

**A critical review of the development of sustainability indicators for the City of Cape Town: A focus on environmental and socio-economic sustainability**

by

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## **Declaration**

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## **Abstract**

Sustainable development has gained great interest at global, national and local community levels. For instance, governments, civil societies, the commercial sector as well as local communities have responded to the agreed framework of UNCED known as Agenda 21, developed at the 'Earth Summit' held at Rio de Janeiro in 1992, inter alia through the development of indicators aimed at monitoring and evaluating the achievement of sustainable development. As a result, different tools to measure the level of sustainability have been developed and applied in many cities globally. These include different types of indicators, namely environmental, social, and economic performance monitoring indicators, as well as combined indices.

Since cities are dynamic complex open systems with interrelated social, economic and environmental systems, and sustainable development cannot be absolutely achieved, integrated sustainable development indicators that concurrently address social, economic and environmental dimensions are crucial to aid in monitoring sustainable development particularly in any given urban system. This study gives an overview of these indicators and indices.

The South Africa government has acknowledged in both its National Framework for Sustainable Development of September 2006 and the Draft National Strategy for Sustainable Development and Action Plan of May 2010 that like other cities globally, cities in this country face similar challenges particularly due to urbanisation. In this study, the focus is on evaluating the sustainability challenges of the City of Cape Town and the role sustainability indicators could play in helping to achieve sustainable development objectives. This is supported by a review of the so called 'sustainable cities' and in particular how the Cities of Seattle (USA), Santa Monica (USA) and Curitiba (Brazil) have tried to address urban challenges.

To meet the study objective of recommending the type and a process of developing indicators that will aid in improving sustainability in the City of Cape Town, selected indicators and indexes developed globally, nationally and for other cities are critically reviewed. Selected policies, plans and indicators developed by the South African national government, the Western Cape provincial government, and the City of Cape Town are reviewed. The review aims at investigating whether the existing policies and indicators were useful in addressing sustainability challenges particularly in the City of Cape Town. The review focuses on the policy objectives to assess whether the policies contradicted or were supportive of each other, the existence or lack thereof of gaps in the policies, and whether local communities and other stakeholders were involved in decision making processes. The findings suggests that although sustainable development is addressed in the policy documents of all three spheres of government in South Africa, the implementation has not yet been effective – and the

City of Cape Town is no exception based on published reports such as the State of Cape Town Report.

On the basis of the lessons derived from the success stories of cities like Seattle, Santa Monica, and Curitiba towards achieving sustainability, several recommendations are suggested to assist the City of Cape Town in developing, implementing, and reporting on sustainability indicators.

## Opsomming

Op internasionale, nasionale asook plaaslike gemeenskapsvlakke het volhoubare ontwikkeling groot belangstelling gelok. In reaksie op die ooreengekome raamwerk van UNCED, Agenda 21, ontwikkel by die “Earth Summit” (Rio de Janeiro, 1992), is aanwysers gemik op die monitering en implementering van volhoubare ontwikkeling deur regerings, burgerlike samelewings, die kommersiële sektor asook plaaslike gemeenskappe ontwikkel. Dit het gelei tot die ontwikkeling en implementering van verskillende instrumente vir die meet van volhoubaarheid in verskeie stede wêreldwyd. Hierdie instrumente sluit in verskillende aanwysers, ondermeer omgewings-, sosiale-, ekonomiese- en prestasie aanwysers asook gekombineerde indekse.

Omdat stede dinamies komplekse ope sisteme met interafhanklike sosiale, ekonomiese en omgewingssisteme is, en volhoubare ontwikkeling nie absoluut bereikbaar is nie, is geïntegreerde volhoubare ontwikkelings aanwysers wat sosiale, ekonomiese en omgewings dimensies gelyktydig aanspreek van kritieke belang in die monitering van volhoubare ontwikkeling, spesifiek in enige gegewe stedelike sisteem.

In beide sy nasionale raamwerk vir volhoubare ontwikkeling (Julie 2008) en nasionale strategie vir volhoubare ontwikkeling en Aksie plan (weergawe van 20 Mei 2010) het die Suid Afrikaanse regering erken dat plaaslike stede, soos ander wêreldwyd, dieselfde uitdagings in die gesig staar veral as gevolg van verstedeliking. Die fokus van hierdie studie was die evaluering van die volhoubaarheids-uitdagings van die Stad Kaapstad en die moontlike rol wat volhoubaarheids-aanwysers kan speel in ’n poging om volhoubare ontwikkelings doelwitte te bereik. Hierdie word ondersteun deur ’n oorsig van die sogenaamde “volhoubare stede” en spesifiek hoe stede soos Seattle (VSA), Santa Monica (VSA), en Curitiba (Brasilië) stedelike uitdagings probeer aanspreek het.

Ten einde die studie doelwit aangaande die aanbeveling van die ontwikkelingsproses van aanwysers en indekse vir die verbetering van volhoubaarheid in die Stad Kaapstad te bereik, is verskeie internasionale, nasionale sowel as stedelike volhoubare ontwikkelings indekse krities geëvalueer. Geselekteerde beleid, planne en aanwysers wat deur die Suid Afrikaanse

Nasionale regering, die Wes Kaapse provinsiale regering en die Stad Kaapstad ontwikkel is, is ondersoek. Die doel van hierdie evaluasie was om vas te stel of bestaande beleid en aanwysers nuttig is, in die aanspreek van volhoubaarheids-uitdagings spesifiek in die Stad Kaapstad. Die fokus van die evaluasie was op beleidsdoelwitte ten einde te bepaal of: verskeie beleid teenstrydigheid toon of andersins ondersteunend is, die bestaan of gebrek aan leemtes in beleid en of plaaslike gemeenskappe

en of ander belange groepe in die besluitnemingsproses betrokke is. Die bevindinge dui daarop dat alhoewel volhoubare ontwikkeling in beleidsdokumente van al drie sferes van die Suid Afrikaanse regering aangespreek word, die implementering daarvan nog nie so doeltreffend is nie - en gebaseer op gepubliseerde verslae soos die stand van Kaapstad, is die Stad van Kaapstad nie 'n uitsondering nie.

Na aanleiding van lesse geleer uit die sukses verhale van stede soos Seattle, Santa Monica en Curitiba in die bereiking van volhoubare ontwikkeling is verskeie aanbevelings gemaak om die Stad Kaapstad by te staan in die ontwikkeling, implementering, en rapportering van volhoubaarheids-aanwysers.

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## List of Acronyms and Abbreviations

AG	Auditor General
ANC	African National Congress
ASGI-SA	Accelerated and Shared Growth Initiative – South Africa
APA	American Planning Association
BEE	Black Economic Empowerment
BNG	Breaking New Ground
CBD	Central Business District
CBOs	Community Based Organisations
CCT	City of Cape Town
CDI	City Development Index
CTP	Cape Town Partnership
CTSDF	Cape Town Spatial Development Framework
CSD	Commission on Sustainable Development
CSIR	Council for Scientific and Industrial Research
CWRT	Centre for Waste Reduction Technology
DA	Democratic Alliance
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAAT	Department of Economic Affairs, Agriculture and Tourism
DEAT	Department of Environmental Affairs and Tourism
DPLG	Department of Provincial and Local Government
DLG&H	Department of Local Government and Housing
DPLG	Department of Provincial and Local Government
DPSA	Department of Public Service and Administration
DPSIR	Driving Force Pressure State Impact Response
DS	Dashboard of Sustainability
DSR	Driving Force State Response
DTI	Department of Trade and Industry
DWAF	Department of Water Affairs and Forestry
EEA	European Environment Agency
EEA	European Economic Area
EPWP	Expanded Public Works Programme
EPA	Environmental Protection Agency
EPI	Environmental Performance Index
ESI	Environmental Sustainability Index
EU	European Union
EVI	Environmental Vulnerability Index
EWI	Ecosystem Wellbeing Index
FIFA	Federation of International Football Association
GDP	Gross Domestic Product

GEAR	Growth, Employment and Redistribution strategy
GEM	Gender Empowerment Measure
GEOSS	Global Earth Observation System of Systems
HDI	Human Development Index
HWI	Human Wellbeing Index
ICLEI	International Council for Local Environmental Initiatives
IEC	Independent Electoral Commission
IISD	International Institute for Sustainable Development
IMEP	Integrated Metropolitan Environmental Policy
IDP	Integrated Development Plan
IPPUC	Urban Planning Institute of Curitiba
IGOS	International Global Observing Strategy
JPOI	Johannesburg Plan of Implementation
LA 21	Local Agenda 21
LCA	Life Cycle Assessment
MDGs	Millennium Development Goals
MFA	Material Flow Analysis
MTEF	Medium Term Expenditure Framework
MTSF	Medium Term Strategic Framework
NDoH	National Department of Housing
NEMA	National Environment Management Act
NGOs	Non Governmental Organisations
NSDP	National Spatial Development Perspective
NSSD	National Strategy for Sustainable Development
OECD	Organization for Economic Cooperation and Development
PQLI	Physical Quality of Life Index
ProSus	Program for research and documentation for a sustainable society
PSC	Public Service Commission
PSR	Pressure State Response
RDP	Reconstruction and Development Programme
SA	South Africa
SACN	South African Cities Network
SALGA	South African Local Government Association
SCOPE	Scientific Committee on Problems of the Environment
SD	Sustainable Development
SDIs	Sustainable Development Indicators
SoE	State of the Environment
SoER	State of Environment Reporting
SOPAC	South Pacific Applied Geoscience Commission
StatsSA	Statistics South Africa
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCSD	United Nations Commission on Sustainable Development
UNDESA	United Nations Department of Economic and Social Affairs

UNDP	United Nations Development Programme
UNDP SA	United Nations Development Programme - South Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
UN Habitat	United Nations Habitat
UDF	Urban Development Framework
USA	United States of America
USI	Urban Sustainability Index
WACOSS	Western Australian Council of Social Service
WCED	World Commission on Environment and Development
WHO	World Health Organisation

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# Chapter 1: Introduction

## 1.1 Sustainable development: A challenge for cities

The concept of sustainable development (SD) has been widely researched in an attempt to address the twin problem of achieving the necessary development to sustain and improve the quality of human life, and the reduction of materials extraction, consumption and waste generation (UNCSD, 1996; Wackernagle & Rees 1996; Dresner, 2002; Maclaren, 2003; Muller, 2006a; UN Habitat, 2009; Krausmann *et al* 2009). Among the key concerns of SD in the 21<sup>st</sup> century is the manner in which cities<sup>1</sup> are managed, primarily because they are characterised by high human settlement density, exponentially growing material flows, increasing demand for waste management systems, and increasing disparity of incomes among different population groups (Swilling, 2004; SACN, 2004 & 2009; UN Habitat, 2006 & 2009). In particular, a disturbing feature in African cities is that urbanisation is mainly accompanied by the growth of slums with corresponding exacerbated problems of inequality, insecurity, and poverty. The Africa continent is the most affected by high levels of poverty as it currently has the highest prevalent growth of slums globally (UN Habitat, 2006; United Nations, 2006).

Within the agreed framework of UNCED held in Rio de Janeiro in 1992 and the adoption of Agenda 21, the UN Commission on Sustainable Development (CSD) began developing Sustainable Development Indicators (SDIs). Chapter 40 of Agenda 21 recognised the role of indicators in assessing the implementation of SD and providing information for decision making. Consequently, UNCED prompted individual countries to develop SDIs based on specific country's needs (UNCSD, 1996). This was followed by the EU Sustainable Development Strategy adopted in 2006 recognising that indicators are appropriate tools to measure interrelated issues of SD (Pereira & Othman, undated; Steinbuka & Wolff, undated).

Between 1996 and 1999, 134 indicators were developed and tested on 22 countries by the UNCSD in order for countries to gain experience with the selection and development of SDIs and to assess their applicability and suitability for decision making at the national level (UNCSD, 1996). Consequently, the EU statistical office (Eurostat) recommended 54 CSD indicators for use by the European communities. This was an attempt to measure sustainability progress and the extent to which sustainability goals and targets had been achieved, for example, the Millennium Development Goals (MDGs) adopted by the Millennium summit in 2000 (UN, 2003; UNESCO–SCOPE, 2006). The

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<sup>1</sup>A city is a large and densely populated built up area that serves as a centre for trade, administrative services, transport etc.

indicator testing exercise showed that SDIs aid in effective monitoring and evaluation of SD achievements and also systematically facilitate in identifying the most critical areas where action can provide most effective short and long-term outcomes.

## **1.2 The need for developing SDIs for cities**

Present literature reveals that cities are centres of knowledge, networks, human development, culture and creativity, production as well as consumerism (Button, 2002; Girardet, 2004; Newman, 2006; UN Habitat, 2006). The increase in demand for infrastructure, materials, and energy has exerted pressure on existing limited resources. Consequently, cities have become unsustainable with respect to biodiversity loss, resource utilisation, equitable resource distribution, and waste management (Girardet, 2004; Newman, 2006; UN Habitat, 2006; Ravetz, 2000). For cities to measure their level or achievement of sustainability, indicators are crucial tools to inform decisions, measure achievements of set targets, and monitor the sustainability of policies, with a view of addressing areas of concern (Alberti, 1996; Innes & Booher, 2000; Kline, 2000; Scipioni *et al* 2009; Fengli *et al* 2009).

According to UN Habitat, (2009) urban poverty and growth of slums have increased to a point that cities should rethink their planning in order to provide sustainable human settlements and employment and basic services like water and sanitation (UN Habitat, 2009). Cities remain among the biggest consumers of materials and energy, yet the development of SDIs to measure their long-term sustainability is not only poorly researched but continues to receive the least attention in the research community (UNCSD, 1996; CWRT, 1998; Bohringer & Jochem, 2007). In this context, the rapid growth of urban population not only in the City of Cape Town (CCT) but also in other cities, motivates the development of useful SDIs. Globally, different tools to measure sustainability have been developed. Some of the tools developed are discussed in Chapter 2.

## **1.3 Research problem**

The focus of my research was to investigate the extent to which the CCT has developed sustainability indicators. CCT is notably one of the cities in Africa with various policy documents and strategies to promote the city to become sustainable (City of Cape Town, 2000, 2001, 2002, 2003, 2005a, 2006a, 2008a, 2008b & 2009a). Among the areas of concern for cities addressed in these policy documents are tourism, energy, water, increasing unemployment and poverty.

The choice of CCT as a study area was underpinned by several factors in the South African context. These include the City's significance as a tourist destination, the diversity of her inhabitants, and its geographical location within the proximity of highly sensitive environmental systems (City of Cape

Town, 2005a, 2006a, 2008a, 2008b). The CCT government also made commitments to be sustainable through several policy documents that have been developed since 1994 (City of Cape Town, 2003, 2007b; City of Cape Town, 2010b). For example, the Integrated Metropolitan Environmental Policy commits the local government to implement several activities by the year 2020 (City of Cape Town, 2003). One of the statements extracted from the policy document is “*Public transport will be safe, clean, efficient and non-polluting. Commuters will be less reliant on private transport and there would be significant reductions in traffic congestion and air pollution. Public transport will provide all inhabitants of the City of Cape Town with safe, affordable and convenient access to urban opportunities*” (City of Cape Town, 2003: 5). This statement is an example of similar statements that prompted me to closely examine the progress made by the CCT in addressing SD challenges within a broader context of economic growth, promotion of environmental stewardship, and focused redress to diverse social-related challenges with a view of improving the quality of life for the inhabitants of Cape Town.

In line with this commitment and vision, the CCT government has been developing indicators for the last 11 years to monitor progress towards achieving SD. The indicators are reported in the CCT State of the Environment (SoE) reports, Sustainability Reports and the State of Cape Town reports. The reports give a detailed picture of environmental and developmental concerns that persist in the Western Cape Province and CCT in particular (City of Cape Town, 2000, 2001, 2002, 2003, 2005a, 2006a, 2008a, 2008b & 2009a).

Notably these indicators are diverse and comprise of development indicators; the State of Cape Town indicators; SoE indicators, city, ward and suburb social-economic indicators. However, a review of several SoE and State of Cape Town reports brought to light the viewpoint that these indicators have not met the desired objectives of measuring and monitoring sustainability as they are numerous and fragmented (City of Cape Town, 2000, 2001, 2002a, 2002b, 2005b, 2008a, 2008b).

#### **1.4 Purpose of study**

The research was motivated by my previous studies on ‘sustainable cities’ that revealed the unsustainable nature of cities particularly in resource use, environmental management and improving the quality of life of communities. A literature search also confirmed that various cities globally are striving to be sustainable in efficient use of resources, environmental management and improving the quality of life and thus these cities have developed various types of indicators to measure and monitor their sustainability (Kline, 2000; Kenworthy, 2006; Rodriquez 2007; Palmer & Conlin, 2007; Hodge, 2007).

According to the United Nations (2002) urban indicators should address broad key areas that impact on urban development, namely shelter, social development, environmental management, economic development, and governance. Several authors agree that indicators should measure quality of life, environmental protection, local community<sup>2</sup> development as well as community participation in decision making processes (Alberti, 1996; Foxon *et al* 1999; Innes & Booher, 2000; Kline, 2000; Cartwright, 2000; Fraser *et al* 2006; Palmer & Conlin, 2007; Seattle, 2010). Thus, communities should participate in policy formulation, developing indicators, as well as in the implementation and review of SD programmes.

My research explored the policy development by the South Africa (SA) government in the context of SD at the national sphere, the Western Cape Province and the CCT. In particular, I sought to understand the processes undertaken in the development of SDIs at the three spheres of government namely the process of identifying indicators, types of stakeholders involved in the indicator process, selection criteria, implementation, and feed-back mechanisms. To understand the extent to which SA cities are progressing in terms of environmental protection and socio-economic sustainability, the CCT was chosen to investigate whether policy formulation and implementation as well as the development of SDIs have played a role in addressing the most critical issues facing the Cape Town community. Several authors agreed that research with regard to urban indicators should investigate the priority areas of weakness and how the city in question has tried to address them (Alberti, 1996; Innes & Booher, 2000; Fengli *et al* 2009). Therefore, the research questions for this investigation are the following:

- ◆ What are the priority areas of weakness that need addressing in order to improve the sustainability of the city (the CCT in this case);
- ◆ Who are the stakeholders in the process of selecting indicators;
- ◆ Are the indicators aligned to the relevant policies and implementation plans, and have the indicators met the objectives defined in the policy; and
- ◆ What are the mechanisms required to ensure that indicators inform decision making processes and corrective actions?

## 1.5 Research methodology

To meet the objectives of this study, a literature review of SD, sustainability and sustainability assessment tools developed globally was undertaken. Next, an extensive literature review and content analysis of selected national, Western Cape Provincial and CCT policy documents and plans, as well

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<sup>2</sup> McEwan (2002) defined the term *community* as a process of how these people are involved, participate and develop in relation their own empowerment and the power relations surrounding them.

as a review of selected indicators, was carried out. A questionnaire survey was also selected to provide supporting information for the literature review and content analysis.

A **literature review** is an essential part of every research project as it provides an understanding of how scholars have theorised and conceptualised issues related to the research problem (Mouton 2001: 87; Muller, 2010: 7). Mouton identified the following five key reasons why a literature review is important:

- ◆ *To avoid duplication of previous studies;*
- ◆ *To discover the most recent and authoritative theories and debates about the research problem;*
- ◆ *To identify what literature is scientifically proven and is reliable; and*
- ◆ *To understand the most widely accepted definitions of key concepts in the field of the research.*

Muller (2010: 8) noted that assessing selected articles on a certain theme on a given field of research in question and comparing the arguments of various authors helps a researcher to understand the themes better so as to develop his or her own arguments, and thereafter the researcher has the ability to take a particular stance. Bless and Higson-Smith (2000: 20) indicated that a literature review enables the researcher to become familiar with the latest research within a given domain.

Mouton (2001: 179) noted that a **literature review** provides an overview of studies by analysing trends and debates over a given period of time but also pointed out the following limitations (Mouton, 2001: 180):

- ◆ The review provides an analysis and summary of existing literature but does not product new information;
- ◆ The existing literature cannot easily be validated by the researcher;
- ◆ An empirical study will still be required to test new insights; and
- ◆ The researcher may be biased in selecting the sources of the study and may also interpret the literature according to one's own viewpoint, which may not be necessarily the same viewpoint of other researchers on the research in question.

Mouton (2001: 165) defined **content analysis** as “*studies that analyse the content of texts or documents and content in this context refers to words, meanings, pictures, symbols, themes or any message that can be communicated*”. Content analysis is a research method that is used to make replicable and valid inferences from texts. The method can be used to assist a researcher in examining the logic of different texts and consequently evaluate performance of practical actions, with a view of making recommendations for improvement (Weber, 1990: 9; Krippendorff, 2004: 18). According to Mouton (2001: 166) content analysis is an acceptable method of research as it is a non-reactive

method of study that tries to minimise errors associated with the interaction between researchers and subjects. Mouton further noted that quantitative content analysis is useful for research involving large volumes of text (Mouton, 2001: 166). Content analysis can be used to investigate whether the message being communicated is a reflection of set objectives. The method is useful for revealing responses from society, cultural patterns, the focus of institutions, emerging ideas, political developments and trends in communication (Weber, 1990: 9). Krippendorff (2004: 18) added that content analysis increases a researcher's understanding of the material being analysed and can also be useful for introducing positive actions such as creating awareness of interrelationships of global systems. For the purposes of this study, I sourced several documents from the CCT website (City of Cape Town, 2010b).

The limitations of **content analysis** include the following (Rubin & Babbie, 2008: 407):

- ◆ Content analysis is limited to examination of published information, is purely descriptive in nature and may not review the underlying motives for the observed trends;
- ◆ It may be difficult to validate the content;
- ◆ The content may be outdated and therefore not reflect current trends;
- ◆ There is a danger of repeating the mistake contained in the original source, particularly when dealing with statistical data;
- ◆ There is lack of independent new perspective;
- ◆ The researcher may be biased in selecting the content to analyse; and
- ◆ Content analysis may be limited by availability of material.

**Questionnaire survey** is a quantitative study that provides a broad overview of a representative sample of a given population with the aim of providing answers to the research problem under investigation (Mouton, 2001: 152). This usually takes the form of structured questionnaires that are filled in by client respondents. The strengths of a questionnaire survey are the following (Mouton, 2001: 153):

- ◆ Large populations can be represented by smaller groups; and
- ◆ The data collected is likely to be reliable and valid.

The limitations of questionnaire survey are the following (Mouton, 2001: 153):

- ◆ Respondents may decline to fill in the questionnaire;
- ◆ Data may not meet the objective of the study if the questionnaire is poorly designed;
- ◆ Respondents may not respond to all the questions on the questionnaire; and
- ◆ Data capturing errors may result in unreliable information.

To mitigate the limitations in my research methodology, recent literature that discusses SD and SDIs was selected as a basis for the research topic. An extensive search of the SA National, the Western Cape Government and the CCT websites was conducted to obtain information on current trends in planning and policy development as well as the current perspectives on SD. Consequently, I selected relevant policy documents within the socio-economic, institutional and environmental dimensions of SD in order to identify interrelationships in these policies as well as gaps that need addressing. As discussed in section 1.5.3, only 2 of the 19 questionnaires were received back and therefore email correspondences with the 2 respondents were used to obtain additional information and also to verify the questionnaire responses. These mitigation measures were supported by guidance and advice from my supervisor on the relevant literature to study so as to meet my research objective.

In the following sections, the research methodology applied in this study is described in more detail.

### 1.5.1. Literature review

The selected literature provides an overview of the trends, processes and the types of indicators and indices developed by international organisations and communities. The assessment tools for measuring urban sustainability were explored to guide recommendations for the CCT, and also aid in proposing crucial factors that are essential in developing sustainability indicators that are policy relevant, scientifically founded, readily implementable as well as usable for decision making. The literature review consisted of examining selected literature on the concepts of sustainability and SD as understood within diverse disciplines and, an overview of assessment tools that have been developed by international organisations, with particular focus on SDIs and indices for cities. Various types of indicators and indices were studied including the ecological footprint, environmental space, human development index, environmental performance index, driving force-pressure-state-impact-response (DPSIR) framework which underlies State of the Environment Reporting, as well as performance monitoring indicators.

