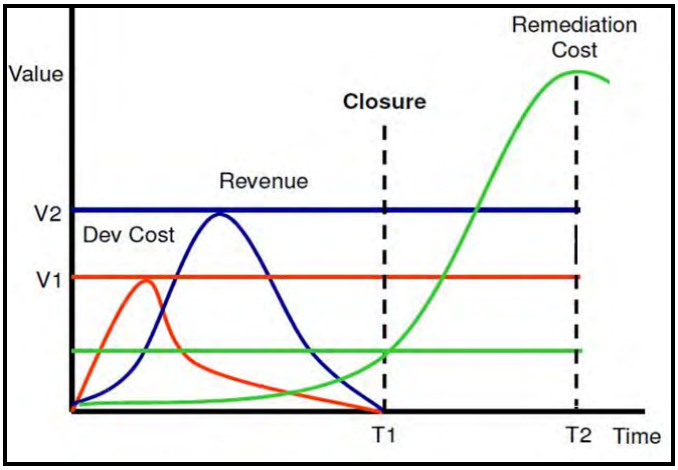


Figure 52: Remediation costs of the mining sector.

Source: Turton (2009:1).

V1 illustrates the development costs, increasing drastically up to the point where the contractual development is completed (comprising of capital and management costs) and then decreasing gradually (only running costs applicable) until a point in time (T1) where development costs will be zero. V2 illustrates the revenue that will be drawn from the mining itself, increasing and reaching a peak after the contractual development phase is completed and then decreasing until a point in time (T1) where no more revenue can be drawn from the mining. At this point in time (T1) the mine is no longer feasible and will close down. The scope of economic feasibility studies end at this point. However, to adhere to principles of sustainable development and qualitative green space planning, these areas need to be rehabilitated to a state similar to the situation before mining activity took place. These remediation costs come into play near to the closure time of the mine (T1), and increase exponentially after closure of the mine.

Reality reveals that companies and investors do not generally budget for this remediation as it is seen as the responsibility of the local authorities to rehabilitate the area. This situation is not sustainable. Turton (2009) proposed that the remediation costs should be part of the initial budget and economic feasibility study, to ensure rehabilitation of the area (by the core investors). This links with the conclusion that "development "and "environment" should not be viewed as opposing poles, but rather be planned for holistically. If remediation costs are incorporated from the start of the developmental project (thus if Green Planning are prioritised equally in all developments) it will result in lower remediation costs for both investors and local authorities.

5.3.2 Income generation due to green spaces

Short term income generation due to green spaces (as derived from the literature and case studies captured in this document, and based on the findings of Consultancy 644, 2010), is realised in terms of:

- Taxes and levies: Based on the conclusion that property prices increase when adjacent to a qualitative (safe) green space, provided by the local government. However, this increase in price benefits the property owner, and the local government has no return on investment. An important and effective method to ensure direct return on municipal investment made on green spaces, is tax. The Netherlands introduced Property Tax (OZB), which is levied on properties as a fixed percentage of the property value, based on the added value provided by the green spaces and qualitative environment. In 2010, the property tax levied on properties in the Netherlands was 0.0919 percent of the property value, charged on an annually basis (Consultancy 644, 2010:33). The Hedonic pricing method can also be used in the South African situation to determine additional value of properties, gained from public green spaces. In this way, the local government can raise additional property levies.

- Benefit sharing: Focussed on business and commercial properties, implying that their location within the green space stimulates additional income as it attracts more visitors and stimulates the work efficiency and productivity. This benefit should be shared with the local government, as provider of the space. A percentage of the revenue can be used as a reasonable amount to share.

- Fees: Entrance fees can be charged for using public green spaces, such as parks, golf courses, or gardens, due to the functionality of the space. Additional fees can be charged for parking nearby green spaces. However, the aim is to redirect this income back to the local government, as they are the provider and core green space investor within the municipality.

- View and existence warrant: Implies that residents (property owners and renters) will pay additional amounts to ensure the protection of and proximity to green spaces, due to the functional use and experience value it offers (refer to recreational uses, sense of place and a beautiful view). Residents can invest in an area, by contributing to a protection fund, allocated to protect and enhance green spaces within the areas. When local governments gain revenue from green spaces (as proposed here), they will prioritise these spaces in their planning and budgeting processes.