In addition, an overview of the literature in regard to complex systems was carried out to understand the type of relationships between a system and its components in order to consider when defining and developing indicators of complex systems. Previous studies have mentioned that cities are complex systems comprising people; infrastructure, services, governance, ecological systems, and material flows (Alberti, 1996; Innes & Booher, 2000; Li *et al* 2009). Cities affect and are affected by socio-economic, institutional and natural systems beyond their physical boundaries. Urban systems both regionally and globally are strongly interrelated and influence the sustainability of individual cities. For this reason, the complex relationship of a city and its environment needs to be taken into account in urban decision making and in the development of urban indicators as the evolution of a city

involves its people, institutions, infrastructure, and ethics as well as the influence of other cities (Alberti, 1996; Foxon *et al* 1999; Innes & Booher, 2000; Troyer, 2002; Li *et al* 2009).

A sustainability process attempts to respond to these changes, and therefore necessitates development in tandem with fast evolving cities. As a city evolves, it is subject to uncertainties, risks, and institutional changes that affect its sustainability. As such, the indicators need to be flexible, and reviewed periodically to reflect changes occurring in a given city (Cilliers, 2000; Uprichard & Bryne 2005; O'Sullivan *et al* 2006). Increasingly, the systems approach to sustainable development is being applied to cities to emphasise the interconnectedness and interactions of social, economic, and environmental subsystems (Alberti, 1996; Troyer, 2002; Gallopin, 2003).

To further understand the concept of complexity and sustainability of urban systems, I also examined the processes adopted by the cities of Seattle and Santa Monica in developing their indicators in order to compare them with those used in the CCT. The City of Curitiba was also an insightful city in the way it managed to integrate transport and land use in its SD plans. The Cities of Seattle, Santa Monica and Curitiba are internationally recognised as role model sustainable cities.

These cities were selected for review because like the CCT, they attract large numbers of local and international tourists and they are also faced with similar sustainability challenges as the CCT. For example, all three cities needed to address key sustainability issues like solid waste management, water conservation, efficient land use and transport system, and improving the quality of life of their residents. The knowledge derived from the review of these cities was then used to propose an effective method of developing sustainability indicators for the CCT taking into account the City's unique needs.

The study provided an opportunity of identifying the process proposed towards developing indicators for urban complex systems and also the types of indicators that are suitable in measuring urban sustainability and that are useful for communication to policy makers, civil society, NGOs, city planners and local communities. Several authors agreed that community participation is a fundamental aspect in the process of developing indicators as residents in a particular community ought to contribute to defining indicators suitable to their unique needs, and circumstances (Kline, 2000; Innes & Booher, 2000; Communities and local government, 2003; Fraser *et al* 2006).

From a review of SA policy documents and indicators developed, coupled with the study of indicator development in the cities of Seattle, Santa Monica as well as a review of Curitiba sustainable city programmes - a suitable method of developing sustainability indicators for urban complex systems



and indicators applicable towards improving sustainability in the CCT, within the context of the City's unique needs was suggested.

### 1.5.2. Content analysis

From 1991 to the present, several policy documents were published by the SA national, provincial and local spheres of government. An analysis of the policy documents specifically produced by the national government, the Western Cape provincial government and the CCT was carried out to investigate the extent to which SD and SDIs as tools to measure and communicate progress had been addressed in SA and particularly in the CCT. An in-depth study of CCT policy documents and annual reports received special attention.

Some of the selected policy documents by the SA national government, the Western Cape provincial government, and the CCT analysed in this study included:

#### National

- ◆ Urban Development Framework (1997);
- ◆ Report to the United Nations Commission on Sustainable Development, results from testing of CSD indicators of sustainable development in South Africa (1998);
- ◆ Environmental indicators for national state of the environment reporting (2002);
- ◆ People-Planet-Prosperity: A strategic framework for sustainable development in South Africa (2006);
- ◆ The Presidency: National Spatial Development Perspective (2006);
- ◆ Industrial Policy Action Plan (2007);
- ◆ The Presidency Development indicators, Mid-Term Review (2007);
- ◆ The Presidency: Development Indicators (2008);
- ◆ Environmental Sustainability Indicators: Technical Report (2008);
- ◆ The Presidency: Medium Term Strategic Framework (2004);
- ◆ The Presidency: Medium Term Strategic Framework (2009);
- ◆ The Presidency: Improving Government Performance: Our Approach (2009);
- ◆ The Presidency: Green Paper on National Strategic Planning (2009);
- ◆ The New Growth Path: The Framework (2010);
- ◆ Industrial Policy Action Plan 2 (2010); and
- ◆ The Presidency: Diagnostic overview (2011).

Western Cape provincial policy documents

- ◆ White Paper on Western Cape Provincial Transport Policy (1997);
- ◆ Draft Transformation Plan for Consultation (2005);
- ◆ Towards a Sustainable Development Implementation Plan for the Western Cape. Concept Paper on Sustainable Development (2005a);
- ◆ Western Cape Provincial Spatial Development Framework. Statutory Report (2005b);
- ◆ Western Cape State of the Environment Report (2005c);
- ◆ Western Cape Provincial Growth and Development Strategy, (2006);
- ◆ Provisional Environmental Headline Indicators (2006);
- ◆ Sustainable Energy Strategy and Programme of Action for the Western Cape (2007);
- ◆ Compendium of indicators for the Provincial Growth and Development Strategy (2007);
- ◆ A Climate Change Strategy and Action Plan for the Western Cape (2008);
- ◆ Western Cape Provincial Economic Review and Outlook (2009);
- ◆ Western Cape Provincial Spatial Development Framework Explanatory Manual (2009);
- ◆ Provincial Economic Review and Outlook (2010); and
- ◆ Western Cape Sustainable Human Settlements Strategy (undated).

City of Cape Town policy documents

- ◆ The Integrated Metropolitan Environment Policy (2003);
- ◆ Draft Integrated Development Plan for Review and Comment (2004);
- ◆ Draft Integrated Development Plan (IDP) (2004);
- ◆ City of Cape Town Sustainability Report; Draft set of indicators (2004);
- ◆ City of Cape Town Sustainability Report (2005);
- ◆ Draft Integrated Development Plan (IDP) (2005);
- ◆ City of Cape Town Portfolio of Sustainability Best Practice (2005/2006);
- ◆ State of Cape Town 2006, Development Issues in Cape Town, (2006);
- ◆ City of Cape Town Sustainability Report (2006);
- ◆ City of Cape Town Transport Plan (2006);
- ◆ Draft Cape Town 2025 Implications for Cape Town (2006);
- ◆ An Intergovernmental Approach to the development challenges of Cape Town, (2006);
- ◆ Economic and Human Development (EHD) Strategy. Part 2 Implementation Plan, (2006);

- ◆ Framework for Adaptation to Climate Change in the City of Cape Town (2006);
- ◆ 5 year Plan for Cape Town, Integrated Development Plan (2007/8 – 2011/12);
- ◆ State of Cape Town 2008. Development Issues in Cape Town (2008);
- ◆ City of Cape Town, State of Environment Report (2008);
- ◆ Responsible Tourism Policy for the City of Cape Town (2009);
- ◆ Integrated Transport Plan for the City of Cape Town 2006 to 2011 (2009);
- ◆ Draft Cape Town Spatial Development Framework (2010);
- ◆ City of Cape Town Environmental Agenda (2009-2014);
- ◆ City of Cape Town Annual Report 2009/2010;
- ◆ City of Cape Town Integrated Waste Management policy (undated); and
- ◆ Draft City of Cape Town Green Buildings Guidelines (undated).

### 1.5.3. Questionnaire survey

The original idea was that the literature review was to be complemented by a questionnaire survey that was mailed to 19 local respondents in the field of urban development based in CCT. The criterion used to identify the respondents was through the individuals who previously participated in providing information for developing indicators for the CCT's SoE and sustainability reports. The respondents were identified from the most recently published reports as well as through discussions with a former City official who previously participated in developing the indicators. The questionnaire sought to investigate the process followed in developing indicators for the CCT and other issues including; what type of indicators and categories would be appropriate for the City, whether the CCT was sustainable, whether the indicators developed had influenced decision making by the City, and who were the stakeholders involved in developing the indicators. The questionnaire is included as Appendix A.

However, only 2 of the 19 questionnaires were received back. Through email correspondences, the rest of the respondents indicated that they did not feel knowledgeable enough with the current debates on sustainable development and therefore declined to participate in the questionnaire survey. Alternatively, they recommended two respondents among those that I had initially identified to complete the questionnaire.

Because of the unexpected poor response through the questionnaire survey, it was impossible to gather comprehensive information as anticipated at the initial stages of this research. As the purpose of the questionnaire survey was always to supplement the content analysis of existing literature, the

absence of comprehensive input from respondents did not largely affect the quality of this research. The respondents that were recommended by others (as they were previously involved in the development of indicators for the City of Cape Town SoE reporting and also in the City of Cape Town sustainability reports published in 2005 and 2006 respectively) provided valuable and comprehensive information by filling in the questionnaire. I also obtained valuable additional information through email correspondences with the respondents.

The respondents felt that the CCT is not 'sustainable'. Among the reasons provided to support this opinion was the lack of understanding of the term *sustainable development* by the SA government. The SA government was seen to have emphasised the production of policy documents on social developmental issues, like provision of basic services to the poor, yet environmental concerns were viewed as of lesser priority by senior officials and politicians. It was also noted that the CCT does not have sufficient funds, technology as well as capacity to collect data for indicators and also implement SD programmes. For instance, alternative technologies and the capacity to implement these technologies are relatively expensive compared to the conventional methods when measured in once-off infrastructure investment, without looking at lower running costs and environmental costs.

The CCT lacks sufficient funds to implement many of the various policies that have been published and as such, the City usually prioritises issues to be addressed that are not necessarily based on feedback from the indicator reports. Besides, some issues that need to be addressed in promoting sustainability fall under the national government sphere, while others fall under the provincial government sphere. This implies that there are sometimes overlapping responsibilities for addressing key issues like sustainable human settlements, health, education, crime, transport and land use between the Western Cape Province and the Cape Town Metropolitan Government. For example, health, housing, unemployment and crime prevention challenges are under the control of the national government and the local government is tasked with implementation programmes to address these challenges.

The respondents mentioned the difficulty in developing sustainability indicators due to the complexity of the CCT context, including constant changes in political and administrative leadership, increasing urbanisation and the absence or unavailability of accurate data for calculating several indicators. In some cases, government officials showed a disinterest in sustainable development and therefore the project of developing indicators for the City lacked governmental support.

The key issues highlighted by the respondents as requiring urgent redress by the CCT to improve sustainability were public transport, human settlements, poverty, health, security, energy, waste, tourism and governance. The respondents also provided information on the nature of constraints

hindering successful development of SDIs for the CCT but also proposed which indicator sets could be suitable for monitoring sustainability in the CCT. The comments received from the respondents were similar to my findings from the literature review and content analysis and therefore contributed positively to my research.

## **1.6 Outline of the study**

### *Chapter 2 Sustainable development and assessment tools*

Chapter 2 provides an overview of SD and sustainability. A review of sustainability assessment tools developed at global as well as regional scales is also presented with the aim of investigating whether indicators developed by SA at national, provincial and local levels are aligned to those developed at the global scale, and their appropriateness in accordance to the specific needs of SA. The indicators and indices presented in Chapter 2 include non-integrated indicators, the DPSIR framework, the dashboard of sustainability, integrated indicators and indices, environmental indices, market based indices, social and quality of life based indices, and indices for cities. The chapter also includes a discussion of the process of choosing indicators and presents an overview of cities as complex systems as well as indicators of complex systems. Several types of indicators are presented including a critique of sustainability indicators.

### *Chapter 3 Exploring sustainability in cities*

In this Chapter, I review the concept of so-called ‘sustainable cities’ and present examples of successful urban indicator projects focusing on examples of ‘sustainable cities’, namely Seattle, Santa Monica, and Curitiba. An overview of the CCT in the context of sustainability is presented. The socio-economic and environmental subsystems, which constitute challenges and opportunities for the CCT, are examined in detail. An overview of sustainability indicator development in SA is presented. The processes adopted in identifying the indicators, how indicators were linked to each other as well as how the implementation and feedback mechanisms were addressed are examined. The chapter closes with a summary of the lessons learnt from the Cities of Seattle, Santa Monica, and Curitiba. The lessons learnt inform the formulation of recommendations to support future development of suitable SDIs for the CCT.

### *Chapter 4 Review of government policy documents*

In Chapter 4, an overview of policy development since 1994 in relation to sustainable development is presented. A critical review of national and Western Cape provincial government policy documents is

presented, as well as an overview of CCT policy documents and plans. The purpose of the review was to investigate whether SD and SDIs are addressed in the policy documents. In this chapter, I also investigated whether the CCT policy documents are aligned to the national government policy objectives.

#### *Chapter 5 Conclusions and recommendations*

Chapter 5 concludes this investigation by presenting the challenges facing SA with regard to SD and discusses the research questions mentioned in section 1.4. The conclusions are drawn from the analysis on policy framework and the development of indicators at national, Western Cape Provincial government and the CCT. Several recommendations on how to improve sustainability in the CCT are presented based on lessons learnt from the examples of sustainable cities. Suggestions on the process of developing indicators to effectively address integrated socio-economic and environmental challenges in the CCT are presented. The chapter closes by recommending further studies to analyse the challenges, complexity and dynamic nature of the CCT with a view of improving the knowledge for decision makers.

## Chapter 2: Sustainable development and assessment tools

### 2.1 Introduction

As discussed in Chapter 1, the reduction of material consumption and levels of waste generation, coupled with improving the quality of human life are crucial for SD. In light of these requirements, it is therefore important that the use of SDIs as measuring tools, particularly to aid in implementing SD in cities, should be emphasised. The challenges and opportunities facing cities require urgent planning<sup>3</sup> and the implementation of approaches that supports SD coupled with well identified and integrated indicators that are useful for communicating to the stakeholders, and also inform policy makers about problems that require response in the form of corrective measures. This chapter begins by presenting an overview of sustainability and SD concepts. Selected indicators and indices that have been developed at global scale are then presented. Various types and indicators are discussed as well as the process of choosing indicators. Further, an overview of cities as complex systems and indicators applicable to such systems are presented, as well as a discussion of how indicators need to relate to complexity. The chapter closes with suggestions for selecting indicators that may be relevant and applicable in the urban context, based on the complexity of the urban problems encountered within specific urban regions.

### 2.2 Overview of sustainability and sustainable development

Sustainability has been defined as “*the ability of a system to adapt to change and continue to function over a long time span*” (Maclaren, 1996; United Nations Division for sustainable development, 2005 cited in Milman & Short, 2008). The World Commission on Environment and Development (WCED) defined sustainability as “*the level of human consumption and activity which can continue into the foreseeable future, so that the systems which produce goods and services to humans persist indefinitely*” (WCED, 1987). Sustainability is also deemed as either weak or strong (Du Plessis & Landman, 2002; Hattingh, 2003).

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<sup>3</sup> Claassen (2001, cited in Muller, 2003: 1) defined planning as a “*predetermined course of action to achieve a specific goal*”. Planning involves a continuous process where certain decisions and trade offs are made on how available human and financial resources will be optimally utilized to meet specific targets (Conyers & Hills, 1992 cited in Muller, 2003).

Weak sustainability is the view that different kinds of capital can be fully interchanged, and that natural capital can be used up as long as it is converted to manufactured capital (Roseland, 2000). According to this view, economic activity should not be confined to predetermined environmental limits. Strong sustainability is the view that the environment performs certain functions that are essential for the survival of human and ecosystems and therefore economic activity should be confined to the carrying capacity of the environmental limited resources (Du Plessis & Landman, 2002; Hattingh, 2003).

Hattingh (2003) further described different concepts of sustainability and SD that are used to suit particular ideological needs of people, organisations, or governments. In defining SD, Hattingh (2003) noted that issues are prioritised depending on the urgency of the subject in question. For example, this could be an emphasis on the degree of environmental protection (in developed countries), equity and participation (in developing countries), or the scope of the subject area. Thus, SD may be viewed as commitment to living within the earth's carrying capacity, or it could be viewed as social development where concerns like resource use, pollution, biodiversity and meeting local needs are crucial. Hattingh (2003) also explained that a conservative model of SD emphasised the conservation of the environmental resources whereas a radical model of SD generally advocated structural changes in the economy, politics, institutions and individual lifestyles for fair distribution of resources while living within the ecological limits (Hattingh, 2003).

According to Allen (2002) urban sustainability encompasses the following dimensions:

- ◆ Economic sustainability – the ability of the local economy to sustain itself without damaging the natural resource base;
- ◆ Social sustainability – a set of actions and policies aimed at the improvement of quality of life and fair access and distribution of the use of the natural and built environment;
- ◆ Ecological sustainability – the impact of urban production and consumption on the integrity and health of the city-region and global carrying capacity;
- ◆ Physical sustainability – the capacity of the urban built environment and techno-structures to support human life and productive activities and;
- ◆ Political sustainability – the quality of governance systems and public policies used to guide the relationship and actions of different actors within the socio-economic, ecological and physical dimensions of sustainability.

Allen (2002) emphasised that political sustainability coupled with active participation of the civil society is crucial for developing policies and implementing programmes that promote urban



sustainability. According to Jacobs and Slaus (2010) economic sustainability is the improvement of human economic welfare in personal disposable income, equality in income distribution, employment, education, energy efficiency and net household savings.

Recent literature has identified social sustainability and sustainable governance as important elements in addressing sustainability challenges particularly in cities (Roseland, 2000; Colantonio, 2007). These are discussed in detail in sections 2.2.1 and 2.2.2.

### 2.2.1 Social sustainability

The Western Australian Council of Social Service (WACOSS) (2002) defined social sustainability as occurring when formal and informal processes, systems, structures, and relationships actively support the capacity of current and future generations to create health and liveable communities. WACOSS (2002) further stressed that socially sustainable communities are equitable, diverse, connected and democratic, and provide a high quality of life. According to the City of Vancouver (2005) social sustainability is about meeting the basic needs of residents, developing human capacity and involving communities in local economic development programmes (City of Vancouver, 2005; Rodrigues Regional Assembly, 2009a).

Social sustainability is a complex and multidimensional concept and linkages between social environmental and economic sustainability are not yet clearly understood (Colantonio, 2007). Social capital has recently emerged as an important element of social sustainability. Social capital refers to social trust, norms and networks that enhance social and intellectual interactions within a society. Social capital contributes to stronger communities and networks that can prompt governments to support collective action in addressing sustainability challenges (Roseland, 2000; Olsson *et al* 2004). It includes active participation in governance, aligning policy to local conditions and public involvement in planning, policy development and implementation of SD programmes. Active participation allows communities to express their needs and aspirations that are essential in policy formulation, implementation and monitoring of programmes.

### 2.2.2 Governance for sustainable development

Governance in the context of SD comprises democratic and active participation of the public in decisions making processes (Roseland, 2000). Governance contributes to improved communication and understanding between different stakeholders about common issues affecting them and ways to resolve the issues. Governance implies that the government does not make decisions for communities but rather allows communities be part of the planning process, taking into consideration all the values

and interests of stakeholders. Governance should therefore promote accountability and collective shift in individual and political actions that promote SD (Roseland, 2000).

Sustainable governance is also considered as the integrative evaluation of policy inputs, conversion processes, outputs and outcomes towards delivery of public services (Cloete, 2005 & 2007). Sustainable governance relates to institutional durability of public policy programmes as well as continuous assessment of policies and implementation plans and programmes at project level. Resources (i.e. financial, human, technology) for effective policy design and implementation are essential to achieve policy goals and enable durability of government programmes over time. Sustainable governance implies that institutions have the capacity required to deliver public services, can adapt to dynamic systems, and can improve service delivery in the long term. In addition, institutions should be flexible in order to address new challenges as they emerge (Cloete *et al* 2003; Cloete, 2005 & 2007). Sustainable governance outcomes include the following features (Cloete *et al* 2003: 3):

- ◆ Representivity and equity in resource control and allocation;
- ◆ Developmental and growth focus;
- ◆ Participatory, responsive, people-centred strategies;
- ◆ Democratic rights, stability, legitimacy and transparency of processes;
- ◆ Political and financial accountability;
- ◆ Professionalism and ethical behaviour;
- ◆ Flexible, effective, efficient and affordable processes;
- ◆ Co-ordination, integration and holism of services;
- ◆ Creative, competitive and entrepreneurial practices;
- ◆ Literate, educated, participating and empowered citizens as products; and
- ◆ Sustainable outcomes.

### 2.2.3 Social-economic and environmental perspective on sustainable development

The concept of SD is increasing its popularity in diverse disciplines such as engineering, social sciences, economics, physical sciences, biology, urban planning, and ecology, to name just a few, and also within the private and public sector, while the concept is still evolving among disciplines and advocacy groups (UNDP, 2002 & 2008; Du Plessis & Landman, 2002; City of Cape Town, 2003; DEA & DP, 2005a; DEAT, 2006a; Bohringer & Jochem, 2007; UN Habitat, 2009). SD is difficult to define because of the multiplicity of goals required to achieve sustainability. In addition, there are diverse interpretations and dimensions advanced by different sets of stakeholder groups (Olsson *et al*

2004; Gagliardi *et al* 2006) and, in this study, only a few examples are provided for illustrative purposes:

- ◆ Maclaren, (2003: 25) defined SD as “*access for all to a fair share in the limited environmental resources on which healthy quality of life depends*”.
- ◆ Wackernagle and Rees (1996: 32) viewed sustainability as “*living in material comfort and peacefully with each other within the means of nature*”.
- ◆ The Environmental Protection Agency (EPA, cited in Sikdar, 2003: 1928) defined sustainability, thus “*sustainability occurs when we maintain or improve the material and social conditions for human health and environment over time without exceeding the ecological capabilities that support them.*”
- ◆ From an engineering perspective, the sustainability of a system will require rethinking of the way industrial products and processes are designed, built, operated and evaluated. Thus, Bakshi and Fiksel (2003: 1350) defined sustainability as “*a sustainable product or process is one that constrains resource consumption and waste generation to an acceptable level, makes a positive contribution to the satisfaction of human needs, and provides enduring economic value to the business enterprise.*”
- ◆ According to Nooteboom (2007: 646) sustainable development from a systems theory point of view is “*when development enables a system to maintain its (order) as an integral system, whilst also maintaining its role as part of a larger system on which it depends*”.

Dresner (2002: 67) noted that SD should meet the basic needs of humanity, acknowledge that the environment has limits, and also, meet both intergenerational and intragenerational equity. In this study, the SD definition according to the Brundtland Commission, *Our Common Future* (WCED, 1987: 43) was adopted since it is widely used in the scientific literature (Olsson *et al* 2004:3; Dresner, 2002:67; Wuppertal Institute, 2007) which states thus: “*meeting the needs of the current generations without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of needs, in particular the essential needs of the world’s poor to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organisation on the environment’s ability to meet present and future needs* (WCED, 1987: 43). Mebratu (1998: 504) acknowledged that the Brundtland definition formed the basis of all other sustainability concepts defined in the scientific community and noted that SD should aim to achieve balanced development in environmental, social and economic systems. Olsson *et al* (2004) added that SD and its operationalisation should be based on the specific needs in a region particularly in addressing the unsustainable trends. SD should improve the quality of life and create a balance between economic growth and environmental protection while embracing equity and community participation.

To conceptualise the aspects of socio-economic and environmental aspects of SD, a systems approach is critical in understanding how SD can be achieved in a given country, city, or region. A system is “*a set of entities with relations between them’ or ‘a bounded region in space-time, in which the component parts are associated in functional relationships*” (Ryan, 2008: 2). According to Ramo and Clair (1998: 2) a systems approach is “*a reasoned and integrated rather than a fragmentary look at complex problems*”. A systems approach can be used by individuals, institutions or governments to make rational and concrete judgements with a view of providing practical solutions to the world’s complex problems.

A systems approach shows “*what can be done, what it will cost, why it is beneficial, as well as the negatives*” (Ramo & Clair, 1998: 148). A systems approach is used to evaluate the problems and opportunities posed by these systems so as to develop appropriate policies and implementation plans to address the interrelated problems (Clayton & Radcliffe, 1996; Gallopin, 2003).