Longer-term income generation may occur in terms of the following issues:

- Land values: The overall land values of the municipality in whole will increase when the area is developed in a qualitative manner, incorporating green spaces and safe useful areas. The character and exclusiveness of the city will be enhanced, translated into higher tourism and visitor numbers, higher demand for property numbers and greater investments in the areas.

- Decision-making: Land-use is an important factor in urban economic growth and development because land-use patterns contribute to the desirability and productivity of a city. The ability to influence land-use decisions is therefore an essential economic development instrument to stimulate future economic growth.

The value of green spaces lies within the function and use of the green space itself. Local authorities should grasp the importance of qualitative green spaces (in terms of function and use) to provide for the abovementioned benefits of cost-savings and income generation, and should therefore enhance the planning of integrative, qualitative, functional green spaces. The connections among the function, use and value of green spaces are summarised in the following figure. It illustrates that the interface between “environment” and “economics” lies within the usage (goods and services) that the green space can provide.

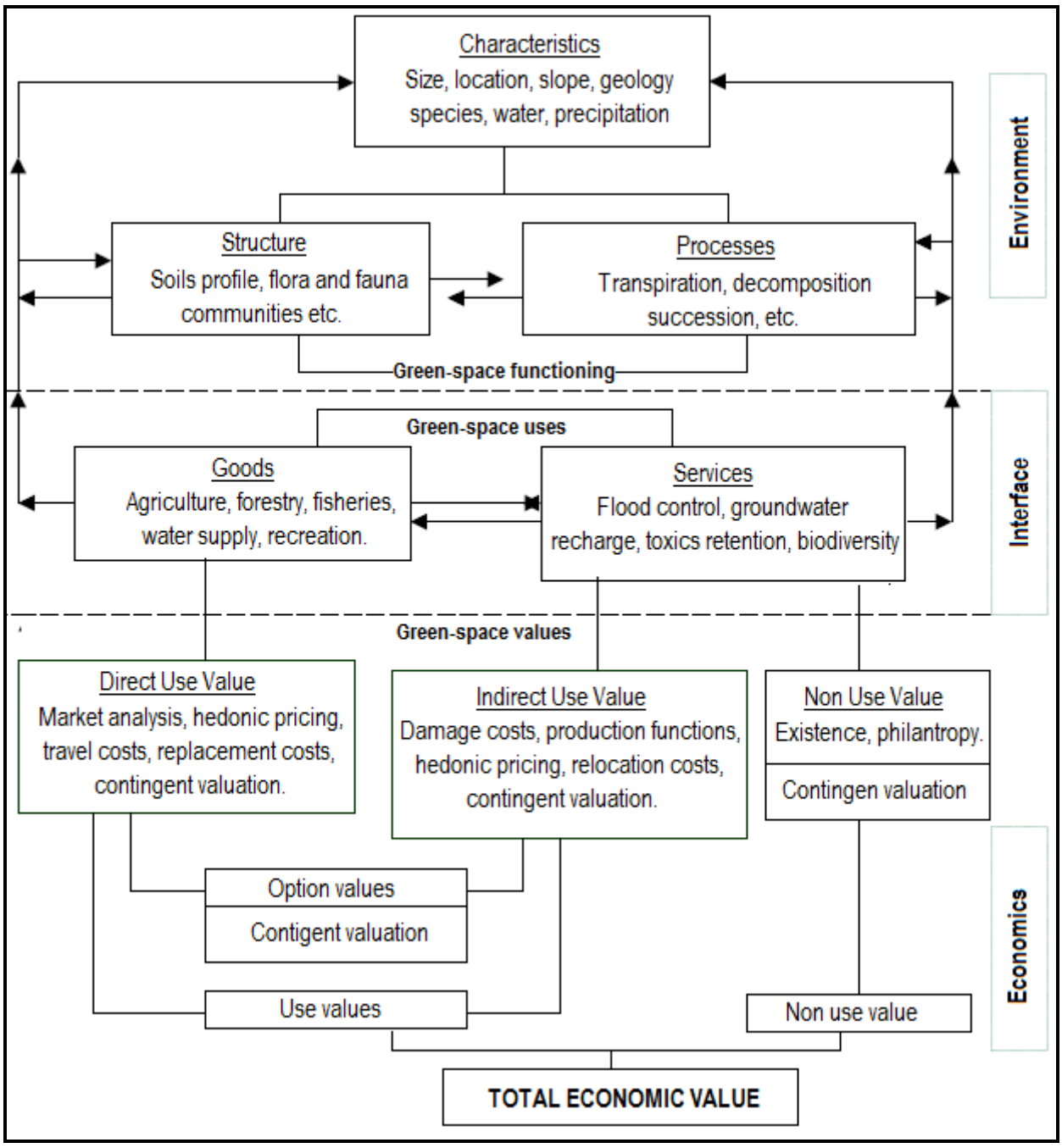


Figure 53: Connections among green space functions, uses, and values.