The systems approach views the world as a complex system, with various subsystems that are highly interrelated and interconnected (Capra, 1983; Innes & Booher, 2000; Gallopin, 2003). Du Plessis and Landman (2002) described a system as an entity that maintains its existence through mutual interaction of its parts and therefore a systems approach plays a key role in addressing infinite complex set of issues that are interconnected and interdependent. Bossel (1999) added that the complex web of interacting systems can be broken down into individual systems where each system affects its own performance as well as the performance of other systems. The systems approach was useful in trying to understand the interacting systems of the CCT and aided in proposing indicators. Several studies have revealed that SD challenges are complex and highly interrelated (Bossel, 1999; Bell & Morse, 2001; Dresner, 2002; Olsson *et al* 2004; Fraser *et al* 2006; Muller, 2006a). Therefore, it is evident that an interdisciplinary approach is required for SD to be translated into practical actions (Innes & Booher, 2000; Gallopin, 2003; Maclaren, 2003; Olsson *et al* 2004; Fraser *et al* 2005; Muller, 2006a; Wuppertal Institute, 2007).

To realise specific SD goals and objectives in a given community, local communities and other relevant stakeholders should be involved in policy formulation and implementation (Bossel, 1999; Dresner, 2002; Olsson *et al* 2004; Fraser *et al* 2006; Muller, 2006a). Muller (2006a) further suggested that networks of diverse stakeholders are crucial in addressing regional challenges. Sustainable development is therefore viewed as a *process* towards achieving sustainability, and therefore requires periodic assessment for deciding future actions and corrective measures for improvement (Clift, 2000 cited in Sikdar, 2003).

### 2.3. Assessing sustainable development

The widely accepted principles of assessing sustainable development known as Bellagio principles were developed in 1996 by a group of researchers and practitioners from five continents (Bossel, 1999). These principles sought to improve SD assessment by community groups, non-governmental organisations, corporations, national governments and international institutions. The Bellagio principles provide useful information on the key aspects that should be considered when choosing indicators, such as stakeholder and community participation. Continuous monitoring of the key issues identified in a given region should form the basis of identifying areas for improvement. The principles emphasise that any indicator project requires a common vision by the relevant stakeholders that will then guide the assessment criteria to be used as well as government support in developing policy frameworks to address interrelated problems including urban areas. The Bellagio principles provide a holistic approach of assessing sustainability of a complex system and therefore could provide a useful assessment of urban systems. The complexity of urban systems is discussed in detail in section 2.7. The Bellagio principles as presented by Bossel are presented in Table 1.

Table 1: The Bellagio principles.  
Source: IISD, 1997: 2-4

Guiding vision and goals	<ul style="list-style-type: none"> <li>◆ Be guided by a clear vision of sustainable development and goals that define that vision.</li> </ul>
Holistic perspective	<ul style="list-style-type: none"> <li>◆ include review of the whole system as well as its parts; consider the well-being of social, ecological and economic subsystems, their state as well as the direction and rate of change of the state, of their component parts, and the interaction between parts</li> <li>◆ consider both positive and negative consequences of human activity in a way that reflects the costs and benefits for human and ecological systems, both in monetary and non-monetary terms.</li> </ul>
Essential elements	<ul style="list-style-type: none"> <li>◆ consider equity and disparity within the current population and between present and future generations, dealing with such concerns as resource use, over consumption and poverty, human rights, and access to services, as appropriate;</li> <li>◆ consider the ecological conditions on which life depends;</li> <li>◆ consider economic development and other non-market activities that contribute to human and social well-being.</li> </ul>
Practical focus	<ul style="list-style-type: none"> <li>◆ adopt a time horizon long enough to capture both human and ecosystem time scales, thus responding to current short-term decision-making needs as well as those of future generations</li> <li>◆ define the space of study large enough to include not only local but also long distance impacts on people and ecosystems</li> <li>◆ build on historic and current conditions to anticipate future conditions: where we want to go, where we could go.</li> </ul>
Adequate scope	<ul style="list-style-type: none"> <li>◆ an explicit set of categories or an organising framework that links vision and goals to indicators and assessment criteria</li> <li>◆ a limited number of key issues for analysis</li> <li>◆ a limited number of indicators or indicator combinations to provide a clearer signal of progress</li> <li>◆ standardizing measurement wherever possible to permit comparison</li> </ul>

	comparing indicator values to targets, reference values, ranges, thresholds or direction of trends, as appropriate
Openness	<ul style="list-style-type: none"> <li>◆ make the methods and data that are used accessible to all; make explicit all judgments, assumptions and uncertainties in data and interpretations</li> </ul>
Effective communication	<ul style="list-style-type: none"> <li>◆ be designed to address the needs of the audience and set of users</li> <li>◆ draw from indicators and other tools that are stimulating and serve to engage decision-makers</li> <li>◆ aim, from the outset, for simplicity in structure and use of clear and plain language.</li> </ul>
Broad participation	<ul style="list-style-type: none"> <li>◆ obtain broad representation of key grassroots, professional, technical and social groups, including youth, women and indigenous people to ensure recognition of diverse and changing values</li> <li>◆ ensure the participation of decision-makers to secure a firm link to adopted policies and resulting action</li> </ul>
Ongoing assessment	<ul style="list-style-type: none"> <li>◆ develop a capacity for repeated measurement to determine trends</li> <li>◆ be iterative, adaptive and responsive to change and uncertainty because systems are complex and change frequently</li> <li>◆ adjust goals, frameworks and indicators as new insights are gained</li> <li>◆ promote development of collective learning and feedback to decision making</li> </ul>
Institutional capacity	<ul style="list-style-type: none"> <li>◆ clearly assigning responsibility and providing ongoing support in the decision-making process</li> <li>◆ providing institutional capacity for data collection, maintenance and documentation</li> <li>◆ supporting development of local assessment capacity.</li> </ul>

#### 2.4. Sustainable development indicators and indices

The word *indicator* has different meanings when used in social, ecological, environmental or institutional dimensions. According to Heink and Kowarik (2010) a globally accepted definition of indicator does not exist. Presently, various types of indicators including bioindicators, environmental indicators, ecological indicators and indicators of sustainability are used in different disciplines. The Oxford Advanced Learner's Dictionary (2000: 609) defined an indicator as "*a sign that shows you what something is like or how a situation is changing*". Indicators are also considered as quantitative or qualitative measurements of the state of something that is important or as simple measures that represent a state of economic, social and environmental development in a defined region (Bossel, 1999: 25). Various authors have defined indicators either as descriptive measures, hybrid measures, normative measures, parameter values, descriptive components or hybrid components. The definitions commonly refer to indicators as measurement and communication tools useful for decision making. A few examples of indicator definitions are presented in Table 2.

Table 2: Examples of indicator definitions

Source: Heink and Kowarik, 2010: 586

Definition	Nature of definition
“An indicator is a variable that describes the state of a system” (Walz, 2000: 613 cited in Heink & Kowarik, 2010)	Descriptive measure
“An indicator may be defined as a characteristic which, when measured repeatedly, demonstrates ecological trends, and a measure of current state or quality an area” (Ferris & Humphrey, 1999: 313 cited in Heink & Kowarik, 2010)	Hybrid measure
“Indicator: index or measurement endpoint to evaluate health of a system (economic, physical, biological, human)” (Burger, 2006: 27 cited in Heink & Kowarik, 2010)	Normative measure
“An indicator is an observed value representative of a phenomenon of study. In general, indicators quantify information by aggregating different and multiple data” (European Environment Agency, 2003: 5 cited in Heink & Kowarik, 2010).	Parameter value
“An indicator is an element, process, or property of the ecosystem that for some reason (logistical, budgetary, technological) cannot be measured in a more direct way” (Carignan & Villard, 2002: 46 cited in Heink & Kowarik, 2010).	Descriptive component
“To indicate is to make known with a high degree of certainty. In biology an indicator is an organism so intimately associated with particular environmental conditions that its presence indicates the existence of those conditions”(Patton, 1987: 33 cited in Heink & Kowarik, 2010).	Hybrid component

Presently there are a number of global initiatives for assessing SD and for informing policy decisions. Numerous and different types of sustainability indicators, frameworks and indices have been developed by international organisations such as the UN Commission on Sustainable Development (UNCSD), the World Bank, the Organization for Economic Cooperation and Development (OECD), the South Pacific Applied Geoscience Commission (SOPAC), the United Nations, the United Nations Educational Scientific and Cultural Organization (UNESCO) and the United Nations Development Programme (UNDP) (UNCSD, 1996; World Bank, 1996; Alberti, 1996; CWRT, 1998; UN, 2003; Weiland, 2007; UNDP, 2008; UN, 2010; Wuppertal, 2010; World Bank, 2010). Several indicator sets comprise of composite indicators (indices) including the environmental space and ecological footprint concepts, the City Development Index (CDI); the Environmental Vulnerability Index (EVI); and the Environmental Performance Index (EPI) (UNFPA, 2001; Wackernagel *et al* 2002; UN, 2002; Venetoulis & Talberth, 2005; Esty *et al* 2008; SOPAC, 2009; Yale Centre for Environmental Law & Policy, 2010). The environmental indices provide a measure of actual and potential impact on natural systems (humans, ecosystems, land, air and water) that result from anthropogenic activities such as human settlements, extraction of natural resources, and industrial manufacturing.

Ness *et al* (2007) developed a framework for sustainability assessment tools, in which they categorised various indicators and indices. These include non-integrated and integrated indicators and indices, product-related assessment tools for materials and energy flows and, assessment tools for policy change or project implementation. The indices proposed in their framework included the ecological footprint, Wellbeing Index and Human Development Index. Their framework is presented as Figure 1. Similarly, Singh *et al* (2009) provided an overview of several global assessment initiatives. These include development indices, market and economy-based indices, sustainability indices for cities, environmental indices for policies, nations and regions and environmental indices for industries.

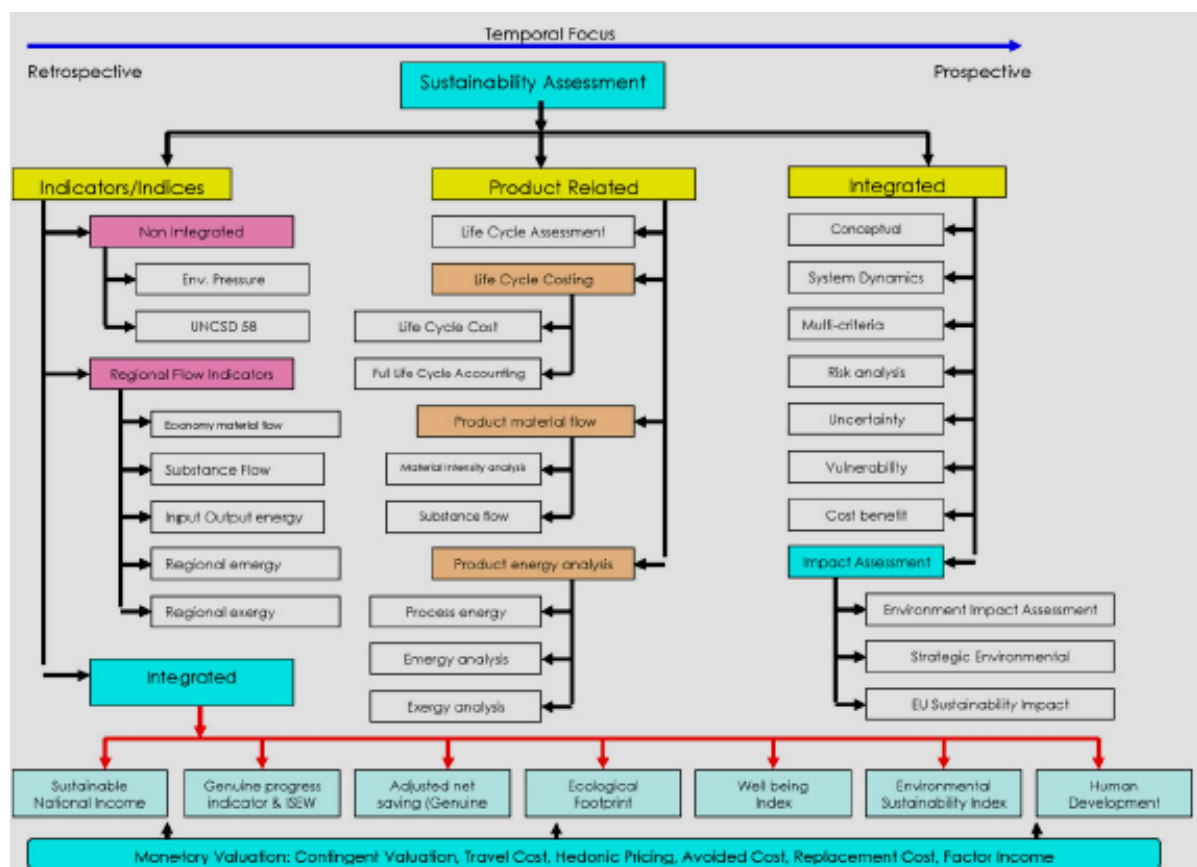


Figure 1: Framework for sustainability assessment tools

Source: Ness *et al* 2007: 500

Among the most effective tools of measuring the degree to which SD goals and objectives have been achieved is through the development of SDIs. The indicators are generally quantitative, qualitative, or both, and the number of indicators may range from ten to 134 depending on the case under question (UNCSD, 1996; CWRT, 1998; UN, 2009). However, numerous indicators may not be easy to interpret and analyse as they contain substantial information. Besides, it is also very expensive to



collect all the information needed to develop the indicators. As such, the development of indicators may be time consuming and therefore key indicators to be monitored should range from three to five and should be useful in providing information for decision making (Innes & Booher, 2000; Steinbuka & Wolff, 2007; UN, 2009; UN Habitat, 2009).

SDIs can be used to measure the ability of a system to change and to function over a long time span and to inform policy makers of the extent to which SD goals have been achieved. SDIs assist in undertaking transparent comparison on the performance of various policy alternatives, and facilitate in the identification of areas that may require improvement (UNCSD, 1996; CWRT, 1998; Bohringer & Jochem, 2007; Milman & Short, 2008; Eurostat, 2009). Indicators can also be tools useful for governments to inform policy in the prioritisation of resource allocations in order to meet short and long-term social, economic, environmental, and governance goals as well as identifying and addressing critical areas that merit intervention. SDIs can also enable governments to make sound decisions regarding regional SD priorities (UN, 2003; UNESCO-SCOPE, 2006). Indicators are either non-integrated or integrated as presented in the following sections.

#### 2.4.1 Non-integrated indicators

Ness *et al* (2007) described non-integrated indicators as indicators that are not combined in a single numerical value. Themes are chosen with specific indicators to monitor and report changes over time, depending on what dimensions of SD need to be monitored. Various sets of non-aggregated indicators as well as frameworks have been developed to aid in reporting on environmental, social and economic issues. These include social indicators developed by the World Bank, **OECD**, Eurostat and **UNCSD** to mention just a few (OECD, 2008 & 2010; Eurostat, 2009: 281; World Bank, 2010).

The **OECD** developed headline indicators for monitoring environmental progress, policy support and evaluation, as well as for communication to the public. These indicators focused on ten broad areas, namely climate change, ozone layer, air quality, waste generation, freshwater quality, freshwater resources, fish resources, energy resources and, biodiversity (OECD, 2008). The indicators monitor pressure on the environment caused by human activities and are used to report on the interrelationships of social, environmental and economic situations and how the society responds to these situations. The OECD further developed 31 indicators to measure social progress in population growth, self sufficiency, equity, health and social cohesion (OECD, 2010).

The social indicators developed by the **World Bank** are used for assessing human as well as social changes in 170 countries. Approximately 94 indicators are used to monitor changes in aspects including the population size, population growth, structure of population, labour force, education,

illiteracy levels, natural resources, income, poverty, expenditure on food, housing, fuel and power, transport, communications, and investment towards medical care and education (World Bank, 2010).

The indicators developed by **Eurostat** aimed at balancing important aspects of social, economic and environmental dimensions of SD (Steinbuka & Wolff, 2007; Eurostat, 2009). For example, programmes aimed at sustainable consumption and production, energy and conservation, as well as the management of natural resources could drastically reduce environmental pollution and improve social and environmental health in the long term. The Eurostat SDI themes included socio-economic development, climate change and energy, sustainable transport, sustainable consumption and production, natural resources, public health, social inclusion, demographic changes, global partnership, and good governance (Eurostat, 2009: 281).

The **UNCSD** published a list of 58 national indicators on socio-economic, environmental and institutional aspects of SD. These indicators were used to evaluate the progress by governments in implementing the priorities of the UNCED that were agreed upon at the 1992 Rio de Janeiro conference. The indicators included water quality, housing, education, health as well as indicators for ratified global agreements in the category of institutional category (UNCSD, 2001).

Similarly, the **EU** developed quality of life indicators that were widely used to measure social sustainability in 58 European cities (Kline, 2000; Craglia *et al* 2004). The indicators mainly reflected the socio-economic changes in community participation, education, environment, culture, and recreation (Kline, 2000; Craglia *et al* 2004).

The **UN** statistical division also developed indicators for tracking progress in various dimensions of sustainability (UN, 2010). These indicators include aspects such as: child bearing, child and elderly populations, contraceptive use, education, health, housing, human settlements, income and economic activity, literacy, population, unemployment, waste supply and sanitation.

Several authors posit that quality of life entails decent, safe and enjoyable places to live, work in and visit, and also involve a sense of belonging to a community. Housing affordability, health care, public safety, high levels of education, and community participation in government decisions are regarded as some of the indicators that can be used to measure the extent to which the quality of life of urban communities has improved (Kline, 2000; Troyer, 2002; Du Plessis & Landman, 2002).

A poor state of the environment prompts a society to address the prevailing pressures that impact negatively on human health and ecosystems. For example, governments globally have responded by implementing national and sectoral policies to suit their regional needs. As such, environmental

policies that integrate transport, air quality, and energy use challenges are considered as crucial because they impact on the quality of life of communities. A close relationship between land use, materials, transport and energy specifically in urban areas exists and therefore indicators should reflect on material inputs as well on outputs (Hille, 1997; Weiland, 2006; Niemeijer & De Groot, 2008).

In an effort to integrate social, economical, and ecological dimensions of sustainability, the **OECD** developed the pressure-state-response (PSR) framework to monitor the relationship between human activities and the environment. The framework was later expanded to one linking driving force-state-response (DSR) and also driving force-pressure-state-impact-response (DPSIR). The indicators include input, output, outcome and impact indices for monitoring various stages of project implementation (Hille, 1997; Bossel, 1999; Bell & Morse, 2001; DEAT, 2002; Du Plessis & Landman, 2002; Muller & Burns, 2007; Niemeijer & De Groot, 2008). The various types of indicators are presented in section 2.5.

The DPSIR framework was developed by the OECD to assess the causal linkages between socio-economic and environmental impacts. Driving forces represent human activities, processes, patterns and external influence that impact on SD such as urbanisation, population increase and industrial development. Driving forces impact *pressure* on the environment leading to change in the quality or quantity of natural resources. For example, air pollution caused by industrial activities deteriorates the air quality and impacts negatively on social and eco-systems. The *state* describes the current condition of social and biophysical environment while *impacts* describe the human health and environmental consequences, such as effects of poor water and air quality. Society *responds* through environmental, general or sectoral policies aimed at improving human and ecosystem health (Du Plessis & Landman, 2002; Singh *et al* 2009). The DPSIR framework is presented as Figure 2.

Du Plessis and Landman (2002) highlighted the interrelated factors that should be taken into consideration when planning for sustainable human settlements particularly in urban areas. For example, poor transport and land use planning and management in cities may result to congestion and environmental pollution, impacting negatively on human health and ecosystems. The government will then have to respond by increasing the budget for health care to provide treatment for pollution related diseases. The DPSIR framework has also been applied in SA for the national State of the Environment Reporting (SoER) and the Western Cape SoER (DEA & DP, 2005).

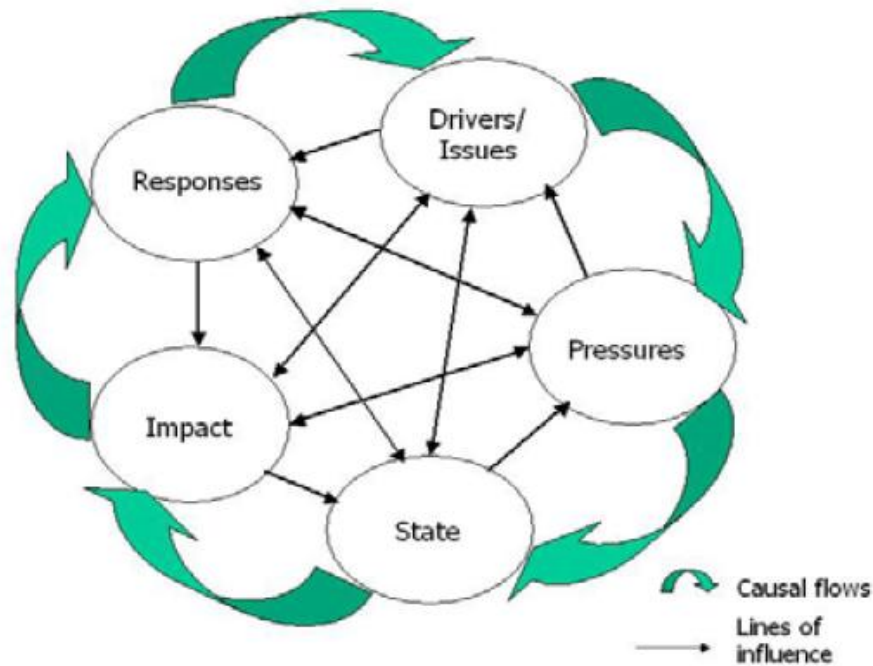


Figure 2: The DPSIR model

Source: Du Plessis and Landman, 2002: 25

## 2.4.2 Integrated indicators and indices

Integrated indicators combine different indicators into a single index and these include the dashboard of sustainability, market and economy based indices, social and quality of life-based indices, environmental indices and indices for cities. The indices are presented in the following sections.

### 2.4.2.1 Dashboard of sustainability

The Dashboard of Sustainability (DS) was developed in 1990 by a consultative group on sustainable development indices and the European Commission Joint Research Centre (UNESCO – SCOPE, 2006). A free software application to implement the DS can be downloaded from the internet (Dashboard, 2010). The DS simplifies the reporting of complex relationships between economic, social and environmental issues by presenting a single graphical and numerical evaluation. The DS presents performance using five colour codes, where dark green represents 1000 points and dark red represents 0 points and therefore provides a relatively easy and convenient way of communicating to policy decision makers (UNESCO – SCOPE, 2006; Scipioni *et al* 2009). Scipioni and others (2009) applied the DS to measure the sustainability of Padua Municipality in Italy and according to them, DS proved to be an effective tool in measuring urban local sustainability as several indicators could easily be analysed simultaneously and compared over the long term to assess SD progress.

The DS has been used to support implementation of the Local Agenda 21 (LA 21) and the MDGs (Scipioni *et al* 2009; European Commission, 2010). For example, the MDG dashboard displays the UN MDGs indicators in a user friendly format, with colour coded country profiles and maps. Between 1990 and 2008 the UN used the DS to assess progress towards SD in 200 countries (European Commission, 2010).

#### 2.4.2.2 *Market and economy-based indices*

Market and economy-based indices include the Gross Domestic Product (GDP), Internal Market Index, Business Climate Indicator, European Labour Market Performance, and the Genuine Savings Index. The GDP is used in countries to monitor “the total money value of the annual flow of goods and services produced in an economy” (Bossel, 1999: 12). It is one of the most widely economic indicators used by EU and international organisations to determine countries that are eligible for international monetary support and also provides a reflection of economic performance of governments. For example, countries with a low GDP usually receive loans or grants from international funding organisations.

The GDP is influenced largely by global market systems which also affect other national, regional and local subsystems (Eurostat, 2009). For example, the economic recession during 2000 and 2003 negatively affected the GDP per capita growth, investment, household saving and employment in several countries (Eurostat, 2009). Likewise, increase in the oil prices negatively impacts on transport and food prices across countries. GDP growth effectively determines levels of employment, tax revenues, and subsidies and influences economic wellbeing and the quality of life in terms of living conditions, health, consumption, education and investment (Wuppertal, 2010).