Source: Lambert (2003:5).

The economic value of green spaces can be used as a tool to manage the constant conflicts between 'pro-development approaches' and 'pro-environment approaches', as it provides the interface between 'environment' and 'development' as captured in Figure 53. By determining the economic value of green spaces, a platform is created to compare green spaces and urban-spaces with one another in terms of direct (financial) economic values and indirect (social and environmental) economic values. This platform can influence municipal decision-making with regard to spatial planning and future development proposals, internationally, but also locally.

5.4 The South African context

Is there scope in the South African context (particular Potchefstroom) to enhance green space planning?

The case studies conducted in Potchefstroom illustrated significant results with regard to the green space values. In contradiction to the scenarios in Europe, most green spaces had a negative impact on residential property values in Potchefstroom. Although many factors might contribute to this phenomenon, it was evident that most green spaces lack quality and function. The green spaces (except for the Golf Course and Sport Fields) are mainly neglected, open stands or fields, not contributing to the aesthetics or character of the area, and actually increasing crime opportunities within these areas (due to the lack of insufficient lighting, qualitative designs, visual attributes and controlled entrance). The lack of quality within the green space can also be linked to the lack of function related to the green space. Literature studies indicated that residents prefer spaces for social or recreational purposes (Goosens, 2009) and will thus use these green spaces more frequently.

In light of these findings, Potchefstroom has scope to enhance green space planning, focussing on providing qualitative, safe and functional green spaces within the urban environment. Based on the case studies in the Heilige Akker and Grimbeek Park, the entire neighbourhood will benefit from qualitative green spaces, as the area average R/m^2 price will be increased, resulting in economic benefits. Qualitative, functional green spaces can contribute to the city-scale planning, by enhancing the character and sense of place, thus increasing the 'willingness-to-buy' within an area, and contributing positively to the overall city perception and valuations. Qualitative, functional green spaces can also contribute to the street-scale planning, by enhancing functional spaces that will stimulate social and recreational opportunities, contributing to safer environments, this increasing the 'willingness-to-buy' within a certain street, resulting in higher residential property values, and thus increasing municipal revenues based on these property values. As a result, local governments will be more 'willing-to-provide' green spaces when it is proven profitable.

For green space planning to be enhanced and implemented successfully in the South African context, a tool is needed to guide the planning of green spaces, and guide municipal decision-making processes. The tool should be understandable (even for authorities that do not have an urban planning education or background, as this is mostly the case in South Africa, explained in chapter 2), comprehensive (including all the values of green spaces in order to make a informed decision), practical (to bridge the current urban research and planning practice of sustainable development). The proposed tool is described in the following chapter, as a recommendation to enhance green space planning locally and internationally, as part of local authority planning and budgeting processes with regard to future development and spatial planning.

5.5 Conclusion

Based on the literature and empirical studies captured in the previous chapters, the primary research questions "(1) can green spaces enhance the current sustainable development approach?, (2) can the economic value of green spaces be determined?, (3) and is there scope in the South African context (Potchefstroom) to enhance green space planning?", were answered in chapter 5. Recommendations were made based on these conclusions, as well as the proposed tool, are presented in the following chapter.

Chapter 6: Recommendations

" We must not, in trying to think about how we can make a big difference, ignore small daily differences we can make, which, over time, add up to big differences that we often cannot foresee."
- Marion Wright Edelman, Founder of the Children's Defence Fund -

6.1 Introduction

The current sustainable development approach was rethinked and evaluated throughout this research, based on the economic value of green spaces and the possible contribution it can offer to future urban development decision-making processes. In the previous chapter, it was concluded that the economic value of green spaces could be determined, although it is subject to many different factors (direct and indirect benefits). There is also a need within a local South African context to determine the economic value of green spaces, due to increasing urbanisation and decreasing qualitative green spaces, resulting in constant conflicts between 'pro-development approaches' and 'pro-environment approaches'. The economic value of green space can guide future decision-making as it provides a platform to compare, link and create an interface between spatial planning, urban economics, and the environment. However, a planning tool is needed to determine the economic value of green spaces, as this was not done before within the local context. To integrate the findings and conclusions of this research, and to use it to the advantage of the economy and the people of South Africa, the following tool is proposed to determine the economic value of green spaces.