The Internal Market Index consists of 19 variables consisting of growth: in per-capita income, long-term unemployment, price dispersion, growth in intra-EU trade, prices of utilities services, availability of venture capital, energy intensity, and green-house gas emissions (European Commission, 2001b cited in Singh *et al* 2009). The Business Climate Indicator consists of five sub-indicators related to the production trends of order books, export order books, stocks and production expectations. Each indicator varies between -100 and +100 to show either deterioration or improvement in production processes (Singh *et al* 2009: 200).

The European Labour Market Performance is a composite index used to monitor labour market performance using basic performance indicators including unemployment rate, the long-term unemployment rate and the youth unemployment ratio (Storrie & Bjurek, 1999 cited in Singh *et al* 2009). The Economic Sentiment Indicator developed by the European Commission combines

business tendency surveys into a single composite indicator. The indicator consists of four components namely industrial confidence, construction confidence, consumer confidence and share price index (Nilsson, 2000 cited in Singh *et al* 2009).

#### 2.4.2.3 *Social and quality of life-based indices*

The Human Development Index (HDI) was developed by the United Nations Development Programme (UNDP) to evaluate social and economic progress in different countries (UNDP, 2008; Ness *et al* 2009). It consists of a combination of three dimensions, namely longevity, knowledge, and standard of living that are used to assess the performance of countries in different areas of human development. Longevity is measured by life expectancy at birth, knowledge is measured by a combination of the adult literacy rate and the combined primary, secondary, and tertiary gross enrolment ratio and standard of living is measured by GDP per capita. The earlier Physical Quality of Life Index (PQLI) was developed in 1976 to measure quality of life in developing countries. The PQLI comprises three indices namely life expectancy, infant mortality and adult literacy rate and the performance of individual countries is assessed on a scale of 1 to 100 (Morris, 1979 cited in Singh *et al* 2009).

The Gender Empowerment Measure (GEM) shows gender inequality in three key areas, namely participation and decision making, percentage of men and women appointed in key executive positions and income disparities between men and women (UNDP, 1996 cited in Singh *et al* 2009). The Wellbeing Index consists of the Human Wellbeing Index (HWI) and the Ecosystem Wellbeing Index (EWI) and is aggregated from over 60 different indicators for 180 countries. HWI includes population, health, wealth, education, culture, community and equity issues. EWI aggregates land, water and air, biodiversity and resource use indicators. The two indices are equally weighted and are combined into an illustrative tool called the *Barometer of Sustainability* (Prescott-Allen, 2001 cited in Ness *et al* 2007).

According to Colantonio (2007) indicators to measure progress in social sustainability should be based on the interlinkages of the social, institutional, economic and environmental systems as shown in Table 3. Several assessment methods have recently been designed to measure changes in the social dimension of SD (Colantonio, 2007: 28).

Table 3: Thematic areas of social sustainability  
Source: Colantonio, 2007: 8

<b>Dimension</b>	<b>Key theme area</b>
Social	<ul style="list-style-type: none"> <li>◆ Access to resources</li> <li>◆ Community needs</li> <li>◆ Conflicts mitigation</li> <li>◆ Education</li> <li>◆ Elderly and aging</li> <li>◆ Enabling knowledge management</li> <li>◆ Freedom</li> <li>◆ Gender equity</li> <li>◆ Happiness</li> <li>◆ Health</li> <li>◆ Identity of community pride</li> <li>◆ Image transformation and neighbourhood perceptions</li> <li>◆ Integration of newcomers and residents</li> <li>◆ Leadership</li> <li>◆ Justice and equality</li> <li>◆ Leisure and sport facilities</li> <li>◆ People with disabilities</li> <li>◆ Population change</li> <li>◆ Poverty eradication</li> <li>◆ Quality of life</li> <li>◆ Security and Crime</li> <li>◆ Skills development</li> <li>◆ Social diversity and multiculturalism</li> <li>◆ Well being</li> </ul>
Socio-institutional	<ul style="list-style-type: none"> <li>◆ Capacity building</li> <li>◆ Participation and empowerment</li> <li>◆ Trust, voluntary organizations and local networks</li> </ul>
Socio-economic	<ul style="list-style-type: none"> <li>◆ Economic security</li> <li>◆ Employment</li> <li>◆ Informal economy</li> <li>◆ Partnership and collaboration</li> </ul>
Socio-environmental	<ul style="list-style-type: none"> <li>◆ Inclusive design</li> <li>◆ Infrastructure</li> <li>◆ Environmental health</li> <li>◆ Housing</li> <li>◆ Transport</li> <li>◆ Spatial/environmental inequalities</li> </ul>

#### 2.4.2.4 *Environmental indices*

The environmental indices developed globally include the concepts of Environmental Space, Ecological Footprint, the Environmental Sustainability Index (ESI), the Environmental Performance Index (EPI), and the Environmental Vulnerability Index (EVI). The Environmental Space and Ecological Footprint concepts are widely used globally and locally to monitor environmental sustainability. The concept of Environmental Space emphasises that there are limits that can be exploited with regard to the physical environment, and as a result, available global resources should

be distributed fairly between the developed and the developing countries (Hille, 1997; Rocholl, 2001; Weiland, 2006). Environmental limits include stocks of renewable and non-renewable resources, as well as sinks. Sinks entail the ability of the environment to absorb wastes and pollution. Thus, the amount of space taken up as stocks and as sinks for absorbing solid waste and pollution produced is assessed. Several authors have noted that exceeding the limits of environmental space is partially responsible for the global environmental degradation and climate change (Hille, 1997; Rocholl, 2001; Maclaren, 2003).

The Ecological Footprint concept estimates the amount of space that an individual or a city uses in terms of use of productive land and water for the production of resources. The Ecological Footprint calculates and measures the impact of a specific population and affluence on the environment for specific regions. The calculated values show which regions have exceeded their consumption levels (Wackernagel & Rees, 1996; Wackernagel *et al* 2002; Venetoulis & Tasberth, 2005; Swilling, 2006).

The ESI developed by the Centre for International Earth Science Information Network in 2002 consists of 68 indicators in five different categories. These include the state of environmental systems (air, water, soil, ecosystems), reducing stresses on environmental systems, reducing human vulnerability to environmental change, social and institutional capacity to cope with environmental challenges and the ability to comply with international standards and agreements (Centre for International Earth Science Information Network, 2002).

In 2006, the Yale Center for Environmental Law and Policy, in consultation with area specialists, statisticians, policy makers in several countries in developing and developed countries, developed the EPI (Esty *et al* 2008). The EPI focuses on two overarching objectives; reducing environmental stresses to human health and promoting ecosystem vitality and sound natural resource management. The EPI was designed to help policymakers (Esty *et al* 2008: 13):

- ◆ Spot current problems and identify environmental issues;
- ◆ Track pollution control and natural management trends;
- ◆ Highlight where current policies are producing good results;
- ◆ Reveal where ineffective efforts can be halted and funding redeployed;
- ◆ Provide a baseline for cross-country and cross-sectoral performance comparisons; and
- ◆ Identify best practices and successful policy models.

Using 25 indicators, scores are calculated at three levels of aggregation. The first level aggregates data for six core policy categories; environmental health, air quality, water resources, biodiversity and habitat, productive natural resources and climate change. In the second level, data from the



environmental health subcategories and the ecosystem vitality categories is aggregated. In the third level, the overall EPI is calculated based on the arithmetic average of the environmental health scores and the ecosystem vitality scores and all variables are normalised in a scale from 0 to 100.

The EVI was developed by South Pacific Applied Geoscience Commission (SOPAC) and UNEP through consultation with countries and environmental management experts globally. The specific areas monitored are climate change, biodiversity, water, agriculture, fisheries, human health aspects, desertification and exposure to natural disasters. The index provides information on environmental issues that need addressing and enables stakeholders to identify ways of adapting to climate change and natural disasters (SOPAC, 2010).

#### 2.4.2.5 *Indices for cities*

Several indices that have been developed for cities include the City Development Index (CDI), the Sustainability Index for Taipei, the Urban Sustainability Index (USI), and the Compass Index of Sustainability.

The City Development Index (CDI) was developed in 1997 by the United Nations Centre for Human Settlements (Habitat) consisted of five sub-indices namely city product, infrastructure, health, waste and, education. Data for the CDI was sourced from 164 cities from developing as well as developed countries. The infrastructure sub index builds on four indicators that are equally weighted as; percentages of households which are connected to clean water, electricity and telephone networks. The waste sub index consists of the percentage of untreated sewage in total wastewater and, the percentage of solid waste disposed (United Nations, 2002).

The Sustainability Index for the City of Taipei in Taiwan was developed to assess the City's SD patterns between 1994 and 2004 (Lee & Huang, 2007; Singh *et al* 2009). The Sustainability Index comprised of 51 sustainability indicators covering social, economic, environmental and institutional dimensions. Indicator values were standardised between 0 and 1 values and assigned equal weights aggregated into a single value.

The Urban Sustainability Index (USI) developed for urban China was based on 22 indicators chosen from a sustainability indicator database of 387 indicators. The overall urban sustainability score was based on three components of urban sustainability namely urban development capacity, urban coordination capacity and urban development potential. The USI score is the weighted sum of the three components and varies from 0 to 1 (Zhang, 2002 cited in Singh *et al* 2009).

The Compass Index of Sustainability was developed for Orlando in Florida. Indicators in four categories namely nature, economy, society and, well being were used. The indicators corresponded to four points on a compass equally weighted and scaled with values ranging from 0 to 100 (Atkinson *et al* 1997 cited in Singh *et al* 2009).

## 2.5 Types of indicators

Different types of indicators are globally used for communication to stakeholders as well as for policy decisions. These include performance monitoring indicators developed by the World Bank to measure the extent to which an institution or organisation has performed towards agreed target World Bank, 1996). Performance indicators provide information to aid in clarifying the relationships between impacts, outcomes, outputs and inputs and assist in identifying problems encountered during project implementation (World Bank, 1996; Hille, 1997). Other indicators are used to measure urban sustainability and management of complex urban systems.

### 2.5.1 Performance indicators

Performance indicators are used to measure ‘response’ by government to an environmental driver, pressure, state or impact (Hille, 1997; Bossel, 1999; Bell & Morse, 2001; DEAT, 2002; Du Plessis & Landman, 2002; Muller & Burns, 2007; Niemeijer & De Groot, 2008). The different performance monitoring indicators developed by the World Bank are the following (World Bank, 1996: 11-16):

- ◆ Results indicators – measure project results in relation to project objectives.
- ◆ Input indicators – measure the quantity or quality of resources allocated to particular project activities. Examples of resources are funding, human resources, training and equipment.
- ◆ Output indicators – measure the quantity or the quality of goods or services created or provided through the use of inputs. For example, for energy efficiency project output indicators could be the percentage of people using public transport.
- ◆ Outcome and impact indicators – measure the quantity and quality of the results achieved through the provision of project goods and services such as reduced energy use and transport costs resulting from improved public transport or, the number of youths employed in sustainable jobs resulting from training programmes.
- ◆ Relevance indicators – to assess policy development and outcome of projects. For example, a policy supporting small scale industries can result to improved economic growth and consumer well-being.
- ◆ Risk indicators – measure the status of projects through risk and sensitivity analyses. These indicators are used as part of a project’s economic analysis such as the impact of inflation or, workers strike action on a particular system.

- ◆ Efficacy indicators – show how well the results at one level of project implementation have been translated into results at the next level of project implementation. For example, the efficiency of inputs translating into the effectiveness of project outputs and consequently, sustainability of a given project.
- ◆ Efficiency indicators – represent the ratio of inputs needed per unit of output produced. Examples of efficiency indicators are accountability indicators for measuring the extent to which resources are available and the extent to which they are used to meet present targets.
- ◆ Effectiveness indicators – represent the ratio of outputs per unit of project outcomes or impact, or the degree to which outputs affect outcomes and impacts. Such indicators could be the miles of road built per unit increase in vehicle usage or, new road usage per unit decrease in traffic congestion.
- ◆ Sustainability indicators – represent the persistence of project benefits over time, particularly after project funding ends. For example, continuous maintenance of trains and railway lines after completion of a public transport project.
- ◆ Direct measures – correspond precisely to results at any performance level such as number of organisations using solar energy.
- ◆ Indirect measures – used when direct measures are too difficult, inconvenient or costly to be used. Indirect measures are based on a known relationship between the performance variable and the measure chosen to express it for example, using declining crime statistics as an indirect measure of improved security.
- ◆ Intermediate indicators and leading indicators – intermediate indicators measure intermediate results or intervening steps toward project objectives as well as the linkages in causal chains. Leading indicators are used to measure the impact of project implementation.
- ◆ Quantitative indicators – are easily quantified and can be measured by defined numerical values. These are applicable to impact, outcomes, outputs and inputs during project implementation.
- ◆ Qualitative indicators – are used when detailed information regarding attitudes of beneficiaries is required. For example, information obtained from survey techniques or group interviews can be used as a measure of effectiveness.

According to Cloete (2003 & 2005) assessing policy performance and targets is critical in order to determine whether policy processes and products are aligned to policy objectives as outlined in the policy. Cloete (2005) proposed indicators applicable to policy performance as shown in Table 4.

Table 4: Indicators for measuring policy performance  
Source: Cloete, 2005: 26

Input indicators	<ul style="list-style-type: none"> <li>◆ Policy design and content</li> <li>◆ Financial resources for /project</li> <li>◆ Human resources skills for project</li> <li>◆ Support for programme</li> <li>◆ Other required resources</li> </ul>
Resource conversion indicators	<ul style="list-style-type: none"> <li>◆ Process efficiency</li> <li>◆ Process effectiveness</li> <li>◆ Process productivity</li> <li>◆ People-centred, participatory and responsive processes</li> <li>◆ Process equity, fairness, representivity</li> <li>◆ Process transparency</li> <li>◆ Accountability</li> <li>◆ Democratic nature of processes</li> <li>◆ Project management</li> <li>◆ Process flexibility</li> <li>◆ Co-ordination, integration and holism of services</li> <li>◆ Professionalism and ethical nature of processes</li> <li>◆ Creativity, competitiveness and entrepreneurship</li> <li>◆ Networking</li> </ul>
Output indicators	<ul style="list-style-type: none"> <li>◆ Results/outputs achieved</li> </ul>
Outcome indicators	<ul style="list-style-type: none"> <li>◆ Achievement of national vision</li> <li>◆ Affordability of outcome</li> <li>◆ Equity, fairness, representivity of outcome</li> <li>◆ Development and growth focus of outcome</li> <li>◆ Contribution to stability of outcome</li> <li>◆ Democratic nature of outcome</li> <li>◆ Empowerment of citizens as outcome</li> <li>◆ Citizen satisfaction</li> <li>◆ Policy learning and review</li> <li>◆ Project sustainability in the short, medium and long term(socio-economic managerial, technical, environmental)</li> </ul>

### 2.5.2 Indicators for measuring urban sustainability

Walle *et al* (2004: 181) proposed the following indicators for measuring urban sustainability:

- ◆ Integration indicators used to measure significant overlaps between policy domains;
- ◆ Sectoral indicators to measure various components of the urban system;
- ◆ Policy process indicators to measure how well sectoral departments are collaborating in urban planning;
- ◆ Environmental indicators to measure an element of the urban system;
- ◆ Project indicators to measure the performance of a specific project; and
- ◆ Strategic indicators to measure the overall urban performance.

### 2.5.3 Indicators for managing complex urban systems

Innes and Booher (2000) identified three tiers of indicators for managing complex urban systems:

- ◆ System performance indicators – to reflect how the system is working;
- ◆ Policy and program indicators – to review outcomes of policies and the state of particular subsystems; and
- ◆ Rapid feedback indicators – to assist individuals, agencies and businesses in making sustainability-related decisions.

## 2.6 Process of choosing indicators

The New Economics Foundation proposed guidelines for use in the process of choosing indicators (New Economics Foundation, 1996 cited in IISD, 1997). The guidelines have been used globally in many indicator projects and have resulted in the successful selection of indicators and implementation programmes in the regions that have used them (IISD, 1997). A good example is the City of Seattle indicator project discussed in detail in section 3.2.1.1. The proposed guidelines for choosing indicators involve the following steps:

- ◆ Raising awareness about sustainable development and the need for an indicator project – A public forum with a shared vision and consensus is crucial and should include key representatives from the national and regional government, regional planners, businesses, NGOs, local communities, general public and local communities (including the youth, women and people with disabilities). An indicator project requires planning for activities such as targets for collecting data, sharing information with stakeholders, how available resources will be utilised, and what steps will be followed in implementing SD projects.
- ◆ Deciding issues – The issues and challenges that need addressing, and for which monitoring is required should be decided through active participation of a broad range of stakeholders. After issues are identified, the community then needs to agree on priority issues to be addressed as well as methods to be used for obtaining required information. Such methods could be through interviews, questionnaires or workshops.
- ◆ Gathering data – Information can be obtained from existing sources such as published reports and official data sources. Where data is not available, opinion surveys can be used to obtain valuable information directly from community residents.
- ◆ Communicating indicators – Communicating indicators involves the presentation of data in a form that can be understood by targeted groups, such as the community, civil society, policy makers and the public. Therefore, an appropriate media for communication should be chosen. For example, the local radio and CBO forums are convenient for communication with local residents while the internet and public forums could be suitable for communicating to the general public.

- ◆ Feedback from stakeholders – Appropriate methods of evaluating indicators need to be developed for example, comments from stakeholders are useful in refining indicators and developing a set of indicators, which is then evaluated by experts in respective disciplines.

The New Economics Foundation (2003) recommended that local partnerships should be encouraged to develop indicators and monitor their effectiveness in accordance to the specific needs of the community. Furthermore, a shared vision, participation and improved communication between stakeholders is crucial in developing appropriate policies that will integrate overall sustainable development planning and implementation programmes (Innes & Booher, 2000; New Economics Foundation, 2003; Runhaar *et al* 2006; Niemeijer & De Groot, 2008).

Development planning is seen as a collaborative exercise that allows the participation of various stakeholders with an objective of examining socio-economic and environmental costs and benefits of an intended programme, in order to determine the most appropriate option and to plan a suitable course of action (Business Dictionary, 2011). Further, Section 2(15) of the Western Cape Planning and Development Act No. 7 of 1999 defined *development planning* as a strategic and participatory process to integrate economic, spatial, social, infrastructural, housing, institutional, fiscal, land reform, transport, environmental, water and other strategies or sectoral plans with the aim of equitable allocation of scarce resources.

To avoid oversight in critical areas of SD (for example, focusing more on environmental issues and less on social and economic aspects), Bossel (1999) stressed that experts in relevant disciplines should be involved only in technical review of the indicator set. Their role would then be to provide advice on completeness of the indicator set, based on its viability, measurability and policy relevance. He further noted that the best knowledge of systems and its problems such as the systems' long-term perspective is provided by the people interacting with the system constantly. These include citizens, unemployed people, residents, small business owners, social workers and commuters. According to Bossel (1999) stakeholders could be involved in several activities such as data collection and analysis as well as socio-economic and environmental projections and therefore it is important to clarify the roles of individual experts and the broader involvement of stakeholders.

According to Alberti (1996) effective monitoring of urban sustainability should provide planners with the relevant information for designing sustainable land-use plans, effective transport systems, and open spaces for liveable cities. Further, the cost of developing indicators as well as institutional capacity for policy development and implementation need to be taken into account (Milman & Short, 2008). Alberti (1996) stressed the need for expert and policy makers to set targets and criteria for evaluating indicators, identifying data needs and specific mechanisms for their systematic collection,

monitoring, policy development and linkages among urban policy areas. The key characteristics of successful indicators in most urban indicator programmes suggested by Alberti (1996) are the following:

- ◆ Policy relevance – an indicator should focus on the crucial needs of a community in a specific region. Indicators should be policy oriented and inform policy development, implementation, and evaluation of the outcomes;
- ◆ Scientifically founded – indicators should be theoretically well-founded technically and scientifically and their validity should be aligned with both international standards and also linked to economic models, forecasting, and information systems;
- ◆ Readily implementable – indicators should be aligned to the policy and, implemented to meet the strategic objectives defined in the policy; and
- ◆ Usable for decision making – indicators should prompt the stakeholders to take a positive action towards achieving sustainability.

Singh *et al* (2009) further highlighted that the classification and evaluation of indicators need to be based on the following general dimensions of measurement:

- ◆ The aspect of sustainability that the indicator will measure;
- ◆ The techniques/methods employed for construction of indices;
- ◆ Whether the indicator compares the sustainability measure across space or time and also in absolute or relative manner;
- ◆ Whether the indicator measures sustainability in terms of input or outputs;
- ◆ Clarity and simplicity in its content, purpose, method, comparative application and focus;
- ◆ Data availability for the various indicators across time and space and;
- ◆ Flexibility in the indicator for allowing change, purpose, method and comparative application.

## 2.7 Overview of cities as complex systems

A complex system consists of interactions between different elements of the whole system and the overall interaction between the system and its environment (Cilliers, 2000). The subsystems are self-organised and the whole system evolves over a period of time. The evolution of the system may be interrupted by unexpected events and uncertainties (O'Sullivan *et al* 2006; Ness *et al* 2007). Ness *et al* (2007) described two types of uncertainties: stochastic uncertainty and fundamental uncertainty. Stochastic uncertainty arises from the natural variability of the system and fundamental uncertainty is the inability to predict due to limited knowledge about the system. Consequently, uncertainty and risk analyses tools have been developed to help predict the probability of events and potential damages. These analysis tools are useful for management and reduction of the risks.

Cilliers (2000) described a complex system as a system consisting of several elements that are dynamic and also exchange energy and information with their environment. Cilliers (2000) noted that knowledge of complex systems is limited however, the available knowledge is useful in providing vital information in trying to understand the complexity and possible corrective interventions. A complex system constantly behaves in complex ways, with complex behaviours emerging when the system is constrained. Thus, to fully understand a complex system, the overall system needs to be evaluated rather than evaluating parts of the system. Cilliers (2000) described complex systems as non-linear consisting of the following features:

- ◆ A large number of elements that in themselves can be simple;
- ◆ Elements within a system interact dynamically by exchanging energy and information, and the interactions are propagated through the system;
- ◆ There are many direct and indirect feedback loops forming open systems that exchange energy and information with their environment;
- ◆ Complex systems have a memory, not located at a specific place but distributed throughout the system;
- ◆ Any complex system has a history that influences the behaviour of the system; and
- ◆ The behaviour of a system is determined by the nature of the interactions and not by what is contained within the components.

The dynamic systems including ecosystems, cities, and countries have many feedbacks and nonlinear relationships among their components. These interactions and feedbacks can result in rapid changes into new conditions when systems are interrupted. The sustainability of systems is therefore determined by their resilience to disturbances, their desirability to human societies, as well as their temporal and spatial scale boundaries. Resilience and desirability can be used in the development of appropriate policies, and the scale can be used to determine how the sustainability of the system should be monitored. A system's survival is determined by constant feedbacks between its components. However, when a system moves into a new regime, new feedbacks will form to maintain the system in the new regime. Human activities can increase the sustainability of one system but can also cause degradation of other systems. For example, new mining activities provide job opportunities; however, excessive mining in a particular region degrades the surrounding environmental system (Olsson *et al* 2004; Mayer, 2008).

Nooteboom (2007) noted that for a system to survive in the larger dynamic environment, it must keep its *wholeness* as well as its *partness* of the larger system in which it depends on for survival and from which it competes with other systems for resources. A system may change when under a certain form of stress. Stress may be caused by disagreements between different actors for example, intergovernmental disagreements relating to the development and implementation of policies. A



system's improvement and sustainability requires participative planning and transparency between different stakeholders in order to create networks of learning and implementing the knowledge that is acquired through various interactions (Nooteboom, 2007).

Studies on complexity theory have highlighted that cities are complex systems that are continuously evolving and re-generating (Cilliers, 2000; Innes & Booher, 2000; Gallopin, 2003; Uprichard & Byrne, 2005; O'Sullivan *et al* 2006; Nooteboom, 2007; Sanjaykumar, 2008; Fengli *et al* 2009). Fengli *et al* (2009) observed that cities are complex systems constantly affected by socio- economic and environmental factors and agreed with Alberti (1996) that cities are also affected by a wider global system, for example, global environmental pollution, economic growth, markets and rapid urbanisation.

A city is made up of people who depend on the natural environment and economic systems as life support systems – and the underlying institutional system plays a major role in determining the quality of life of city residents (Troyer, 2002). Its population can be categorised into groups as well as the activities carried out within it that are closely interrelated among people and the environment within which they operate (Innes & Booher, 2000; Craglia *et al* 2004).