6.2 Municipal Strategic Investment in Green (MSIG)

Conventional methods and models for spatial data analysis are based on 'hard', quantitative, cardinally measured information. Approaches such as location-allocation models, optimisation models, entropy models, spatial assignment models, and regional growth models, all reflect the past trend to cast complex and multidimensional spatial interaction patterns in the framework of a cardinal metric system. In recent years, significant progress has been made in the analysis of 'soft', qualitative, or categorically measured data. Researchers in the areas of regional and urban economics, geography and urban planning have become increasingly aware of the necessity to incorporate qualitative data and methods, including spatial consumer choice behaviour, locational perceptions and preferences, contingency table analysis, spatial scenario analysis, qualitative impact analysis, project and plan evaluations and spatial conflict analysis (Nijkamp *et al*., 1984:v).

The present aim is to bridge the gap between conventional 'hard' approaches and the evolving 'soft' approaches through a collection of values, which are measurable, and comparable. From the literature studies, it was shown that green spaces do have value, not only social and environmental, but also economical value. However, literature also revealed that local governments are often neglecting the planning of green spaces and tend not to invest in green spaces, as the return on investment is not brought back to the municipality, but is realised in terms of community benefit and property owners' advantage. The local government is mostly the provider of the public green spaces but does not gain from this investment, and thus it is understandable why they choose not to invest in these spaces. Authority decisions with regard to development initiatives versus environmental enhancement are mainly driven from an economic (financial) perspective and therefore the economic value of spaces was chosen as the measurement to link the 'hard' and 'soft' data. The recommended tool (formulated from the findings of this research) to be used by South African local governments in planning for green spaces, is called "Municipal Strategic Investment in Green" (SMIG). The objective of this tool is to value urban spaces, with specific reference to green spaces, taking in consideration the 'hard' and 'soft' data.

The SMIG-tool is proposed as an adequate tool to enhance the municipal planning of qualitative urban green spaces in order to be beneficial to the municipality itself. Ultimately, the SMIG-tool makes use of a comprehensive checklist comprising of different green space values, providing local governments with a monitoring tool to plan for and justify municipal green space investment, and ensure a financial return on such investment (Consultancy 644, 2010:2). Municipal Strategic Investment in Green (SMIG-tool) provides the political arena with a comprehensive basis to firstly gain a better understanding of the importance of green spaces and, secondly, to debate in depth the using of the tool as a common ground to plan for these green spaces. It incorporates the initiatives of soft data (benefits not measurable in economic terms) and hard data (benefits connected to an economic value). 'Soft' data is difficult to quantify, as stated in previous chapters, and therefore a derivative value was calculated.

Broadly speaking the proposed tool consists of two domains, (1) the monitoring domain where an inventory of the existing green space is made by listing values of green spaces (based on soft data), and (2) the monetary domain where the focus is on the financial returns on investment in urban green space, using innovative strategies to either reduce costs or generate income (Consultancy 644, 2010:30), refer to Table 32.

Table 32: Strategic Green Investment towards a cost-benefit analysis.

Municipal Strategic Investment in Green (SMIG)			
Domain	**Monitoring** Soft data benefits Qualitative	**Monetary** Hard data benefits Quantitative	
		Cost Saving	**Income Generating**
Benefits	• Accessibility • Availability • Visibility • Cultural • Historical • Education • Employment • Health • Production • Noise levels • Safety	<u>Short term</u> • Spatial planning • Maintenance costs • Energy savings • Emissions costs • Storm water savings <u>Long term</u> • Remediation costs	<u>Short term</u> • Property tax • Green proximity levies • Benefit sharing • Entrance fee • Parking fee • View warrant • Existence warrant <u>Long term</u> • Land value
Total benefit (Cost-benefit Analysis)	Sum of benefits related to values	Sum of benefits in economic value (Rands)	Sum of benefits in economic value (Rands)

Source: Based on Consultancy 644 (2010:31).