Innes and Booher (2000) added that the overall sustainability of a city is determined by individual actions in the context of the larger society, the natural environment, and the global economy. The actions are influenced by shared knowledge which is used to improve the overall city performance. As centres of knowledge, cities influence, and are influenced by other cities. The dynamic social and economic developments in urban areas result to increased population and stress on the available resources thus increasing material flows from regions beyond the urban area (Moriguchi, 2007; Li *et al* 2009). Sustainability of a city depends on continued support by the national government, citizen participation, integrated urban planning, consistent policies and implementation plans coupled with ongoing monitoring and evaluation framework (IISD, 1997; Cloete *et al* 2003; Lundqvist, 2007; UN-Habitat, 2009).

Bossel (1999: 17) defined a system as a component of five subsystems comprising:

- ◆ Individual development (civil liberties, human rights, equity, health, social integration, participation, and family);
- ◆ Social system (population size and growth, social structure, ethnic composition, cultural diversity, income distribution, employment, social problems, and social security);
- ◆ Institutional subsystem (government and administration, public finances and taxes, political participation, conflict resolution, policy development, community administration, citizen participation, and NGOs);

- ◆ Infrastructure (settlement and cities, transportation, distribution, supply system, waste disposal, health and education services, research and development);
- ◆ Economic system (production, consumption, money, market, international trade, labour and employment, commerce and trade, income); and
- ◆ Resources and environment (natural environment, natural resources, and renewable resources).

According to Button (2002) city systems encompass market, political, administrative, legal and social systems. Sanjaykumar (2008) viewed the city system as a web of interactions between the physical and built environment, economic, infrastructure, institutions, and social systems. Therefore, according to him, a city system comprises the following features:

- ◆ Physical environment – which is the physical location of a city;
- ◆ Institutions – government departments, schools, hospitals, parastatals, universities, private companies and NGOs;
- ◆ Infrastructure – roads, railways, buildings, parks, harbours and bridges;
- ◆ Environment – water, soil, natural reserves, air, food and energy;
- ◆ Economic – stock and money markets, employment, and prices;
- ◆ Social subsystem – the city residents, tourists, employees, businessmen or commuters.

In terms of complexity thinking, a subsystem cannot be addressed in isolation as this could lead to unintended consequences in other sectors. Small changes in one subsystem can have large impacts on other systems and may consequently disrupt the whole system. For example, an economic recession may force companies to retrench some of their employees, resulting in increased unemployment, social unrest, destruction of infrastructure, and consequently disruption of the whole urban system. Similarly, an increase in the price of oil may lead to rise in transportation costs, increase in food prices which will then impact negatively on the poor.

For a city to maintain its vibrancy it needs to continue functioning while responding to pressures, problems, and opportunities experienced in the context of its dynamic processes (Ravetz, 2000). In this respect, a system can either be classified as simple or complex (Rosen, 1987 cited in Uprichard & Byrne, 2006: 665). Rosen (1987) further argued that *“a simple system is an autonomous system that is independent from other systems whereas a complex system has several intertwined subsystems within the larger system”*. Based on this, a city could be described as a complex system because the social, institutional, administrative, ecological, and economic subsystems are strongly interrelated (Ravetz, 2000; Rosen, 1987, cited in Uprichard & Byrne, 2006). Button (2002) noted that cities are complex and dynamic systems through which national economies evolve and observed that one of the challenges for urban authorities is to develop policies that will address the interactions between evolving subsystems.

Published literature has explicitly explored the complexity of cities – and defines the city’s subsystems as consisting of infrastructure, services, trade, transport, communication, people and ecosystems coupled with socio-economic and environmental problems (Alberti, 1996; Innes & Booher, 2000; Sandstrom, 2002; Atash, 2007; Fengli *et al* 2009). Button (2002) noted that urban systems are influenced by dynamic interactive forces such as the market, administrative, political, legal and social aspects which usually provide feedback used in policy decisions. Nooteboom (2007) shared the same view that a city consists of market systems, social systems and ecosystems where social systems survive on the other subsystems. For example, people depend on water for domestic use and agricultural use and when there is lack of water or pollution of available water sources in a community there could be negative impacts on humans, animals and ecological health.

Button (2002) added that the nature of these interactions has an influence on policy responses for the stress and impact of human activities within a region. A few examples of these activities relate to land use, travel patterns, institutional governance, and the overall city planning. Effective policy formulation in a complex system requires that the interrelated issues of ecological and socio-economic dimensions are clearly defined and addressed, and also that the governance mechanism is clarified (Runhaar *et al* 2006).

According to Cloete *et al* (2003) adaptation to unexpected events like changes in institutional governance, global or national economic recession, and the negative impacts of global warming should be considered when defining a sustainable city. Adapting to these events may not be feasible in developing countries due to financial and resource constraints, and similarly the CCT may also be constrained with regard to adaptation (DEA & DP, 2005; City of Cape Town, 2006d & 2008a).

Interactions within a complex system are rich and dynamic and the relationships within subsystem are crucial for the wellbeing of the whole system. Cities are viewed as open systems that exchange information with other organisations and the wider global system. Thus, cities cannot operate independently (Manson & O’Sullivan, 2006).

Cities are dynamic as they drive industrialization, economic growth, social change and it is through this dynamism that cities face major challenges of urban sprawl and growth of slums (Sanjaykumar, 2008). Certain characteristics will emerge in the system which the system should be prepared to address. For instance, a city may experience an unpredictable economic recession, an increase in oil prices as well as chaos associated with the emergence of such challenges like job losses and increases in commodity prices.

According to WACOSS (2002) urban systems consist of social, environmental, and economic systems – and the social system constantly interacts with the economic subsystem for exchange of goods and services as well as the environmental systems for basic provisions of water, air, and energy among other interrelationships as illustrated in Figure 3.

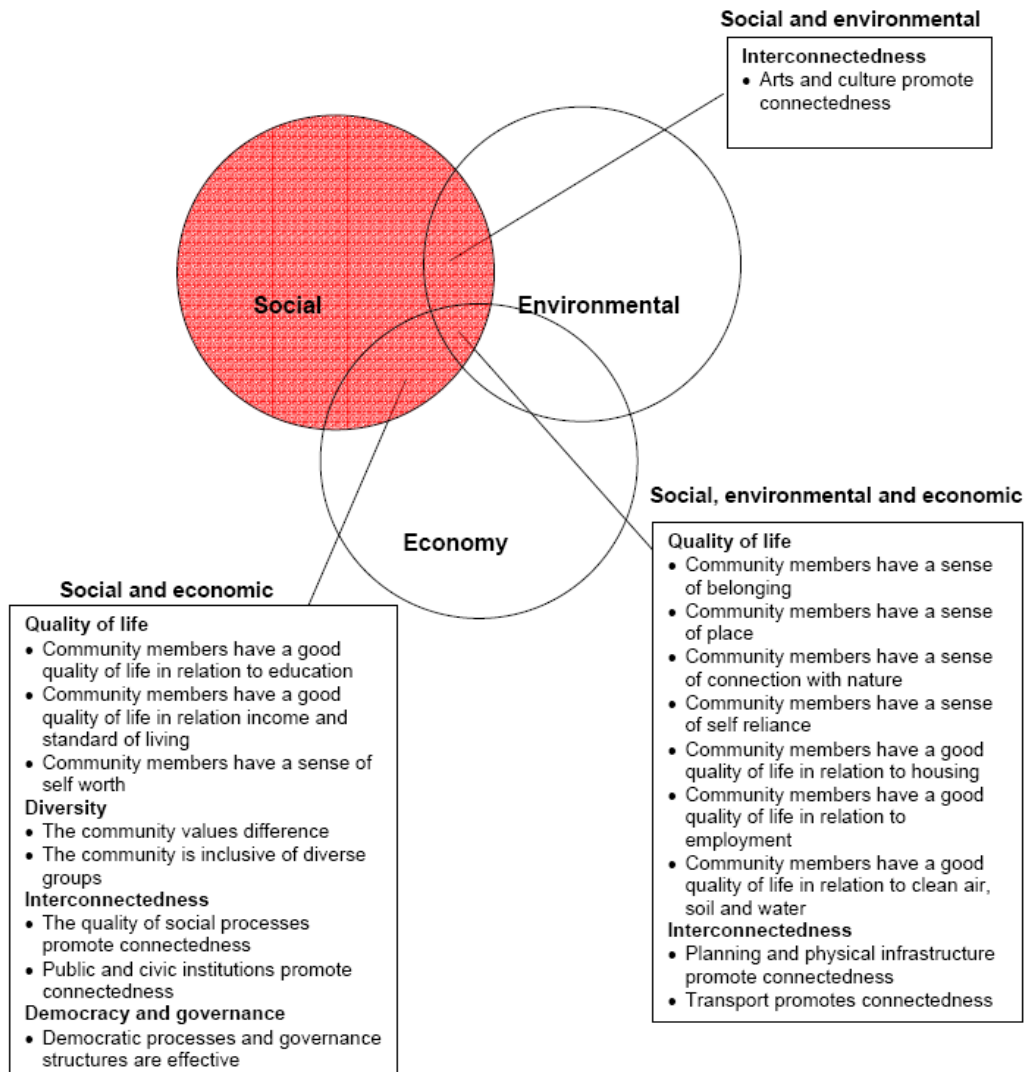


Figure 3: Overlap between social, environmental, and economic subsystems.

Source: WACOSS, 2002: 14

## 2.8 Indicators for complex systems

Integrated assessment tools that combine nature and society have been developed to support decisions related to development of policies and implementation of projects in urban regions. The assessment tools include Multi-Criteria Analysis and Risk Analysis. Multi-Criteria Analysis (MCA) is used for assessments in situations where a policy needs to be identified for addressing complex issues and

Risk Analysis is the assessment of potential damages and losses occurring as a result of risks and threats. For example, the EU developed a Sustainability Impact Assessment (SIA) to provide an integrated assessment covering environmental, economic and social dimensions useful in assessing policy impacts (Ness *et al* 2007).

Indicators of complex systems should be based on the interrelationships between the system and its components and should provide valuable information on the viability of a system and its rate of change. Bossel (1999: 24) defined a viable system as “*a system that is able to survive, be healthy, and develop in its particular system environment*” and the viability of a system depends on the interactions with other systems as well as the viability of several subsystems.

A systems approach is required in choosing indicators for urban systems and involves analysing the total system and its components so as to identify the key issues to be addressed and the most appropriate indicators. Indicators of viability and sustainability of urban systems are crucial in providing information on the state of the urban system as well as its interaction with the surrounding environment (Bossel, 1999). Sustainability is a dynamic process that incorporates social, ecological, technological and institutional governance aspects. Therefore, changes in any of these aspects will affect the society and the city’s surrounding environment, both locally and globally (Gallopini, 2003; Fengli, 2009; Scipioni *et al* 2009).

The selected indicators should describe performance of sub-systems as well as their contribution to other systems. According to Bossel (1999: 25) indicators of a complex system should include basic orientors, namely “*labels for certain categories of concern or interests in different subsystems (existence, effectiveness, freedom of action, security, adaptability, co-existence and psychological needs)*”. Further, the indicators should be comprehensive and a small number to monitor the key priority issues identified by the relevant stakeholders. Guidelines proposed by Bossel (1999) were used to identify indicators for assessing the sustainability of the City of Seattle. The indicator framework suggested by Bossel (1999) is shown in Table 5.

Urban sustainability indicators have been identified as crucial tools to ensure that urban areas become sustainable due to the numerous and evolving functions in cities. Bossel (1999) suggested that indicator sets of a given system should provide information about the current state and corresponding viability of that system as well as the system’s contribution and effect to the performance of other systems. Such information includes correcting a system’s behaviour with a view of advancing its viability.

Several communities have initiated indicator programmes to aid in designing and implementing SD (Alberti, 1996). The existing literature shows that there are no universally agreed international standards to measure sustainability, for instance that of a city (UNCSD, 1996; CWRT, 1998; Gagliardi *et al* 2006) and as a consequence, developing meaningful evaluation tools for urban sustainability remains a challenging task (UNCSD, 1996; CWRT 1998; Gagliardi *et al* 2006). Presently, a comprehensive theory on sustainability indicators to guide urban development is lacking due to the complexity aspects of sustainability (Weiland, 2006; UN Habitat, 2009). Recent studies are mainly focussed on SD at the national or large regional scales, and hence, they are difficult to apply in measuring the sustainability of a given city (Bossel, 1999; Bond *et al* 2001; UNDESA, 2001; Vevela & Ellenbecker, 2001; Vevela *et al* 2001; Lopez-Ridaura, *et al* 2002; Rochi *et al* 2002; EU, 2009). Furthermore, Walle *et al* (2004) observed that integration indicators to measure the interrelationship between land use and transport in cities are not widely used. This could be attributed to the fact that cities are complex systems, and are continuously evolving in multi-dimensional aspects like land use, travel patterns, resources utilisation as well as competing policy and societal interests.

Weiland (2006) agreed that sustainability indicators are essential instruments for understanding and communicating urban development, especially to promote stakeholder participation and empowerment. In addition, indicators ought to be incorporated into management cycle and projects coupled with occasional sustainability assessment.

One of the main drivers of human induced change in urban systems is the increased use of materials and energy in social-economic systems as well as the corresponding wastes (Krausmann *et al* 2009). Material flows of energy, food, water, and construction materials not only form part of daily consumption but also contribute to enormous waste sinks in cities. Moriguchi (2007) proposed that a city needs to develop input indicators to measure direct material inputs to aid in reducing consumption and waste generation and eventually protect the environment from further degradation.

Life Cycle Assessment (LCA) is among the assessment tools used to evaluate the environmental impacts of a product or a service throughout its life cycle. It analyses real and potential pressure that a product has on the environment; from acquisition of raw materials, the production process, use of developed products, and disposal of the products (Lindfors, 1995 cited in Ness *et al* 2007). Similarly, Material Flow Analysis (MFA) is also used to assess resource flows and also in identification of inefficiencies within a system. Within MFA, particular inputs such as the amount of energy flowing into a system as well as the amount of energy used in manufacturing of a product or service can be analysed (Ness *et al* 2007).

Table 5: Guidelines for identifying ‘indicators of viability’

Source: Bossel, 1999: 59

basic orientor	viability of affecting system	contribution to affected system
existence	Is the system compatible with and can it exist in its particular environment?	Does the system contribute its part to the existence of the affected system?
effectiveness	Is it effective and efficient?	Does it contribute to the efficient and effective operation of the total system?
freedom of action	Does it have the necessary freedom to respond and react as needed?	Does it contribute to the freedom of action of the total system?
security	Is it secure, safe and stable?	Does it contribute to the security, safety and stability of the total system?
adaptability	Can it adapt to new challenges?	Does it contribute to the flexibility and adaptability of the total system?
coexistence	Is it compatible with interacting subsystems?	Does it contribute to the compatibility of the total system with its partner systems?
psychological needs*	Is it compatible with psychological needs and culture?	Does it contribute to the psychological well-being of people?

\* *only for systems with sentient beings*

Further, Moriguchi (2007) suggested that integrated indicators are crucial in linking upstream resource input and waste generation. Runhaar *et al* (2006) observed that urban policy should be well coordinated by several stakeholders that play a role in city development both in funding and decision making so as to address resource scarcity and environmental degradation. Button (2002) and Walle *et al* (2004) emphasised that urban indicators should be relatively few – and should address the overlapping crucial issues in a particular region for example transportation, waste management, human settlements, land use, and energy as these are some of the key areas that need redress in cities. Button (2002) added that effective management of urban systems requires urban indicators to reflect the key causal linkages in the context of global sustainability such as indicators integrating sanitation, water quality, and health.

The SDIs recently proposed by the South Africa Cities Network (SACN) appear to be comprehensive as they target key areas that determine urban sustainability such as land use and planning, transport,

energy and human settlements (SACN, 2009: 58). The energy indicators are useful as they assess the energy flows and uses in various urban sectors for instance, indicators on transport energy consumption and industrial energy consumption per annum were proposed. However, these indicators do not seem to be aligned to specific policies or linked to specific indicator themes. Further, indicators on overall urban performance and indicators on performance of specific projects seem to be lacking. A full list of the indicators as developed by the SACN is included as Appendix B.

Alberti (1996) suggested that key urban indicators should be linked to global indicators consisting of: resource indicators sink indicators, ecological support system indicators, and, human impact and welfare indicators. Urban indicators should address the core problems facing the community rather than addressing symptoms (Kline, 2001 cited in Holden, 2007). For example, monitoring air emissions should be coupled with addressing traffic congestion which partly is the contributor to poor air quality. As urban regions experience various interrelated problems, urban indicators should be integrated to address regional urban problems, and also measure outcomes, changes in process, and policy (Kline, 2001 cited in Holden, 2007).

Furthermore, indicators should be based on a particular community's own priorities to address issues related to equity in resource distribution, infrastructure maintenance and replacement, and reuse of resources. Urban indicators should also focus on both positive and negative changes. For example, indicators monitoring the level of unemployment as well as indicators monitoring improvement in employment patterns in urban regions should be considered. Innes and Booher (2000) noted that appropriate indicator development needs both expert knowledge and community participation. In particular, through a process of debating the design of indicators may shape the stakeholders' thinking about policies, and an agreement on indicators may lead to agreement in policy. In addition indicators need to influence policy decisions and programmes that are appropriate in reversing the negative trends in urban areas.

Button (2002) suggested that for indicators to be meaningful in the urban context they should be few and be used in monitoring important environmental trends such as transport, waste management, and energy. Li *et al* (2009) added that urban indicators ought to be flexible in order to respond to the overall urban development while integrating the dynamics of the whole urban system, and also noted that urban sustainability will require a shift from resource based economy to service economy, for example, a change of lifestyle with more resource conservation measures such as reuse and recycling of waste. Urban indicators should incorporate social, economic, ecological, environmental, and institutional aspects of a city and should be independent to avoid overlap as well as being measurable, practical, and dynamic.



## 2.9 Critique of sustainability indicators

As discussed in section 2.4 many global initiatives on indicator development exist and in several cases the focus is on one of the three aspects; environmental, economic or social. For example, the economic indicators developed by the OECD measure country specific GDP, production, unemployment rates, prices, finance, trade, and consumption. The overall growth rate is also measured by several indicators including; price indices, labour indicators, balance of payments, and the level of international trade (OECD, 2010). Similarly, the World Bank indicators focus on meeting basic needs and addressing environmental stress in urban areas. Thus, indicators for transport, fuel consumption, urban population as well as access to water and sanitation were developed (World Bank, 2010).

Despite global efforts to develop indicators, there has been a limited effort on development of indicators at country level. Some of the frameworks such as the PSR and the DPSIR focus more on the environmental dimension and less on the socio-economic dimensions and do not account for the non linear relationships between different components of sustainability of a causal chain (Bossel, 1999; Patlitzianas *et al* 2008). Besides, the frameworks do not propose appropriate corrective actions and implementation plans (Patlitzianas *et al* 2008). The DPSIR framework lacks indicators for complex systems such as subsystem indicators and system indicators which are important for evolving urban systems with many feedback loops. Further, the impacts in one casual chain may be *pressures*, and in another they could be a *state*. For example, the policy drivers by the SA government to provide housing tend to be a *response* to the pressures caused by previous drivers (housing backlogs) however, the current *pressure* on the government is to improve the quality of housing units and to create sustainable settlements that include basic infrastructure (Du Plessis & Landman, 2002).

Most of the indices do not show important aspects such as the interlinkages between individual indicators, the dynamic nature of a system and the important issues that require policy decisions. Therefore, indices may be misleading and poorly understood by policy makers (Singh *et al* 2009).

Given the complex nature of systems, the aggregation of indicators into a single index may not reveal critical issues in some sectors, which when not addressed may threaten the overall health of a system (Bossel, 1999). The non integrated indicators, however, do not show the overall sustainability of a system (Mayer, 2008). For example, as Lee and Huang (2007: 515) noted, the Sustainability Index for Taipei is a combination of the crime rate, households below poverty line, wealth gap and motor car ownership rate and therefore it is difficult to identify specific challenges in a particular sub system. Thus, some of the subsystems can simultaneously become more sustainable while others become less sustainable with a possibility of poor performance of the overall system despite an improvement in

most indicators (Olsson *et al* 2004; Mayer, 2008). Different indices incorporate the same underlying data from global sustainability data sets such as those provided by the UN. The same methods are used to aggregate the data which could result to assumptions, weighting problems, biases and, methodological disparities that could negatively influence the final ranking of countries. Single indices such as the Wellbeing Index, Ecological Footprint and Environmental Sustainability Index are calculated using averages. The indices may provide misleading information such as poor countries appearing to be more sustainable than wealthy countries (Mayer, 2008).

The policy oriented indicators (e.g. performance indicators) inform policy makers on required actions like development of new policy frameworks and implementation plans (Hezri & Dovers, 2006). Meaningful actions require continuous monitoring and interdepartmental policy integration coupled with responsible actions by individuals and society towards SD. However, the government may be reluctant to develop new policies that address issues communicated by indicators.

Although urban indicators provide information on the current state of the urban system, they rarely provide information on the system's resilience – the ability or the likelihood that the current state can be maintained or improved over time. Most indicators tend to concentrate on issues where data is available and neglect important issues where data is lacking thus addressing a single dimension of SD (Bossel, 1999; Milman & Short, 2008).

According to the New Economics Foundation (2003), the quality of life indicators are gaining interest in local communities where they are used by local authorities to influence policy decisions and enhance the quality of life of residents. Further, they aid in raising awareness and encouraging partnerships among stakeholders. However, challenges like lack of incentives from legislation, disinterest from senior managers, lack of resources and unclear institutional responsibilities, lack of vision and leadership and poor communication are identified as some of the reasons that hinder quality of life indicators from influencing policy and decision making processes (New Economics Foundation, 2003).

Social sustainability in terms of quality of life is difficult to define as it is closely linked to the ecological, institutional, and economical systems. For example, a healthy ecosystem provide clean water and improves the quality of life of communities however, poor water quality causes health problems resulting to decline in the quality of life of communities. Similarly, low incomes result to consumption of less healthy and cheap food and as a result increase chances of malnutrition and poor health (WACOSS, 2002; Rodrigues Regional Assembly, 2009 a & b). Phillips (2003) added that quality of life has different conflicting definitions and therefore agreement on what is measured is generally lacking.

Social sustainability is the most difficult to measure and quantify because unlike environmental and economic aspects, the social dimension lacks a solid underlying theoretical framework and in a number of cases the linkage between social performance and sustainability production does not exist. Moreover, a conflict of interests between various groups such as employers, workers and wider communities often exist (UNCSD, 1996; CWRT, 1998; Gagliardi *et al* 2006; Musee & Lorenzen, 2007; Bohringer & Jochem, 2007). Furthermore, the complex nature of material and non-material dimensions of quality of life such as the living conditions of urban residents, equitable access to resources, and participation in decision making processes add to the difficulty in measuring quality of life in cities (Kline, 2000; Du Plessis & Landman, 2002; Craglia *et al* 2004).

One of the challenges of sustainability is to identify projects that have positive impacts in all dimensions of SD as a project that is perceived to be sustainable in one dimension may be damaging in another dimension. Using indicators to monitor issues that a region cannot influence may not be useful as SDIs need to be associated with actions for improvement (Olsson *et al* 2004). In order to monitor the extent to which a system is sustainable, comprehensive and reliable data is crucial. A common problem of using indicators is the unavailability of data, as data collection in most cases is developed at the national level. Many indicator initiatives tend to focus on issues such as methods of selecting indicators, participation as well as advantages of using specific indicators. However, the practical use of indicators is not adequately addressed. Most of the indicators developed by international organisations are broad and therefore do not address the specific problems at a regional level (Olsson *et al* 2004).

## **2.10 Concluding remarks**

The study showed that the concept of SD and development of SDIs are contested topics, and context-specific complexities must be evaluated so that indicators are appropriate and “fit-for-purpose” to be useful for influencing policy decisions. Cities in developing countries are facing major challenges such as growing populations, poverty, unsustainable transport, unsustainable resource use and poor waste management systems. Therefore, it is difficult for cities to identify key indicators that can measure the complex and dynamic interrelationship between socio-economic, environmental, and institutional dimensions of SD.