Monitoring Domain: This part of the tool focuses on the soft data (qualitative benefits not measurable in monetary terms) in order to make an inventory of the existing green space by listing the different values of green space, stemming from different levels (micro, meso and macro level). The purpose of this domain is to provide local governments with a comprehensive and extensive framework of values of green spaces, serving as a checklist to evaluate the current green space status and create awareness of the importance and function thereof. Moreover, apart from merely being a checklist, the inventory also serves as an inspiration list for municipalities to identify drivers of green space values and benefits of green spaces stemming from different domains. It is based on a multi-criteria analysis of green space values, individually weighted by the local government to determine the importance of the specific green space values versus other values. This assessment is subjective as each municipality will assess the values based on its own preferences, agenda setting, and motives. In the end, municipalities will have a list of green space values, scored from highly important to least important or redundant. Finally, the most important values and benefits will be taken into consideration in the cost-benefit analysis. Potential methods used to gather green-values are also incorporated in this domain and include data collection methods and data processing methods.

Monetary Domain: The monetary domain focus on hard data (quantitative benefits measurable in monetary terms) and comprises of different strategies which local governments can use to either reduce their running costs (in terms of spatial planning efficiency, saving on maintenance costs, saving on energy consumption, CO_2 emission costs and storm water facility and maintenance costs, and long term remediation costs), or to generate additional income (by property taxes, green proximity levies, benefit sharing income, entrance fees, parking fees, view and existence warrants for protecting and enhancing of specific green spaces, and long term land value increase). The emphasis is placed on innovative strategies to ensure this return on green space investment, made by the local government. This is the first local approach towards such a strategy, thus limited in approach and in need of expansion and more comprehensive initiatives (although simplicity often ensures better implementation and monitoring of the tool itself). However, this proposal (and tool) forms the point of departure for rethinking such a comprehensive tool. The SMIG-tool is dynamic and flexible, implying it can be adjusted to specific municipal preferences.

Cost-Benefit Analysis: Once the local government evaluated the urban area or proposed development plan in terms of the monitoring domain (qualitative benefits) and monetary domain (quantitative benefits), the collected data is processed in a cost-benefit analysis as part of the final step of the SMIG-tool. The results of the monitoring domain are hard to quantify, and will thus be related to values, either positive or negative, illustrating the weaknesses in the areas, along with opportunities. The result of the monetary domain is stated in financial terms (in Rand value) and can thus be directly integrated in the cost-benefit analysis. This will guide municipal budgeting and spending as authorities will be able to calculate the direct benefit derived from the green space in comparison to the benefit (revenue) when the green space is developed. It should be stressed that municipalities are likely to benefit more from green spaces than from urban development, as green spaces stimulate income generation and minimise running costs, as illustrated in the SMIG-tool. From a municipal point of view if would thus be sensible to prioritise the green spaces.

The SMIG-tool is not a financial investment tool that will indicate whether or not to invest, it is rather a tool that can be used by local governments to evaluate green spaces based on the added value it will offer, and to justify municipal budgeting and spending in this regard.

6.3 Maximise competitive benefits of green spaces

The outcome of the SMIG-tool will be the maximisation of the competitive benefits of green spaces. This will realise when local governments invest in green spaces, resulting in an overall increase in the value of the area because of the qualitative green spaces. This benefit of revenue that is the result of the green spaces can be ploughed back in municipal budgets to again address future green space planning needs.

Green investment by municipality → Increased value → Return on municipal investment

Municipal investment in green spaces implies that local governments should not only consider traditional "balance sheet items" when evaluating a development proposal or rethinking the spatial planning of an area, but also include the "off-balance sheet items", as illustrated in the following figure. Turton (2009) refers to these "off-balance sheet items" as the externalised costs that needs to be present in the short term planning in order for long term planning to be sustainable and economically feasible. Figure 54 illustrates the situation in the mining sector and the great need to include the externalized costs from the beginning of the planning and funding process in order to limit these future costs and ensure economic benefits that will maximise competitive benefits of green spaces.

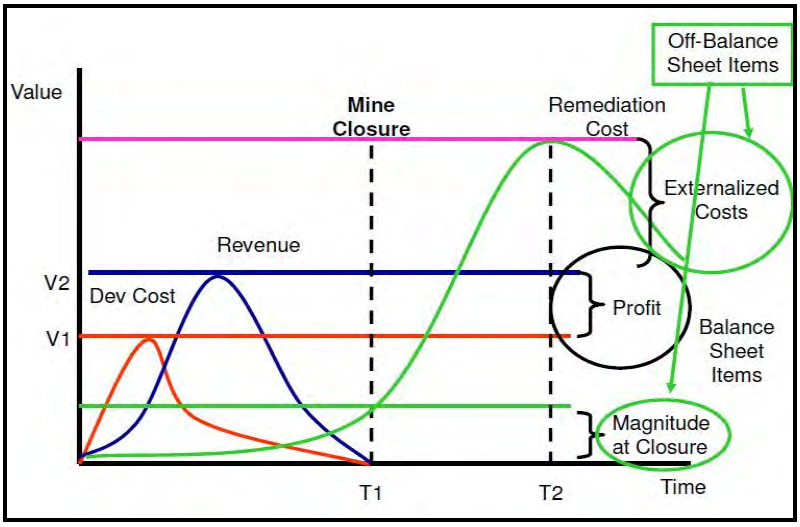


Figure 54: Externalised costs.

Source: Turton (2009).

This can be realised when the SMIG-tool is combined with economic multiple criteria analysis methods to provide a rational basis for classifying a number of choice possibilities (in this regard, values) based on multiple criteria. Although multiple criteria analysis and evaluation methods are not specifically designed for spatial analysis, it has been applied extensively to spatial problems. The multiple criteria analysis method often use two kinds of input data: an impact matrix and a set of political weights attached to the criterion effects and these data sets create an entry point for the spatial dimension (Nijkamp *et al.,* 1984:443) via:

- the project impact matrix when an evaluation problem can be spatially disaggregated into various zones (as with the conflict between urban-zones and green spaces)
- the weight vector where different authorities will have different priority-sets for the evaluation criteria concerned (as with valuing green spaces).

In order to deal with mixed information (as created through this SMIG-tool) methods has been developed to deal especially with mixed qualitative-quantitative impact scores (Voogd, 1982).

These methods are all based on the same procedural framework, called the Evamix approach. This approach involves the construction of two measures: one dealing with the ordinal criteria and the other on dealing with the qualitative criteria. By making various assumptions about standardisation and aggregation, an appraisal score for each alternative can be calculated. The global structure of the Evamix procedure is summarised in Figure 55:

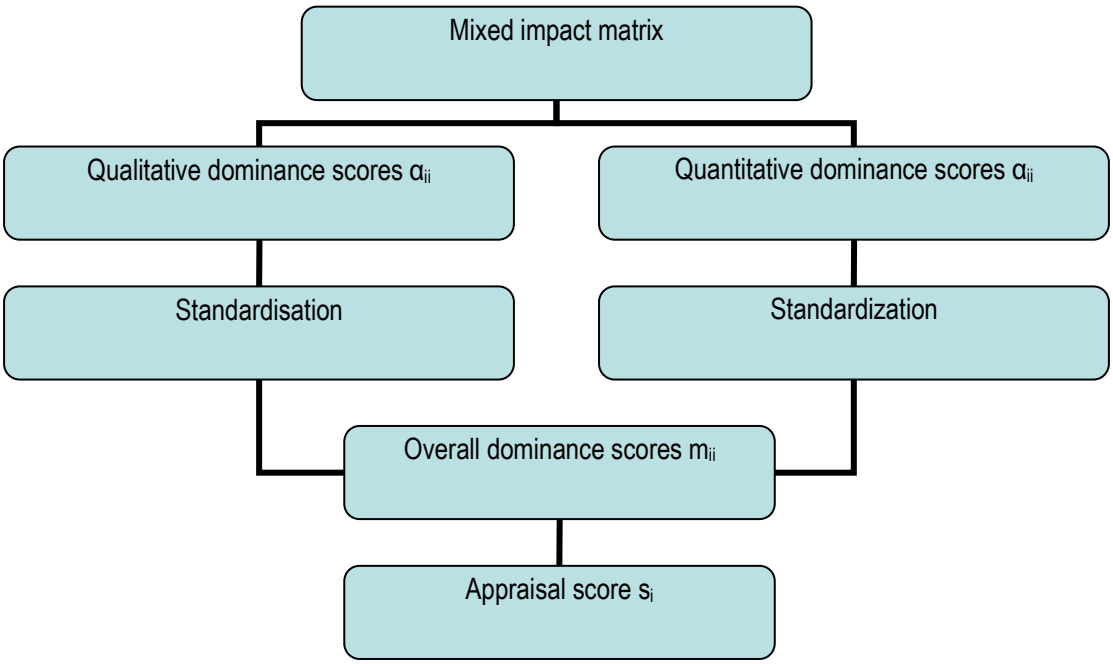


Figure 55: Brief overview of the Evamix procedure.

Source: Nijkamp *et al* (1984:493).