Since a city is a complex dynamic system, economic development, quality of life and environmental protection are interrelated crucial elements that should be taken into account when planning, implementing, monitoring and evaluating policy as well as when developing indicators. Indicators of urban complex systems should therefore be selected and agreed upon by client communities, within a

coherent policy framework and legislation, and should also be flexible to accommodate changes in community interests. SDIs do not provide solutions to problems but rather they can be used as a learning process by relevant stakeholders for practical actions such as broadening interest in SD and encouraging active participation at grassroots level.

## Chapter 3: Exploring Sustainability in Cities

### 3.1 Introduction

In Chapter 2, various indicators and indices developed globally and applicable to various regions as well as indicators that could be applied to measure urban sustainability were reviewed. In this chapter, ‘sustainable cities’ and features of a ‘sustainable city’ are discussed. Examples of cities that have progressed in trying to achieve sustainable urban management are presented. The selected cities are the City of Seattle in the United States of America (USA), Santa Monica in the (USA), and the City of Curitiba in Brazil. The cities were identified as examples of globally recognised sustainable cities, and therefore served as a guide to inform the process of developing indicators and choosing the types of indicators suitable for addressing sustainability challenges in the CCT. The chapter also provides an overview of sustainability in the CCT in the context of a complex and dynamic urban system. The chapter closes with an overview of indicator development in SA with reference to the CCT.

### 3.2 ‘Sustainable cities’

In section 2.7, cities were highlighted as complex systems. This situation raises the question about which aspects define a ‘sustainable city’. Among the urban sustainability principles that should be applicable to cities, the following have been mentioned (Eurostat, 2001, cited in Walle *et al* 2004):

- ◆ A city should be designed and managed within ecological limits;
- ◆ Urban plans should be flexible as cities are dynamic;
- ◆ A city should be able to recover from external stresses, for instance, global climate impacts;
- ◆ A city should be efficient in use of economic and environmental resources; and
- ◆ Equitable distribution of resources and services is crucial for urban communities.

Cities are mainly centres of concentrated human settlements and import resources like water, oil, food, building materials and energy, and on the other hand, export solid waste, wastewater, and wasteheat to different environmental media (water, soil or air). Therefore, to reduce the negative impact of global and local environmental and health risks, sustainable urban development is essential (Weiland, 2006). Alberti (1996) noted that cities can never be 100% sustainable because they face dynamic challenges like in-migration and global environmental impacts. Lundqvist (2007) agreed that cities cannot attain full sustainability as they continuously evolve. Notably, there is growing consensus that a sustainable city should be deemed as being liveable, enjoyable, and healthy as well as with an inherent capability to address the community’s needs and expectations (Alberti, 1996; Kline, 2000; Kenworthy, 2006; Newman, 2006). Some further features defining a sustainable city are

identified in existing literature as follows (Alberti, 1996; Kline, 2000; Kenworthy, 2006; Newman, 2006):

- ◆ Efficient use of water, energy, land, materials, and reduction of waste;
- ◆ Protection of biodiversity, eco-systems, and the environment, also by minimising the amount of carbon dioxide released into the atmosphere;
- ◆ Enabling a high quality of life reflected in health, sustainable human settlements, employment, education, income, leisure activities, accessibility, urban design quality, and sense of belonging; and
- ◆ Institutional ability, including being able to facilitate public participation in decision making processes.

Essentially, a sustainable city should rely on resources that are within its bio-regions with exceptions where the resources are limited and can only be obtained from other regions (Kenworthy, 2006; Newman, 2006; Swilling, 2006). Secondly, sustainable cities should decouple their resource use from consumption and pursue a non-material growth pathway while concurrently improving the quality of life for the residents with a particular focus on the poor. And finally, a sustainable city should aim at equitable distribution of basic goods and services, both within the city and its environs. It is in this context that Ellin (2006) proposed that cities should aim at creating social networks and an environment that is attractive for people to live in. In addition, a sustainable urban future should also aim at developing sustainable neighbourhoods particularly to improve the quality of life of the poor as well as needy children (Rabinovitch, 1992; Swilling, 2004; Ellin, 2006).

Planning for a sustainable city requires an integrated sustainability framework that addresses the delicate balance between social, economic, and environmental elements and that takes into account the complex nature of cities (Ravetz, 2000; Kenworthy, 2006). In this respect, the key interventions for a city to be sustainable should comprise of:

- ◆ Development of integrated transport systems that incorporate buses, trains, as well as pedestrian and cycling paths (Rabinovitch, 1992; Swilling, 2004; Newman, 2006; Swilling, 2006);
- ◆ Improvement of urban land use by designing high density housing, protecting the ecosystems, and promoting urban agriculture (Menegat, 2002; Kenworthy, 2006; Swilling, 2006);
- ◆ Adoption of sustainable environmental technologies that are appropriately localised for energy, building designs, and waste management systems (Swilling, 2004 & 2006);
- ◆ Development of sustainable human settlements encompassing basic services that are linked to the public transport systems (UN Habitat, 2006; Newman, 2006; Swilling, 2006; Lunqvist, 2007; Hendler & Thompson-Smedddle, 2009);

- ◆ Creativity and innovation, for example, through the preservation of its historical sites and promotion of cultural diversity (Healey, 2004; Ellin, 2006; Newman, 2006);
- ◆ Governance and collaborative planning that involves multi-stakeholder relations like government, private sector, the community, and NGOs (Menegat, 2002; Newman, 2006); and
- ◆ Urban edges to reduce under-utilization of land, energy consumption and air pollution and also to reduce the cost of infrastructure provision. An urban edge restricts outward expansion of metropolitan regions by promoting more compact urban settlement patterns and protecting significant environments and resources including seascapes, indigenous vegetation, open spaces and agricultural areas (City of Cape Town, 2004c, 2009c).

SACN (2009: 56) noted that a sustainable city integrates sustainability strategies into city planning in order to align sustainability and urban services. This yields effective redress of both local and global sustainability challenges. In addition, local communities play a crucial role in determining the extent to which their city will be sustainable as they are deeply connected to it. For instance, city inhabitants may express their feelings and opinions either through writing, interviews, or art, and in doing so, make a valuable contribution towards decision making – an aspect that is important in designing a sustainable city (Cilliers, 2000; Uprichard & Byrne, 2005; O’Sullivan *et al* 2006). The perception of the inhabitants regarding a city usually determines their own actions that strongly shape the city’s future.

### 3.2.1 *Examples of ‘sustainable cities’*

For over a decade, several governments including the SA government have adopted different indicator sets to try and make their cities sustainable (DEAT, 2002; DEAT, 2006a & 2008; Fraser *et al* 2006; Rodriguez, 2007; Hodge, 2007). However, the challenge of developing an integrated monitoring system for land use and transport in cities is yet to be addressed (Walle *et al* 2004). Examples of countries with well developed National Strategies for SD (NSSD) include Costa Rica, the Island of Guernsey and Coastal British Columbia. These countries have also developed indicators to address community needs in education; poverty and health care, economic, institutional and environmental challenges and to monitor progress and inform policy makers where corrective action is required to address the areas of need (Fraser *et al* 2006; Rodriguez, 2007; Hodge, 2007). For the purposes of this study, I focused on local sustainable development indicators developed by cities for their respective communities. Examples of cities that are globally recognised as sustainable city models, and committed to improving the quality of life and environmental protection, are illustrated in the following sections.

### 3.2.1.1 Seattle

One of the best known and internationally recognised indicator models was developed by the City of Seattle in the USA between 1991 and 1995 and consequently received an award for “Excellence in indicators best performance” from the United Nations Centre for Human Settlements (Holden, 2007; Seattle, 2010). A survey conducted by *Redefining Progress* on 170 sustainability projects revealed that approximately 90 of them used Sustainable Seattle as a model for their own initiatives. The Seattle indicator set is described as one of the best in measuring regional and neighbourhood quality of life of communities (Holden, 2007; Seattle, 2010).

The success of the model is largely attributed to consultation, participation and acceptance by a wide range of stakeholders that consist of civil groups, government affiliations, city planners, social workers, engineers, energy specialists, economists, and the community. The indicators form a basis of initiatives that support actions by citizens, business, and policy makers, and also reflect the community aspiration and concerns for the future (Bossel, 1999; Weiland, 2006; Holden, 2007; Seattle, 2010). Bossel (1999) noted that the Seattle indicators comprehensively covered important aspects of enhancing the quality of life and economic advancement while protecting the environmental resources. Bossel (1999) further noted that developing community indicators needs a participatory process where a working group with a common vision and a wide range of views and experience of community values is tasked with indicator development. The working group should also include the participation of community and also technical experts to advise on precision, completeness, and the measurability of the indicator set.

The process of developing indicators consisted of the following stages: Firstly, a public forum was organised to discuss the meaning of SD. Secondly, the SDIs suitable for the Seattle community were identified, and finally, a task team was formed to draft the agreed set of indicators. Initially, 150 indicators were drafted and later refined to 40 broadly clustered as social; economic, and ecological indicators. The final set of indicators was presented to the government for approval (Palmer & Conlin, 1997). The national planning department approved the indicators, and incorporated them into the national planning strategy. The indicators covered the whole city system – and were suitable for monitoring progress over a long period of time. Due to the success of the approach and practical set of indicators developed, the Seattle indicator model was endorsed for use both locally (USA) and internationally (Palmer & Conlin, 1997). A set of the Seattle indicators are presented as Appendix C.

According to the Sustainable Seattle Report (1998) the City of Seattle has shown positive trends of reducing water consumption, protection of wild salmon in the Cedar River and improved recycling of solid waste streams. However, negative trends noted were increases in fuel consumption and



increasing quantities of solid waste. The difficulties of obtaining data for certain indicators like changes in biodiversity remained a challenge. Some indicators were also amended to suit regional needs regarding ecological health, pedestrian and bicycle friendly streets as well as open spaces. The City of Seattle promotes equity and justice by encouraging behavioural change of all stakeholders (e.g. communities, businesses, policy makers, etc). For Seattle, the indicator development process was strongly characterised by bottom up engagement, technical advice, and more participatory approach.

Retrospectively, the set of indicators illustrated the integration of social, economic and environmental aspects designed to meet the needs of the Seattle community, their connectiveness character, and also, how they positively contributed in impacting on the quality of life for the residents. It is worth noting that the involvement of the community and broad set of stakeholders is fundamental in developing SDIs for a city. For example, sustainable Seattle used a participatory approach in developing its indicators with involvement of the general public, a group of civic leaders and a group of technical advisers. Thus, the indicators identified were useful indicators, easy to understand and also valid in meeting community needs.

### *3.2.1.2 Santa Monica*

The City of Santa Monica in the USA is also recognised worldwide as a sustainable model city following the successful implementation of its sustainable city programme adopted in 1994 (APA, 2003; Santa Monica, 2006 & 2010). The programme sought to address the needs of the Santa Monica community within the context of social, environmental, and economic development aspects. The City plan had eight goal areas, namely resource conservation, environmental and public health, transportation, economic development, open space and land use, housing, community education and civic participation and, human dignity.

Two types of indicators were developed to measure progress towards achieving each of the eight goals. The system level indicators measured the state, conditions, or pressures on the community whereas the programme level indicators were used to measure the effectiveness of specific programmes and policies. This was to provide useful information to decision makers and other stakeholders in the community. The system level indicators were solid waste generation, water use, energy use, and ecological footprint. On the other hand, the programme level indicators comprised of residential household hazardous materials, organic produce and bus ridership (Santa Monica, 2006).

According to the City of Santa Monica (2006) the sustainable city task force was established in 1994 to coordinate the leadership towards developing the sustainable City plan. Over a year and a half, the task force conducted community surveys and obtained community views on the sustainable City

programme. Thereafter, the proposed programme was distributed to the City of Santa Monica city council, city departments, housing and planning commissioners, chamber of commerce, environment committee, and the community. Questionnaires were also sent to respondents with the aim of identifying areas of consensus. In summary, the indicator development process involved community based public participation coupled with neighbourhood meetings with the final indicators developed and adopted by the city officials (see a full set of indicators in Appendix D).

The sustainable programmes that were implemented by the City of Santa Monica included a household hazardous waste consumer awareness ordinance aimed at discouraging uncontrolled disposal of hazardous waste. This programme was jointly developed by retailers, city officials, and the local community. The programme aimed at promoting the use of non-hazardous products. Following this initiative, the programme was monitored through use of public surveys. Other programmes entailed comprehensive energy conservation programmes, for example, through retrofitting of all city facilities. A working group was initiated to draft sustainable construction guidelines to support sustainable construction in the City. Moreover, the City established an environmental awards programme for businesses, an environmental audit for water, energy as well as a recycling and waste evaluation to monitor progress (Santa Monica, 2010).

To assess the effectiveness of the programmes, measurable targets were set. For example, targets for water use were 14.3 million gallons<sup>4</sup> per day in 1993, and were reduced by the year 2000 to 11.4 million gallons per day. Notably, the City of Santa Monica succeeded in meeting the objective of efficient water use. The success was attributed to comprehensive green neighbourhood programme that promoted efficient use of energy and water resources, waste recycling, and buying of *environmental friendly* products. Among the notable initiatives by City of Santa Monica was the production of cost effective, durable and recyclable consumer products. This was achieved through the development of guidelines for all manufacturers and retailers (Santa Monica, 2010).

Since 1994, the City made progress in integrating indicators into the overall community social economic and environmental development programmes. For example, waste recycling provided a clean and healthy environment for City inhabitants to live in while also creating job opportunities in the recycling industry. Within the context of Santa Monica City, Phillips (2003) noted that setting specific targets for resource conservation, transportation, pollution prevention, public health protection, community and economic development contributed to the success of the sustainable City plan. The City undertook semi-annual reviews to gauge the progress towards achieving previously set objectives. A notable achievement of the City of Santa Monica was improving the City's air quality,

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<sup>4</sup> 1 US gallon = 3.7854 litres

for example, the use of geothermal energy in most of the City facilities contributed to the City's overall sustainability. The achievements were as a result of addressing concerns identified through the use of the indicators. For example, the indicator on energy use showed that only 15% of municipal vehicles used clean fuels and consequently, the City of Santa Monica planned to increase its use of clean fuels to 75% by year 2000.

In addition, indicators were integrated into city plans, by-laws, and implementation programmes. For instance, the green building designs and construction were strongly advocated in the building regulations by the City of Santa Monica (Phillips, 2003). The task team involved broad participation of community stakeholders as well as interdepartmental sustainability advisory panel to coordinate policy and the implementation of the sustainability programmes. In addition, a comprehensive implementation plan was developed as well as annual progress reports to disseminate information to the council officials, city staff and the community. It is therefore evident that well specified goals and targets coupled with clearly defined indicators contributed to the success of the indicator programme in the City of Santa Monica. The case of Santa Monica demonstrates how suitable indicators in a complex city system can be developed and successively implemented as pointed out in section 2.8. Therefore, in the context of CCT, this provides useful information to aid in the process of identifying and developing appropriate indicators as well programmes to address areas of need. One notable aspect is that the channels used for communicating the objectives and the implementation strategies, and the achievements of the SDIs should be suitable to the inhabitants of the city under question.

### 3.2.1.3 Curitiba

Curitiba City is situated in Southern Brazil and covers an area of 435 km<sup>2</sup> with a population of about 2.5 million inhabitants governed under 25 municipalities (Lundqvist, 2007). The City is globally recognised as a model sustainable city in a developing country as a result of its successful integrated urban land use, efficient transport planning, and high quality of life for its inhabitants (Rabinovitch, 1992; Pienaar *et al* 2005).

The successful, efficient and cost effective systems and programmes in Curitiba are attributable to strong institutional leadership, political will, strong networks, and environmental legislation (see for example Rabinovitch, 1992; Pienaar *et al* 2005; Lundqvist, 2007; Curitiba, 2010a, 2010b, 2010c). Over the last 40 years, notable improvements have been made particularly in the quality of life of the local community and the public transport system. The positive environmental gains contributed in enhancing the City's local and international tourist attraction. In addition, Curitiba has succeeded in preserving its cultural heritage and green spaces because the environmental legislation supports

biodiversity protection. This has resulted in enriching the biodiversity of flora in Curitiba City (Curitiba, 2010a, 2010b, 2010c).

Several social and environmental protection programmes include the recycling of waste, reuse of resources and poverty reduction implemented to respond to the City's master plan drafted in 1965 (Rabinovitch, 1992; ICLEI, 2002; Lundqvist, 2007). Although agreed set of SDIs have not been developed in Curitiba, statistics show that about 75% of City's population uses public transport, and approximately 70% of the City's waste is recycled (Rabinovitch, 1992; ICLEI, 2002; Lundqvist, 2007). The success of Curitiba reveals that it is possible for a city in a developing country to strive towards sustainability by efficiently managing its limited resources. Further, institutional support to implement sustainable development is important to allow the linkage of indicators to the formulation of effective policies and implementation of SD programmes.

The integration of land use and transport planning clearly contributed to improved quality of life and environmental protection. For example, Curitiba recycles about 66% of its garbage and also the building and construction industries are granted a tax exemption when their projects are implemented within the existing green building principles. Another example is that approximately two million people use the public transport daily. It is within this context that, since 1974, Curitiba has managed to reduce its auto traffic and air pollution by approximately 30% and 40% respectively. In addition, tourism generated US \$280 million in 1994 and the City's economic growth over the last 30 years has recorded 7.1% against the national average of 4.2% (Curitiba, 2010a, 2010b, 2010c).

Brien (2001) described Curitiba as a City where almost everything is done differently and effectively to promote a self-supporting urban system – through optimisation of social and environmental demands. The success is based on innovative solutions implemented through the Urban Planning Institute of Curitiba (IPPUC) established in 1971 primarily to coordinate policy and implementation programmes. IPPUC introduced research programmes on how efficient planning and implementation of sustainable development projects can be improved. One of the key projects is the ecological building that hosts a new opera house. The building is constructed from steel and glass where porous floors and walls allow natural ventilation through the building. The City is also home to several town centres served by efficient public transport network. Several activities that take place in these centres include administrative and social services that create a sense of place. For example, a 24 hour street provides renting spaces to private cafes, shops, bars, childcare facilities, and libraries. On the other hand, botanical gardens provide employment to youths, and therefore reduce the rate of crime and unemployment (Rabinovitch, 1992; Brien, 2001; Curitiba, 2010a, 2010b, 2010c).

Curitiba was successful in implementing SD projects because a wide range of stakeholders actively participated in designing the programmes and also assisted in financing the implementation of these projects. The stakeholders included local government, city staff, IPPUC, government and international agencies, research institutions, community organisations, residents and NGOs. The lessons learnt from Curitiba are that integrated transport and land use planning can yield reduced traffic and more open spaces for social interaction. For example, the use of public transport and cycling can contribute to improving the environmental health of a city. Secondly, an integrated system of planning involving all departments aids in achieving the strategic city objectives and avoids addressing issues in isolation.

For example, in Curitiba, the IPPUC was effective in ensuring planning continuity and success in addressing political, economic, and social challenges. The innovative and integrated solutions to urban planning reduced problems associated with urbanisation in Curitiba. Commitment to local values, transparency, social justice, poverty reduction and efficient use of resources management largely contributed to Curitiba's SD. Also in this case, the SD solutions need not be expensive, for example, establishing a public transport system is relatively cheaper than expanding road networks to accommodate ever increasing volumes of vehicles and, using old buses for office space instead of constructing new office buildings.

### **3.3 Sustainability in the City of Cape Town**

#### **3.3.1 Introduction**

The CCT is the oldest city in SA and is popularly known as the *mother city*, *Kaapstad* in Afrikaans, and *Ikapa* in the Xhosa language (Pirie, 2007; City of Cape Town, 2010b; Tourism Cape Town, 2010b; IEC, 2010). The City was established in 1652 by Dutch settlers as a supply station for Dutch ships in transit to Eastern Africa, India, and the Far East. Cape Town is located at the southern Cape Peninsula in SA (Western Cape Province, 2006; City of Cape Town, 2010b; Tourism Cape Town, 2010b; IEC, 2010). The CCT has a land area of 2,455 km<sup>2</sup>. Cape Town experiences a Mediterranean climate with a winter season extending from May to September with an average minimum temperature of 7<sup>0</sup>C, and annual rainfall of 515mm. The summer temperatures are mild, with an average maximum of 26<sup>0</sup>C (DEA & DP, 2005; City of Cape Town, 2010b; Tourism Cape Town, 2010b).

Figure 4 provides the aerial view of CCT with some distinctive features like the Table Mountain, the CBD, and recent spatial development of the City suburbs including the newly constructed Green Point Stadium.



Figure 4: Photograph of City of Cape Town CBD and Table Mountain, overlooking the World Cup Stadium. Source: Tourism Cape Town, 2010a.

The CCT is made up of various subsystems that include administrative, the built environment, political, social, legal, natural environment and markets. The subsystems interact with each other within the City and also extend to the other regions beyond the City. Since its democratic independence and freedom in 1994, the SA government has been trying to address challenges caused by Apartheid<sup>5</sup> and the influence of markets that resulted in social exclusion, high levels of inequality, poverty, and unemployment. The State of the Cities Report (SACN, 2004) showed that SA's major cities experience similar challenges of inequality in resource distribution, dysfunctional built environments; inefficient resources utilisation, increase of slums, poor community involvement in policy decisions, high levels of crime, weak government institutions, and a weak economic base. The report (SACN, 2004) further highlighted that the quality of life of the poor in all SA cities is low, including in the CCT. The complex nature of the CCT as an urban system is summarised in the following subsections.

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<sup>5</sup> Racial segregation of South Africa's population groups as African, coloured, Indian, and white.

### 3.3.2 Socio-economic subsystems

In the context of SD, the social subsystem entails human interactions that are closely linked with the economic subsystem. The socio-economic subsystems include a wide range of issues like the provision of basic services, fair share of wealth distribution, participation in decision making processes, the fight against poverty – through employment, and support to sustainable livelihoods. These issues can be addressed by enabling sustainable investments both in the public and private sectors, transforming research into knowledge and practical solutions for SD as well as influencing consumption decisions of the economy (European Economic Area, 2006). In this section, demographics, education, health and economy in the context of socio-economic subsystems are discussed.

#### 3.3.2.1 Demographics

In 2007, the City population was estimated as 3.5 million people, highly cosmopolitan and was ranked as the second most populous city in SA after Johannesburg (City of Cape Town, 2008c; City of Cape Town, 2010b). Between 2001 and 2008, the population is estimated to have increased by 20.9% (City of Cape Town, 2008b). In the same period, it was reported that a total of 190,256 people migrated to the CCT from other SA provinces in search of employment (City of Cape Town, 2008c).

The population distribution for the CCT comprises 48% coloureds, 32% blacks, and 20% whites. Statistics for 2006 showed that 20% of the population was formally unemployed as the City's economic growth is based on highly specialised skills (City of Cape Town, 2007a, 2008 b & c; Western Cape Province, 2006). The CCT social economic profile report published in 2006 showed that the population will remain stable at approximately 3.6 million people between 2010 and 2014 (Western Cape Province, 2006). However, Swilling (2006) and the CCT report on development issues in Cape Town published in 2008 (City of Cape Town, 2008b) disagreed and observed that the population was growing at 3.3% annually as a result of rapid urbanisation which means the population will double in about 21 years. Other statistics showed that between 1996 and 2006 Cape Town's population grew rapidly, with an increase of 700,000 people and in 2008 Cape Town population was approximately 3.5 million (City of Cape Town, 2008b). This growth could be attributed to increasing in-migration and growth of informal settlements.

Recent statistics compiled by Statistics South Africa (StatsSA) showed that the Western Cape population is approximately 5.2 million people and is predicted to increase by 94,600 people by 2011 (StatsSA, 2010). The growing population will require more resources and generate more waste leading to excessive stress on ecosystems. The increasing rates of urban sprawl, resource

consumption, pollution of both freshwater and coastal ecosystems and biodiversity loss poses challenges for SD. For example, recent statistics showed that 60% of biodiversity has already been lost and 30% are endangered due to human activities (City of Cape Town, 2008a & 2009a). The implications are that the City needs to plan for 25,000 new households yearly, taking into consideration the growing needs for water, food, energy, infrastructure and increased levels of waste, growing informal settlements, and unemployment (City of Cape Town, 2008b).

According to the community survey conducted in 2007, 64% of the 5 to 24 year age group was enrolled for studies in educational institutions in 2007 (City of Cape Town, 2008c). Notably, the percentage of adults over 20 years without formal education decreased by 2% between 1996 and 2007 and the number of graduates from high school and tertiary institutions seems to have increased in the same period (City of Cape Town, 2008b).

According to the State of Cape Town report published in 2008, HIV/Aids prevalence had increased in the poorer areas of CCT, particularly in Khayelitsha informal settlement (City of Cape Town, 2008b). A recent report by the CCT has shown that the City has succeeded in reducing the prevalence of antenatal HIV and TB infections (City of Cape Town, 2010: 47).

A literature review showed that the CCT has made progress in meeting some of the MDGs and the economy is growing particularly in the tourism sector (City of Cape Town, 2006b & c). For example, the City has invested substantially on the provision of basic services with a corresponding improvement in access to services. However, the economic growth is largely based on capital intensive industries and has resulted to high levels of unemployment for the semi and unskilled population groups (City of Cape Town, 2008b). The full list of the Millennium Goals and Targets are provided in Appendix E.

The City is a home for diverse race groups represented by different cultures, languages, and incomes classified as black, coloured, and white (Swilling, 2006; City of Cape Town, 2006c; DEA & DP, 2005; Cape Town, 2009). Each of these groups has a unique culture, values and interests. It has been observed that majority of the white population enjoy a high quality of life whereas most blacks and coloureds are poor and unemployed (SACN, 2004; City of Cape Town, 2006c). A large white population reside in affluent City suburbs with large secured homes, well developed infrastructure, and well manicured gardens.



### 3.3.2.2 *Economy*

The CCT is the economic hub of the Western Province and hosts several industries and institutions consisting of manufacturing industries, shipping companies, educational institutions, tourism companies, financial institutions, small and medium businesses, and construction firms (City of Cape Town, 2006c, 2008a, 2008b; Pirie, 2007).

The Western Cape Province is globally known as a centre for tourism, trade, communication, education, art and service institutions like Investec, ABSA<sup>6</sup> as well as Earnest and Young a company that is recognised for its banking and advisory services (Lemanski, 2007; Cape Town, 2009). Pirie (2007) noted that since 1994, CCT has continued to advance in business, property markets, and residential upgrades. Between 1995 and 2004 the economy grew at 3.7% annually, a rate higher than the national average of 3.1% (City of Cape Town, 2006c).

The CCT economy recorded an average annual growth of 4% since 2004 (City of Cape Town, 2008a & 2008b). In 2006, the CCT generated approximately 78% of the Gross Geographical Product (GGP) in the Western Cape, which contributed about 11% to the national economy (City of Cape Town 2008a). Between 1994 and 2004, Cape Town contributed 15.9% to the SA's GDP and within the same period the CCT generated approximately 82% of the Western Cape provincial economic growth (SACN, 2006; City of Cape Town, 2007b). However, there are concerns that majority of the young population and also black females have not benefited from this growth.

Another notable sector is the call centre service, that invested approximately R295 million for call services and as a result has created about 1,000 new jobs since 2004. Moreover, the Cape Town International Convention Centre (CTICC) has attracted 290,000 visitors since 2003, and continues to generate substantial income for the City (Pirie, 2007). Since 1999, there have been extensive programmes geared towards CCT urban renewal. For instance, the Cape Town Partnership is closely working with the City Council and other private enterprises to promote economic growth and job creation in the City. Other extensive developments include the multibillion retail malls, extensive parking spaces, construction of the Green Point stadium, and upgrade of the City roads as well as Cape Town International Airport (Pirie, 2007; City of Cape Town, 2008a; City of Cape Town, 2010b).

Business developments in CCT are concentrated mainly in the northern part of the City, and include the Century City, Tygervalley and Cape Gate Centres. Other developments can also be observed in

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<sup>6</sup> Amalgamated Banks of South Africa

the Southern part in Claremont and Westlake suburbs as illustrated in Figure 5 (Lemanski, 2007; Pirie, 2007; Lemanski, 2007; Cape Town Partnership, 2009). The affluent residential suburbs have been upgraded into new, expensive and competitive apartments to meet increased demand for housing by local as well as international investors. These upgrades include: Perspectives, Mutual Heights, Mandela-Rhodes Place, Claremont, Bellville and The Deck (City of Cape Town, 2002a; SACN, 2004; Lemanski, 2007). Unfortunately, the development of low income housing on City edges has reinforced social exclusion between the rich and poor.



Figure 5: Location of non-residential investment and low income housing. Source: Turok, 2000 cited in City of Cape Town, 2002a: 22

Since 1994 SA has experienced increasing levels of inequality, poverty and unemployment – and a notable widening of the gap between the rich and poor population groups (Seekings, 2000; SACN, 2004; Bhorat & Kanbur, 2006; DEAT, 2006; City of Cape Town, 2006c & e, 2008b). The CCT has also experienced the same challenges in increasing levels of poverty, a skills mismatch, and unemployment of the younger population group (DEA & DP, 2005; Bhorat & Kanbur, 2006). The integration of government departments, local communities, parastatals, research and academic institutions remains a persisting challenge in the CCT (Pieterse, 2010). Integration tries to reduce racial and class segregation and requires effective multi-sectoral actions that will facilitate equal

distribution of resources through local economic development, improved service delivery and provision of basic needs, notably this has not been the case for CCT (Pieterse, 2007 & 2010).

Among the notable challenges of the City are inequality in resource distribution, inadequate housing, high prevalence of HIV and Tuberculosis, urban sprawl, crime, dominance in private car use and unemployment as well as low levels of education particularly among the poor communities (City of Cape Town, 2006 b & c; 2008b). Statistics show that the number of unemployed people is also increasing as a result of migration of people in search of jobs from other smaller towns and rural areas. Unemployment in the City is also partly as a result of job-shedding by companies who opt for capital intensive labour industrial processes. For instance, in 1995 just one year after independence, there were 847,000 people employed while in 2004, only 839,000 people were employed and approximately 6,000 additional people were unemployed (City of Cape Town, 2006b & 2008a). The influx of people into the City seems to have largely contributed to increased social and environmental challenges.

The small business sector in the City has also been affected by the unfavourable macro-economic policies that are geared towards promotion of exports and capital-intensive production (Bhorat & Kanbur, 2006). A major constraint in the City is the lack of a well integrated public transport system. For example, the existing transport system has contributed to congestion on roads, elevated pollution levels, and increased commuter times – especially for the poor living on the City peripheries, far from economic nodes, institutions, and infrastructural support systems (City of Cape Town, 2007; 2006b & 2008b).

Statistics show that 30% of the Cape Town residents live in informal settlements with high levels of poverty, unemployment, poor health, drug abuse, and crime. The number of people living in informal settlements has increased; for example, between 1993 and 2005 the number of families living in informal settlements increased from approximately 23,000 to 115,000 (City of Cape Town, 2001, 2002a). The informal settlements include Khayelitsha, Nonqubela K-Section, Sweet Home, Cape Flats, and Joe Slovo in Langa.

### 3.3.3 Environmental subsystems

This section will explore mainly the natural environment and the built environment within the broader context of the Western Cape Province.

### 3.3.3.1 Transport

The Cape Town International Airport serves both domestic and international flights, and is the second-largest airport in SA after Oliver Tambo International Airport in Johannesburg (Pirie, 2007; City of Cape Town, 2010b; Tourism Cape Town, 2010b). Three national roads N1, N2 and N7, link the CCT to the other cities in SA as well as neighbouring countries. The freeway and dual carriageway metro roads connect different parts and economic nodes of the City. The main metro roads are the M3, splitting from the N2, and linking the City bowl with Muizenburg. The M5 splits from the N1 and links the Cape Flats to the central business district (CBD) (City of Cape Town, 2010b).

The R300 links the N1 at Bellville and N2 at Kuils River and also parts of the Cape Flats. There are however certain gaps in the road network, for example the road network particularly for public transport does not meet the increasing travel demand for the densely populated areas of Cape Town and consequently leads to large volumes of traffic in certain parts of the City including Marine Drive, the N1 between Durban Road and Koeberg Road, the N1 between Vanguard Drive and Cape Town CBD, as well as the R300. The road network is not adequately linked to the railway network resulting to unscheduled and unregulated taxi and bus operations (City of Cape Town, 2006g). Lack of pedestrian crossings and insecurity, for instance along Khayelitsha and the Cape Flats is also a notable concern (Williams & Kingma, undated).

Metrorail provides railway transport service within CCT and its suburbs. The railway network has a total of 23 service lines. The multiple branch lines from Cape Town Station include the following:

- ◆ Kapteinsklip line – Cape Town to Mitchell’s Plain;
- ◆ Simon’s Town line- Cape Town to Simon’s Town;
- ◆ Khayelitsha line – Cape Town to Khayelitsha;
- ◆ Monte Vista line – Cape Town to Bellville and Wellington;
- ◆ Strand line – Cape Town to Strand;
- ◆ Sarepta Link – Mutual to Bellville and;
- ◆ Cape Flats line – Maitland to Heathfield.

These service lines are widely used by the low income populations groups to travel to work and to access other areas of the CBD (City of Cape Town, 2006g, 2008b, 2010b). The literature study has shown that CCT is dominated by private motorised transport particularly by the middle and upper class income groups (Swilling, 2006; City of Cape Town, 2008 a & b, 2009). This form of transport is highly unsustainable as it contributes to congestion and high levels of pollution. Notably, the public

transport system in the City is ineffective, expensive, and also inadequate to meet the needs of the growing population, particularly the majority poor who are unable to access economic opportunities (City of Cape Town, 2008b). Because of the poor integration of different modes of transport in the City, efforts are underway to implement a sustainable bus rapid transport system viewed as safe and affordable (City of Cape Town, 2008 a & b, 2009). The Apartheid planning system contributed greatly to the present ineffective transport system and urban sprawl (City of Cape Town, 2001, 2002a 2007b & 2008b). The CCT acknowledges that socio-economic sustainability will only be realised when the fundamental environmental challenges such as integrated transport system, flood management, and energy crises are mutually addressed (City of Cape Town, 2006c & 2009d). Key strategies include the upgrading of infrastructure, more densification, and improvement of open and heritage spaces (City of Cape Town, 2009d).

### *3.3.3.2 Tourism*

The City of Cape Town is known globally for its tourist attractions because of good climate, natural setting, and well-developed infrastructure (City of Cape Town, 2003, 2008b; Pirie 2007; Tourism Cape Town, 2010b). Attractive features that make the City an international tourist destination include the Table Mountain, Table Mountain National Park and Cape Point – a convergence zone for the Atlantic and Indian oceans. Other tourist attractions include the spectacular coastline and the surrounding wine estates (DEA & DP, 2005; City of Cape Town, 2006c; Cape Town, 2009). The Victoria and Alfred Waterfront, the architectural heritage of Cape Dutch-style buildings, Robben Island historical site, and the Nelson Mandela Gateway are further key attractions to international visitors (Tourism Cape Town, 2010b).

Statistics show that the tourism sector in Cape Town is growing at a rate of 7% per annum and contributed approximately 55,000 jobs between 2003 and 2005. Part of this growth was attributed to the rich biodiversity and natural beauty of the Western Cape Province (DEA & DP, 2005). The Cape Town Tourism Business Plan published in 2008 highlighted the key programmes that would promote tourism in CCT. The programmes aimed at advancing responsible tourism for businesses and visitors in Cape Town, promoting black owned businesses, attracting visitors throughout the year and encouraging Cape Town residents to actively participate in tourism programmes. This was followed by a tourism policy published in 2009 which is discussed in detail in section 4.3.3 (City of Cape Town, 2009d).

It was estimated that more jobs would be created in 2010 when SA hosted the FIFA<sup>7</sup> World Cup (City of Cape Town, 2006c, 2007b, 2009b). Development projects specifically linked to the FIFA project created job opportunities for construction companies as well as individuals according to the City of Cape Town (2008a). The Western Cape Provincial Economic Review and Outlook published in 2010 showed that the accommodation, construction, transport and catering sectors generated substantial income from the World Cup related services (Western Cape Provincial Treasury, 2010). However, according to Du Plessis and Venter (2010) the FIFA World Cup only contributed 0.1% to the GDP, with little contribution to the long-term growth of the economy. Du Plessis and Venter (2010) further argued that few jobs opportunities were created particularly in the construction sector as the existing workforce was assigned new construction jobs. While the idea of job creation is welcome, it is worth noting that long-term sustainable solutions need to be sought to address the rising unemployment challenges facing the CCT.

### *3.3.3.3 The natural environment*

The CCT's natural environment faces ongoing challenges of floods, strong winds, and veld fires. These catastrophes have contributed to the destruction of human settlements, mainly of the poor, and as a result, the poor are plunged further into misery and poverty (City of Cape Town, 2006b & 2008a). In response, the CCT developed vulnerability and adaptation assessment models to minimise the environmental impacts (City of Cape Town, 2006d).

Further, urban sprawl, pollution and degradation of inland and sea waters, increasing demand for fresh water as well as possible future water and energy shortages poses more challenges for the CCT (DEA & DP, 2005; City of Cape Town, 2006c; Swilling 2006). Recent findings by the Department of Water Affairs and Forestry (DWAF) showed that the City's coastal water quality has declined by approximately 16%, and the fresh water quality has declined by 10% since 2003. Further statistics also showed that the residential sector was the biggest water consumer where 51% of the total demand for water was used for residential purposes (DEA & DP, 2005; DWAF, 1996 cited in City of Cape Town, 2008a).

Statistics show that Cape Town obtains 79% of its energy from coal and only 5% from renewable energy (DEA & DP, 2005; City of Cape Town, 2006b, 2008a, 2008b). Furthermore, Cape Town relies on motorised transport, resulting to substantial energy use in the transport sector. These scenarios contribute to environmental pollution and threaten both diversity and human health. An integrated energy planning approach which includes renewable energy resource planning, as well as

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<sup>7</sup> Federation of International Football Association (the English translation of the official French name)

conservation and efficiency in urban areas, is crucial in developing long term sustainability policies for the energy sector (Spalding-Fecher & Williams, 2000).

Various sources show that the CCT is inefficient in its resource use and also generates high levels of waste, coupled with the inadequate management of waste. Since 1999, approximately 60% of waste has been disposed of in the CCT landfills. Further, between 1999 and 2007 water and waste disposal per capita increased by 60% and only a mere 13% of the waste was recycled (City of Cape Town, 2008b). The increase in the levels of waste disposed is attributed to high consumption patterns (DEAT, 2000; SACN, 2004; DEA & DP, 2005; Swilling 2006; City of Cape Town, 2001a, 2006b, 2008b, City of Cape Town, undated). Also, the Cape Town's estimated total Ecological Footprint for 2002, as calculated by Barry Gasson, was 128,264 km<sup>2</sup>, relatively the size of the Western Cape Province and therefore highly unsustainable (Swilling, 2005 & 2006; Cape Town, 2008a; Gasson, 2002). A more detailed ecological footprint analysis for the CCT is included as Appendix F.

In 2006 approximately 750 kg per capita of waste per annum was disposed of, contributing to global warming and negative effects on the human and ecosystems and consequently increasing the vulnerability of the City (Swilling, 2006; City of Cape Town, 2006d & 2008a). Although various policies exist at national, provincial and local government levels aimed at addressing waste management and pollution challenges, implementation of these policies should take into account integrative measures of controlling the amount of waste generated, the management of already produced waste, and restoration actions for the degraded environment (DEAT, 2000; DEA & DP, 2005; City of Cape Town, undated).

Therefore, the interrelationship of socio-economical and environmental challenges will require integrated and participatory planning and effective urban management to systematically address issues related to resource management, vulnerability, employment, and equity as a means of enhancing the overall social, ecological, and economic performance of the City. Participatory planning involves various processes through which diverse groups (public and private sectors, civil society, ethnic minorities, youth, people with disabilities, the elderly and women) each with competing interests, engage together, often with the purpose to arrive at a consensus on a plan and its implementation (Communities & local government, 2003; Muller, 2006b). During the planning process, information is exchanged by the various groups to explore ideas of common ground and compromise and to find a way of reducing disagreements and potential conflicts.

### 3.3.4 Institutional subsystem

The CCT is the capital city of the Western Cape Province and, in addition hosts the national parliament of the Republic of SA (IEC, 2010). During the 1996 local government elections, the CCT was restructured into seven municipalities and in 2000 local elections the CCT became one large metropolitan municipality known as a 'unicity' (City of Cape Town, 2006h; IEC, 2010). The city council that governs the local government consists of the office of the speaker, the executive mayor, and a mayoral committee (City of Cape Town, 2006h & 2008a).

The City is subdivided into 105 electoral wards, and is made up of 23 sub-councils. The executive management team oversees the implementation of the City's strategic goals and objectives outlined in the Integrated Development Plans (IDPs) (City of Cape Town, 2004 & 2008a). The executive management comprises the city manager, chief audit executive and executive directors responsible for community development, economic development, social development, tourism, safety and security, health, transport, roads and storm water, service delivery integration, housing, corporate services, utility services, strategy and planning and, finance (City of Cape Town, 2006h: 70). The present CCT government has identified three areas of focus, namely (2008a):

- ◆ Economic development, agriculture, transport and public works, environmental affairs and development planning;
- ◆ Community safety, social development, cultural affairs and sport, and housing; and
- ◆ Education and health.

Various state owned enterprises assist the CCT in spatial planning and infrastructure development. These include Transnet, Portnet, Eskom, Cape Town Routes Unlimited, Cape Town Tourism and Cape Town Partnership (City of Cape Town, 2006h).

During the local government elections held in Cape Town in 2000, the Democratic Alliance (DA) won the elections by securing 108 seats, while the Africa National Congress (ANC) secured 76 seats of the 200 that were contested (MacDonald & Smith, 2004). Since 1994, the CCT had four municipal managers appointed by either the ANC or the DA. In the 1996 and 2002 elections the management of the CCT was controlled by the ANC while in 2000, 2006 and 2011, the DA took leadership (City of Cape Town, 2006h; Province of the Western Cape, 2008; IEC, 2010). As several authors have noted, the constant shifting of political alliances in the CCT from ANC led government to DA led government has not resulted to a significant change of policy. The establishment of a unicity has increased private-sector involvement in service delivery by outsourcing basic municipal services (water, sanitation, electricity and waste management), a similar approach that the ANC advocated.



Continuous changes within the ANC and the DA leadership have also resulted in mismanagement and corruption among government institutions, coupled with conflict in the municipality governance as well as political pressures to achieve service delivery (Du Plessis & Landman, 2002; MacDonald & Smith, 2004; Pieterse, 2010; Todes, 2011).

The CCT needs to work closely with the provincial and the national government, community, private and public sector to facilitate the integration of City's planning, budgeting, and communication strategies with those of the provincial and national spheres of the government. For example, Eskom, SA Railways, Metrorail and other organisations have a role to play in city development. According to the City of Cape Town (2008a) the City has made a commitment to align its strategies with those of the provincial and national governments with a view of improving sustainability.

The cycle of developing policy and indicators requires various actors to create and share knowledge in order to systematically address the complex city challenges. It is therefore suggested that market research should be carried out to address volatile environments as well as rapidly changing patterns and trends. For example, research on efficient planning methods for sustainable human settlements and sustainable transportation followed by implementation programmes would advance sustainability in the CCT. Creation of knowledge requires new institutions or systematic strengthening of the current ones in order to render them strong and effective. For instance, new knowledge, policies, and programmes coupled with targeted implementation strategies are proposed as having the potential to improve the quality of services to the inhabitants of the CCT. The knowledge should be acquired through establishing relationships based on trust and respect among different organizations.

It should be noted that the creation of knowledge requires extensive research on best practices, but should also be tailored to suit local situations to address the challenges in question, and through the involvement of various role players, including the government, private sector, academics, technical experts and indigenous knowledge from the local communities (Linderman *et al* 2004; Hartley & Benington, 2006; Healey, 2008; Tress *et al* undated). Linderman *et al* (2004) pointed out that institutions need to implement effective quality management practices that support knowledge creation processes by ensuring adequate investment is available particularly for research. Tress *et al* (undated) also noted that a combination of integrative, interdisciplinary, participatory and transdisciplinary research is necessary to address complex challenges. Integrated research therefore enables researchers firstly to share a common understanding towards a given problem and secondly, to use existing knowledge as well as new knowledge to investigate solutions to the problem in question.

The promotion of the sustainability of the CCT can be advanced when the role players are committed to a common vision, and collaboration within a system of partnerships involving the government, and other stakeholders (DEA & DP, 2005b). According to the CCT reports on the State of Cape Town the most critical issues that the City needs to address are spatial and regional planning, human development, economic development, integrated human settlements, transport, crime, and governance (City of Cape Town, 2006b & 2008b).

The CCT has tried to respond to these issues in its recent Annual Report for 2009/10 (City of Cape Town, 2010b). However, several authors suggested that the challenges of the CCT should be addressed through better proactive planning – and interdepartmental policy coordination that incorporates sustainable development objectives. In addition, specific programmes focussing on socio-economic development are crucial, particularly to enable the integration of communities, improvement of public transport and provision of sustainable human settlements (City of Cape Town, 2005b, 2006e; Swilling, 2006; Hendler & Thompson-Smeddle, 2009).

### **3.4 Overview of indicator development in SA**

The UN Commission on SD proposed a set of indicators for monitoring and evaluating regional and national targets (UN Habitat, 2002). One of the UN initiatives launched in 1998 was to develop urban indicators to aid in addressing the growing challenges of sustainable urban development. The urban indicators would also be used for implementing the LA 21 principles at the municipal level (UN Habitat, 2002). According to SACN (2009) cities are responsible for implementing SD policies at the local level. The UNCSD indicators were applied in SA initially in 1997 and national institutions including; DEAT, Human Sciences Research Council, NDoH and Department of Minerals and Energy as well as individuals participated in the testing process.

Vital information on indicators for example, their usefulness and relevance, was sourced through questionnaire responses. The results of this initial testing showed that although some indicator initiatives existed in SA, data for some indicators was either not available or was inaccurate. For example, it was observed that in some cases official data on hazardous waste was inaccurate. Also, the interlinkages between indicators were not clearly defined and there was no consistency system of reporting on environmental indicators and their trends. Until recently, a National Strategy for SD was lacking and there also seemed to be conflicting views on indicators by some of the central government departments (DEAT, 2006; DEA, 2010).

Several types of indicators at national, provincial and local levels have been developed to measure government performance in delivering public services since the advent of democracy in 1994. The

indicators include policy output and outcome indicators developed by key government departments including: the Department of Public Service and Administration (DPSA), the South African Public Service Commission (PSC), Treasury and Auditor General (AG), Department of Provincial and Local Government (DPLG), StatsSA, DEAT and, the Presidency. Indicators developed by DPSA were aimed at assessing performance areas by managers. The PSC developed process oriented indicators to monitor compliance of government departments with identified principles. The AG developed indicators to monitor financial management by government departments. The DPLG developed key performance indicators to monitor the performance of the local government in implementing programmes at the local level. StatsSA maintains data used to assess developmental progress in SA, such as demographics changes and crime statistics (Cloete, 2005; DEAT, 2008).

However, as Cloete (2005) and DEAT (2008) noted, the sectoral policy assessment initiatives are overlapping and a systematic and coordinated implementation and regular assessment of monitoring and evaluation programmes has not yet been developed. Further, there is lack of capacity for activities such as programme monitoring and evaluation, development of indicators, research, data analysis and report writing.

This study specifically focused on some of the developmental and environmental indicators developed by the SA national government, the Western Cape Province and the CCT. The national developmental indicators include the development indicators developed by the Presidency as well as MDG indicators developed by the UNDP SA for measuring progress in achieving the millennium targets. For example, the indicators are used to monitor changes in human development such as poverty, education, health and the natural environment. The development indicators include national indicators for monitoring the country's socio-economic development with a view of improving the quality of life of South Africans particularly for the poor. Development indicators, adopted from the EU Sustainable Development Indicators were developed by the Presidency and national government departments. The indicator themes comprised of economic growth and transformation, employment, poverty and inequality, household and community assets, health, social cohesion, safety and security, international relations, and good governance (UNDP SA, 2003 & 2007; DEAT, 2006a; UN, 2006; Eurostat, 2009; The Presidency, 2007a & 2009a).