Different methods and different assumptions can thus be used. Altogether, the conclusion may be drawn that spatial elements may complicate the use of multiple criteria analysis, but with more or less substantial adjustments, such elements can be taken into account (Nijkamp *et al.,* 1984:444). Consequently, by simultaneously applying these methods to an evaluation problem, insight can be gained into the sensitivity of the results with respect to 'technical' matters. This is extremely important, especially if the evaluation results are directly used by non-experts, as in the case where authorities are making future development decisions, without begin formally educated in most Urban Planning or Economics curricula. It should be noted that the ideal would be to use this advance approach, supported by the Evamix approach, however, the comprehensiveness thereof should not over shadow the simplicity of the tool, as the first and foremost objective is to make authorities aware about the value of urban space and green spaces, in order to plan and budget for these spaces, to enjoy future revenues in the form of sustainable living spaces.

6.4 Long term strategy proposals

Recommendations in terms of long-term strategy proposals with regard to the economic value of green spaces include the following:

- **Breaking of mindsets**: The current belief is that green spaces are worthless, as South Africa has adequate open spaces and therefore do not need to plan for green spaces. Reality is that our local green spaces are being transformed into great urban developments, but it is only focussed on short-term financial gain. The mindset that development provides more gain than conservation should be changed. Authorities need to realise the value of green spaces, not only the social and environmental spin-offs, but also the measurable economic benefit. As green economist Paul Hawken writes, our social and environmental crises are not problems of management, but of design. There is a need for a system overhaul (Milani, 2006:42) to create sustainable, qualitative urban spaces and living environments. The "sustainability dividend" should be sought throughout all planning and developmental projects. The sustainability dividend is realised when environmental science and solutions are used to create and enhance real estate asset value (Enright, 2009:5).

- **Crossing borders**: It is no longer possible to plan future urban development only based on spatial planning considerations. Economics, environmental issues, social needs, political agendas, visual qualities, feasibility, and practicality should all form part of this process, along with adequate participation processes, to promote inter-disciplinary professional thinking and activities, and improve the understanding of the relationship between the developed- and natural environments.

- **Implementing the SMIG-tool**: Authorities need to be introduced to the tool and the functioning thereof. Understanding the added benefits that the tool offers, as well as understanding how to plan for green spaces to receive these benefits, is part of the success of the tool. The importance, necessity and value of green spaces should be understood, enhanced and reflected in spatial planning processes, acknowledging that the value of green spaces are subjective, and linked to the perceptions and needs of communities and the character and function of an area, thus differentiating between people and places.

6.5 Conclusion

The study of the economic value of green spaces is a fairly new concept in South African context and relevant local information and data was limited. The results of the literature study and empirical investigation did provide some preliminary and significant results, contrary to the general tendency in developed countries, and thus unique to the local South African context. This was the first attempt to link economic value and green spaces. Although these findings are based on limited studies and cases, it can be used as the point of departure for further investigations into green spaces and the economic value thereof.

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Annexure

ANNEXURE A: Questionnaire to authorities

Market value
Do current trends (applications) favour developments near open spaces (parks, sport fields, dam, and golf course)?
Does the natural environment influence the price of adjacent properties?
Are there different tax-scales for areas located adjacent to open spaces?
Competitive value
How much revenue does the local government draw from green spaces (golf course, botanical gardens, and dam) in Potchefstroom?
How much revenue does the local government draw from international athletes training on the NWU sport fields?
Is the success of Aardklop linked to the natural environment in which it functions? (Akkerlaan, open spaces etc.)
Natural systems value
Are there a municipal budget allocated for green space planning in Potchefstroom?
How much of the municipal budget is allocated for recreation-projects?
Are green spaces considered when evaluating a development-application?
Does the local government promote the planning of green spaces?

ANNEXURE B: Questionnaire to residents

Market value					
House prices (Rank from 1 to 5, 5 being the best)	Vd Hoff	Baillie Park	Dam area	Heilige Ak	Grimbeek
The most used green space is located in:					
Market value for residential properties are highest in:					
Market value for commercial properties are highest in:					
Preference				**Yes**	**No**
Current trends favour developments near open spaces (parks, sport fields, dam, and golf course)?					
Offices are migrating out of the CBD to locations that offer more open space?					
The natural environment influences the price of houses?					
The natural environment influences the price of office space?					
Tax is higher in areas located adjacent to open spaces (parks, fields, dam, and golf course)?					
Competitive value					
Tourism				**Yes**	**No**
Tourists prefer Potchefstroom because of green spaces (parks, sport fields, dam, golf course)					
Aardklop are successful because of the natural environment it can function in?					
Income (Rank from 1 to 5, 5 being the best option)	Golf Course	Botanic garden	Dam	Sport fields	Walking trail
Users will pay entrance to:					
Users use this area most:					
Use	**Functionality (recreation, sports, activities)**			**Experimental (visual qualities, rest)**	
Users visit green spaces in Potchefstroom mainly for:					
Users will pay entrance fees for green space that offer:					
Users prefer living adjacent to an area with:					
Users prefer working adjacent to an area with:					
Users Potchefstroom offers more green spaces of:					
Natural systems value					
Perspectives				**Yes**	**No**
Potchefstroom is known for its green-areas					
The natural environment in Potchefstroom can be upgraded					

ANNEXURE C: Public participation survey of Potchefstroom Revitalisation study

1: CBD PUBLIC PARTICIPATION

Number of Block ☐
Number of Surveyor ☐

- Do the CBD still offer you some services you cannot get elsewhere?

Yes ☐
No ☐

- How frequently do you visit the CBD

Daily ☐
Once a week ☐
Every fortnight ☐
Once a month ☐
Less frequently ☐

- What is the reason for your visit?

Work place ☐
Shopping ☐
Financial services ☐
Other professional services ☐
Other ☐

- Would you rather shop in the:

CBD ☐
Suburban business centres ☐

Reasons:
……
……
……
……

- What are the most important issues to be addressed according to you in the CBD? (On a scale of 1 – 5. 5 being the most important and 1 the least important)

- *Safety and security*
- *Pedestrian movement*
- *Parking*
- *Traffic circulations*
- *Public Transport*
- *Beautification*
- *Maintenance of infrastructure*

Other: specify:
……
……
……
……

- Proposals for improvement
……
……
……

2: QUESTIONNAIRE TO THE BUSINESS COMMUNITY

Number of Block ☐
Number of Surveyor ☐

- Do you think some intervention is needed to stimulate / upgrade the CBD area? If yes, whose responsibility is it?

Yes ☐
No ☐
City Council ☐
Business Community ☐
City Council and business community ☐
Province ☐

- Which factors are threatening the growth and development of the CBD? (On a scale of 1 – 5. 5 being the most important and 1 the least important)

	1	2	3	4	5
• *Crime*					
• *Lack of sufficient parking*					
• *Out datedness of CBD*					
• *Growth of suburban / regional shopping centres*					
• *Lack of infrastructure*					
• *Maintenance*					

Other: specify:
……
……
……

- What weakness inherent to the CBD prevents growth and development? (On a scale of 1 – 5. 5 being the most important and 1 the least important)

	1	2	3	4	5
• *Planning and traffic circulation*					
• *Accessibility*					
• *Lack of open space*					
• *Beautification*					
• *Safety*					

Other: specify:
……
……
……
……

- What opportunities exist that should be used for CBD upgrading?

……
……
……
……

- Do you think that the CBD should be protected by policies of city council or not (free market)?

Protected ☐
Free Market approach ☐

- Will you be interested to become part of a "city improvement district" to address issues such as safety, environment, movement etc?

Yes ☐
No ☐

- In order of priority, what are the most serious issues to be addressed in the CBD? (on a scale of 1 – 10, 10 being the most important and 1 the least important)

Crime ☐
Beautification ☐
Parking ☐
Traffic circulation ☐
Public transport ☐
Pedestrian movement (closing of roads, boarding of sideways etc.) ☐
Hawkers ☐
Accessibility ☐
Infrastructure (roads, pavements, signage's etc.) ☐
Public facilities (telephones, toilets, open space etc.) ☐

- Type of business / retail:

Service ☐
Food Retail ☐
Clothing & footwear ☐
Entertainment ☐
Furniture ☐
Household appliances ☐
Electronic ☐
General retailer ☐
Restaurant ☐
Other (specify)

- Annual Sales:

R0 – R50 000 ☐
R50 000 – R150 000 ☐
R150 000 – R300 000 ☐
R300 000 – R600 000 ☐
R600 000 – R1 000 000 ☐
Above R1 000 000 ☐

Number of employees ☐

- Will you support a permanent Aesthetical Committee for the CBD? (that will ensure an acceptable standard of development)

Yes ☐
No ☐

- When did you first start your business in the CBD?

Year
Would you say that your business is prospering in the CBD?
Yes ☐
No ☐