The Policy and Coordination and Advisory Services Unit in the Presidency developed 72 development indicators to track progress in socio-economic developmental changes in SA. The indicators are reviewed every ten years to assess trends in development and to identify appropriate policy, output and outcome indicators in several dimensions of development. Several indicators including policy, output, outcome as well as composite indices were also developed by the Presidency (Cloete, 2005; The Presidency, 2007a & 2009a).

In SA the interpretation of the term *environment* is inclusive of biophysical and socio-economic urban, rural and cultural systems, thus the national SoE reports are expected to report on socio-economic and environmental trends (DEAT, 2002 & 2004). DEAT and UNCSD introduced environmental indicators for SoE reporting in 1996 to track progress towards implementation of LA 21. Three areas that were identified for monitoring were the following (DEAT, 2002: 3):

- ◆ Strengthening existing mechanisms for information processing and exchange to ensure effective and equitable availability of information generated at the local, provincial, national and international levels;
- ◆ Strengthening national capacities (government, NGOs and the private sector) in information handling and communication and;
- ◆ Full participation of developing countries in UN systems of collection, analysis and use of data and information.

DEAT developed a list of environmental indicators under several broad themes including; atmosphere and climate, waste management, human well-being, environmental management, inland water, marine, coastal and estuarine, biodiversity and natural heritage and land use (DEAT, 2002). The majority of the indicators were environmental in nature and basically described the state of environmental sub-system. The indicators did not seem to address the correlated socio-economic and environmental dimensions of SD like transport and land use. A list of the environmental indicators for the national SOE Report is included as Appendix G.

According to DEAT (2002) these indicators were based on a policy review of existing legislation as well as on international agreements and were developed in consultation with experts and stakeholders drawn from government departments, academic and research institutions, NGOs and the private sector. DEAT also developed headline indicators reflecting the environmental DPSIR in 2006 as well as environmental sustainability indicators in 2008 to monitor environmental stress, human vulnerability, social environmental equity and global stewardship (DEAT, 2006 & 2008). However, the environmental sustainability indicators were too broad and were not clear on what would be measured, an example is the indicator on *water stress* which is ambiguous and unclear (DEAT, 2008: 18). The environmental sustainability framework is included as Appendix H. The Western Cape Province also developed provincial indicators for monitoring socio-economic and environmental trends in the region. The Western Cape Province identified 14 themes relating to the natural, social and economic elements of SD and then selected indicators within each theme. Key indicators were biodiversity, water and sanitation, energy, health, tourism, transport and urban development (DEA & DP, 2005c: 140). However, the indicators were also too broad and described the state of subsystems

and in addition; some of the indicators were not easily measurable like the indicator on *integration*. A full list of the indicators is included as Appendix I.

The State of Environment Report (SoER) for the CCT was introduced by Cape Town government in 1999 to report on environmental and developmental trends and provide useful information to the IMEP and the City's IDP (City of Cape Town, 2002b & 2004b). The literature study showed that the CCT government has developed indicators for the City of Cape Town SoER since 1999 to date.

In 2004, a new set of SDIs was developed mainly by the Council for Scientific and Industrial Research (CSIR) for the CCT to monitor environmental and socio-economic changes in Cape Town (City of Cape Town, 2004b). The indicators were used in Sustainability Reports that were published by the CCT in 2005 and 2006 (City of Cape Town, 2005a & 2006a). However, the City continued to publish SoE Reports specifically detailing changes in the environment such as air quality, inland and coastal water quality, biodiversity, water use, solid waste and urban sprawl. An analysis of the indicators shows that they were too many (32 indicators) and also difficult to interpret, especially by policy makers as well as the public. Notably, the themes on which the indicators are based were not clearly defined and the indicator development appears to have taken a top-down process with minimal consultation of stakeholders and the Cape Town community. A list of the sustainability indicators is included as Appendix J.

The Cape Town government identified 14 themes and key indicators to monitor changes in the environment. The City of Cape Town Sustainability Reports published in 2005 and in 2006 showed that between 1997 and 2005, several indicators such as access to basic services, unemployment and LA 21 projects improved while other indicators showed a decline, for example transport, air quality and waste management (City of Cape Town, 2005a & 2006b). The CCT recently produced State of Cape Town Reports showing developmental changes in the City (City of Cape Town, 2006b & 2008b; City of Cape Town, 2007b). The eight broad areas of focus that inform the IDP of the CCT were:

- ◆ Shared Economic Growth and Development;
- ◆ Sustainable Urban infrastructure and services;
- ◆ Energy Efficiency for a Sustainable Future;
- ◆ Public transport Systems;
- ◆ Integrated human settlements;
- ◆ Safety and security;
- ◆ Health, social and community development; and

- ◆ Good governance and regulatory reform.

The Environmental Resource Management and Strategic Development and Geographic Information systems Department developed environmental as well as the socio-economic indicators to monitor progress in the eight broad areas of focus by the CCT. Data was collected from StatsSA community surveys and other government departments. The socio-economic indicators include: changes in annual water usage, annual waste disposed per capita, percentage of Cape Town households owning a car, employment status, number of informal dwellings, access to basic services, number of households below poverty line, HIV prevalence and education levels (City of Cape Town, 2008b).

Table 6 provides a comparison of environmental sustainability indicators developed at the national, provincial and local levels. The indicators include socio-economic dimensions of SD such as unemployment, waste, sanitation, economy, urban development, consumption and, public and private transport.

Table 6: A comparison of some environmental indicators developed at the national, provincial and local levels.

National (DEAT (2008: 19)	Provincial (Western Cape) DEA & DP (2005: 140)	Local (City of Cape Town)	
		City of Cape Town (2002: 8)	City of Cape Town (2006a: 5)
◆ Air quality	◆ Air and Climate	◆ Air quality	◆ Air quality exceedance
◆ Biodiversity	◆ Biodiversity	◆ Inland waters	◆ Renewable energy supplied as percentage of total energy
◆ Land	◆ Inland water and water supply	◆ Coastal waters	◆ Energy use per sector
◆ Marine	◆ The coastal zone	◆ Health	◆ Carbon dioxide per capita
◆ Freshwater	◆ Land	◆ Biodiversity	◆ Public and private transport
◆ Groundwater	◆ Waste and sanitation	◆ Urbanisation, urban form and housing	◆ Green space per capita
◆ Air pollution	◆ Energy	◆ Infrastructure	◆ Extent of natural vegetation conserved
◆ Ecosystem stress	◆ Health	◆ Transport	◆ Extent of invasion by alien invasive species
◆ Population pressure	◆ Education	◆ Energy	◆ Extent of urban sprawl
◆ Waste and consumption pressures	◆ Economics and poverty	◆ Waste	◆ Water use per capita
◆ Water stress	◆ Tourism	◆ Economy	◆ Fresh water quality
◆ Basic human sustenance	◆ Urban development	◆ Education	◆ Coastal water quality
◆ Environmental health	◆ Transport	◆ Safety and security	◆ Proportion of effluent reused
◆ Eco-efficiency	◆ Safety and security	◆ Environmental governance	◆ Landfill lifespan
◆ Environmental governance			◆ Waste disposal per capita
			◆ HIV/Aids incidence

<ul style="list-style-type: none"> <li>◆ Private sector responsiveness</li> <li>◆ Science and technology</li> <li>◆ Greenhouse gas emissions</li> <li>◆ Participation in international collaborative efforts</li> <li>◆ Reducing transboundary environmental pressures</li> </ul>			<ul style="list-style-type: none"> <li>◆ TB incidence</li> <li>◆ Leading cause of death</li> <li>◆ Incidence of murder</li> <li>◆ Incidence of rape</li> <li>◆ Incidence of commercial/industrial theft</li> <li>◆ Drug use and drug-related crime</li> <li>◆ Access to water</li> <li>◆ Access to sanitation</li> <li>◆ Percentage of informal housing</li> <li>◆ Incidence of fires in informal settlements</li> <li>◆ Adult literacy</li> <li>◆ Highest level of education achieved</li> <li>◆ Unemployment</li> <li>◆ Gross geographic product</li> <li>◆ Poverty and income disparity</li> <li>◆ Public education and awareness programmes</li> <li>◆ Staff education and awareness programmes</li> <li>◆ Number of Local Agenda 21 projects</li> <li>◆ Capital budget spent</li> <li>◆ Election turnout</li> </ul>
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The Cape Town Government further developed several indicators to measure government performance, monitoring and evaluation of service delivery and implementation of the IDP (City of Cape Town, 2007b: 111). The indicators included performance indicators, policy output and outcome indicators. For example, indicators to monitor ‘*development of a communications strategy for conservation of energy and awareness of climate change*’ and ‘*number of direct job opportunities created*’ were developed (City of Cape Town, 2007b: 111).

### 3.5 Concluding remarks

The examples of Seattle, Santa Monica and Curitiba show that a community can make its city sustainable, depending on the interpretation of SD adopted, which needs to be translated into practical strategies and policies for planning, implementation, and monitoring. For example, reduction in water consumption in Santa Monica was made possible by well defined targets and monitoring programmes. This means addressing specific needs at a time, while gradually improving the

sustainability of a city. For example, improved recycling of solid waste streams in Seattle, Santa Monica and Curitiba contributed to environmental protection and also enhanced quality of life of residents in these cities. The integrated transport and land use planning in Curitiba has improved quality of life of residents as well as the state of the city environment. In addition, Curitiba managed to reduce material inputs for construction by utilising available resources (e.g. reuse of buildings, schools and old buses).

Environmental protection, creation of more open spaces, accessibility and improvement of quality of life has been achieved by programmes that include the recycling of waste, planting trees, and optimal utilisation of resources, energy and water efficiency and the integrated bus system. The implementation of these programmes was monitored by well defined programme level indicators that were reflected in individual actions, policy, and decision making processes. As a result the core problems of traffic congestion and air pollution were addressed.

The integrated approach was used to address complex challenges and a wide range of stakeholders including local communities, actively participated in the process of identifying indicators, policy formulation and effective SD programmes. For example, construction of artificial lakes in Curitiba not only solved the problem of flooding but also provided open spaces for social interaction, resulting in environmental protection, promotion of biodiversity, improvement of air quality, and enhancing quality of life. Active participation of citizens contributed to success of sustainable development projects initiated in the cities of Seattle, Santa Monica and Curitiba. This approach merits consideration in the case of CCT, taking into account the local conditions, opportunities and constraints and also in future sustainable development related projects.

The analysis of the themes and indicators developed by DEAT, the Western Cape Province and the government of Cape Town mainly reported on the state of the biophysical environment and did not show the correlation between the biophysical environment and socio-economic trends. The indicators developed at the three spheres of government were not consistent on the nature, reporting issues and, what would be measured. For example, are they system indicators or programme indicators? This is evident in the various types of indicator sets developed by DEAT like the initial core set of indicators, the headline indicators and, the environmental sustainability indicators. The indicators developed by the Western Cape Province seem to address socio-economic and environmental issues and seem to contradict those developed by DEAT.

The trend in reporting at national, provincial and local government levels has emphasised the biophysical environment which does not provide a true reflection of the socio-economic trends. Therefore, a balanced set of indicators is crucial to inform socio-economic and environmental policies



and plans, such as the IDP and the IMEP. These indicators should inform policy decisions on the need for the provision of basic needs and other issues that are relevant for the City.

Several indicators were developed to measure government performance, monitoring and evaluation of service delivery within the three spheres of government. While the provision of basic services has improved in the majority of areas, there is still a lack of coordination of cross-sectoral policy assessment between government departments and other agencies.

Indicator development in SA seems to be fragmented, inconsistent and lacks coordination between various departments despite the emphasis by the government on the need to align policy and budget allocations. The indicator themes are not clearly defined as in the cases of the Cities of Santa Monica and Seattle, where indicators were linked to programmes and monitoring of performance through programme indicators. For instance, the CCT made use of the SoER reporting system and the State of Cape Town Reports to report on environmental and developmental indicators respectively. The environmental indicators showed slight improvements in water use, air quality, coastal water quality and solid waste management in some areas of the Cape Town metropolitan area.

Similarly, the developmental indicators showed slight increase in job opportunities particularly in tourism, cultural industries and call centres as well as slight improvement in basic service delivery.

An analysis of the indicators also showed that they are numerous, not easily comparable, are highly ambiguous and also repetitive. For most of indicators, data is not readily available and consequently it is difficult for the decision makers, the authorities, and the public to interpret, use or apply them. While a few indicators had a positive effect on decision making in Cape Town, leading to improvement in some areas, the City is still facing several environmental, developmental and institutional challenges. The study of the literature clearly showed that the indicators have not fully achieved the desired purposes of monitoring progress, and enhancing informed decision making to address areas of weakness in the City.

## **Chapter 4: An overview of policy framework and sustainable development in South Africa**

### **4.1 Introduction**

In Chapter 3 the sustainability challenges facing the CCT were discussed. The chapter also revealed that although urban indicators are not widely developed, several cities have developed various forms of indicators to suit their specific needs (e.g. Seattle, Santa Monica and Curitiba as discussed in Chapter 3). Haughton (1997) and Button (2002) noted that sustainable urban development should be seen in the context of external impacts of human behaviour and should not only aim at city sustainability but also in achieving global SD. Notably, a city does not function in isolation, therefore indicators at city level should be linked to provincial, national, and global indicators. As discussed in chapter one, the majority of the world's population now lives in cities and this trend is anticipated to grow in future. Therefore, sustainable cities are crucial in improving the quality of life and environmental protection at regional, national and global scales.

In this chapter, an overview of the SA policies and plans with respect to SD within the context of socio-economic and environmental aspects are presented. The extent to which policy and monitoring initiatives are linked to future planning within the context of supportive institutional governance structures are discussed. The following sections discuss some of the major policy initiatives by the SA government towards addressing the past injustices and meeting global SD requirements.

#### **4.1.1 Overview of policy development since 1994**

The Reconstruction and Development Programme (RDP) was the original policy document of the ANC aimed at promoting equality and transforming the country into a democratic, non-racial, and non-sexist society through resources redistribution (Office of the President, 1994; NDoH, 1997; DEAT, 1998a). The RDP identified integration and sustainability as one of its principles. Within the RDP programme, a policy framework was to be developed to guide the country in urban reconstruction and development to address the key challenges of increasing; urban population, levels of inequality and poverty as well as inefficient resources appropriation at the municipality level. For example, the national government committed itself to deliver a million subsidised housing units within 5 years to households earning a monthly income below R3500.

The RDP was followed by several economic policies and programmes focusing on reduction of poverty and inequality. These policies included the Growth, Employment and Redistribution Strategy

(GEAR), Accelerated and Shared Growth Initiative (ASGI-SA), the New Growth Path, Black Economic Empowerment (BEE), and the Expanded Public Works Programme (EPWP). The GEAR strategy, launched in 1996, was to stimulate economic growth and job creation through fiscal contraction, accelerated trade liberalisation, rigorous monetary policy, privatisation and deregulation of financial markets (Department of Finance, undated). The GEAR strategy was replaced by ASGI-SA in 2006 and the New Growth Path in 2010 (South African Government Information, 2010). An Industrial Policy Action Plan (IPAP) was also developed to support implementation of GEAR, ASGI-SA and the New Growth Path in creating jobs in several sectors such as automobiles, chemicals, metal fabrication, tourism, clothing and textiles, forestry, services, light manufacturing, and construction (DTI, 2007). The first IPAP of 2007 was followed by an updated IPAP 2 in 2010 (DTI, 2010).

According to the Presidency (2007b) ASGI-SA targeted a 6% economic growth in the period 2010 to 2014. A national programme for small enterprises was also to be developed with the aim of providing job opportunities and empowerment to the poor, women, youth and people with disabilities. The proposal was that this programme would create one million jobs over a period of five years (The Presidency, 2006: 40). This growth was to be largely based on infrastructure investment including power generation, power distribution, rail transport, harbours and oil pipelines. The ASGI-SA report published in 2007 showed that economic growth was 5% in 2007. Also about 38% of the EPWP targeted 750,000 job opportunities were created through the infrastructure sector programme (The Presidency, 2007b).

However, the growth path would have negative implications on human and environmental health as it would be based on coal energy production. Further, ASGI-SA was silent on aspects of environmental protection and sustainability, particularly on how and the problems of economic growth which had a negative impact on the environment would be addressed. The New Growth Path of 2010 also targeted 7% economic growth, and the proposed main indicators of success were to be jobs (the number and quality of jobs created), growth (the rate, labour intensity and composition of economic growth), equity (lower income inequality and poverty) and environmental outcomes. In order to support job creation, key sectors that were to be prioritised included infrastructure, the agricultural and mining value chains, the green economy, manufacturing sectors, as included in IPAP 2, as well as tourism and certain high-level services.

The BEE aimed at creating job opportunities for the previously disadvantaged black South Africans through small business development. On the other hand the EPWP would create jobs mainly through road construction and maintenance as well as home-based care training programmes for the

unemployed youth (Abdelal, *et al* 2002, Makgetla & Meelis, 2006; City of Cape Town, 2006c; SACN, 2006; Meth, 2007; The Presidency, 2007b).

Despite these efforts, the literature review suggests that GEAR has not succeeded in employment creation or poverty reduction as the strategy advocated for capital intensive economic growth, and rarely on labour intensive growth, which is crucial in providing job opportunities (DEAT, 1998; SACN, 2006; Meth, 2007; City of Cape Town, 2007a, 2008b, 2008c). The GEAR programme provided limited funds for essential public programmes like sustainable human settlements, health and education. However, it failed to create small scale jobs and employment opportunities for the poor (Goebel, 2007; Pillay, 2008). According to Maile (2010) GEAR led to the reduction of educational subsidies for public institutions resulting to increased inequality in education as the poor could not afford education services provided by the private sector.

In 2004, the National Department of Housing (NDoH) published a plan for the development of sustainable human settlements coined 'Breaking New Ground' (BNG) to address the increasing demand for housing and to reduce the high levels of poverty through enabling people to own housing units as tradable assets in property markets (NDoH, 2004; SACN, 2006; Hendler & Thompson-Smeddle, 2009). Goebel (2007) also noted that housing programmes were underfunded leading to delays in delivery as well as continued location of poor quality housing on urban peripheries (Goebel, 2007). In addition, according to SACN (2006) the BNG lacked clarity on the specific roles of municipalities and this limited its suitability for its wide adoption in the country.

It is clear that most of the economic policies and programmes were mainly export-driven and capital intensive in nature, and therefore failed to meet the intended objectives of reducing inequality and creating job opportunities. Notably, the local industries could not thrive in the prevailing competitive markets. For example, the BEE Strategy raised concerns of firstly, encouraging imports and providing minimal incentives for job creation, and secondly, allocating resources to the black elite thus advancing inequality in resource distribution within the majority black South Africans. ASGI-SA also raised high hopes for the majority South Africans but lacked specific commitments to the long-term broad-based development that can create sustainable jobs. It was also evident that the SA labour market had a large over supply of unskilled labour, but concurrently high demand for skilled labour (Abdelal *et al* 2002; Du Plessis & Landman, 2002; Makgetla & Meelis, 2006; Meth, 2007; Western Cape Provincial Treasury, 2009). Furthermore individual policies were aimed at addressing specific aspects of the national vision. For example, the RDP was narrowed towards social development while GEAR, ASGI-SA, the New Growth Path and BEE aimed at economic growth. Notably, these policies were mostly silent on environmental concerns.

#### 4.1.2 National Framework and National Strategy for Sustainable Development

The Johannesburg Plan of Implementation (JPOI) published in 2002 required countries to develop National Strategies for SD (NSSD) and implementation plans. In response to the JPOI, the SA national government developed the National Framework for Sustainable Development (NFSD) in 2006 that was adopted by Cabinet in 2008 (DEA, 2010). According to DEAT (2006c), SA's focus in responding to the JPOI entailed the development of specific plans to address the socio-economic problems and create a sound institutional framework for implementing SD programmes. The JPOI is included as Appendix K.

Through the NFSD, the government would provide guidelines for developing a SA National Strategy and Action Plan for SD. The priorities of the NFSD were climate change, a green economy, sustainable communities, efficient resource use and improving governance systems. Five areas of focus were outlined in the NFSD namely improving the systems for integrated planning<sup>8</sup> and implementation, sustainable resource use, sustainable economic development, improvement in infrastructure provision, sustainable human settlements and, human development. The NFSD aimed to meet the objectives of the GEAR by boosting economic growth to an average of 6%, promoting equitable resource distribution, reducing poverty and dematerialisation.

The NFSD recognised SA cities as major focus areas with respect to sustainable development. One of the concerns raised by the NFSD was that urban sprawl was threatening biodiversity in major city regions specifically in the CCT (Rebelo *et al* 2010). Urban edge protection and urban agriculture and densification were identified as interventions needed to prevent further urban sprawl. The NFSD outlined the need for implementing sustainable human settlement strategies through densification and mixed land use regulations, improvement of public transport systems and strengthening security within residential neighbourhoods. NFSD also aimed to introduce a regulatory framework for renewable energy generation as well as support for BNG by improving the living conditions of the poor and creating an enabling environment for the poor to benefit from property markets.

Further, NFSD would guide the national, provincial and municipal spheres of the government in aligning their policies with decision making systems. To improve governance for SD, the NFSD proposed the development of a national vision for SD, regular systemic policy assessments, coherent SDIs within the public sector as well as research and development mechanisms that would support

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<sup>8</sup> Integrated planning is a planning process that takes into consideration the interrelationships between socio-economic, political and environmental concerns (Muller, 2003 & 2006b).

SD policies and plans. The NFSD was to be implemented in three phases as follows (DEAT, 2006: 85):

In phase 1, the national vision and the guiding principles for SD would be formulated. Further, an assessment of the long term SD trends would be done and also institutional planning, monitoring and reporting systems would be defined. Areas for strategic interventions would be identified, and these would be aligned with national and international priorities.

In phase 2, the institutional framework for the national strategy for SD would be formalised, followed by the creation of a national coordinating mechanism and partnerships with business and civil society. A detailed action plan would also be developed and aligned to the government priorities in the MTSF as well as the MDGs and the JPoI. The action plan would include sourcing of necessary resources (funds, technology and human resources) for SD. Also in phase 2, a budget for SD would be allocated by the national government, with financial support from the private sector.

In phase 3, the NFSD would be implemented, followed by its regular monitoring and evaluation as well as developing SDIs for *quick win projects*. The SDIs would then be incorporated into the government-wide monitoring and evaluation systems. A communication strategy and information plan for all stakeholders would also be developed.

The NFSD was followed by a Draft National Strategy on Sustainable Development and Action Plan (NSSD) that was published in 2010 for the period 2010-2014 (DEA, 2010) to provide the plan for implementing the priorities of the NFSD. The broad objectives of the NSSD are “*directing the development path towards sustainability, changing behaviour and attitudes and, restructuring the governance system and building capacity*” (DEA, 2010: 9). The goals of the NSSD were outlined as reducing resource use and the carbon footprint, equity in resource distribution and improving the quality of life of all South Africans by providing equal access to resources and a decent quality of life. Further, the NSSD undertook to integrate policy within the spheres of the government, design long term SD programmes and create mechanisms for accountability, monitoring, evaluation and reporting for SD.

The NSSD proposed a national vision for development and the need to integrate sustainability concerns into policy, legislation, strategies and action plans at national, provincial and local government levels. An institutional framework was proposed for effective coordination, planning monitoring and evaluation of implementation of the NSSD (DEA, 2010: 36).

Five priorities were outlined for implementing SD namely: integrating planning and implementation, sustaining ecosystems and efficiency in resource use, economic development to be achieved through investing in sustainable infrastructure, sustainable human settlements and human capital development (DEA, 2010). The NSSD promised to invest in public transport systems to minimise dominance in private car transport. However, no detailed plans were provided on how these initiatives would be achieved. Through the NSSD, 4 million job opportunities would be created as well as provision of water and sanitation to all South Africans by 2014. Also, a 15% reduction on energy used in the transport sector was envisaged by 2015 as well as city-wide public transport systems by 2020 (DEA, 2010).

The NFSD outlined that the civil society, organized labour, business, industry and experts would play a key role in policy development and implementation however, it is not clear how these stakeholders would be involved. Notably, both the NFSD and the NSSD seem to have been developed mainly by the government with little participation of business, private sector, civil society and local communities. Further, the NFSD was not strong on creation of sustainable human settlements and provision of basic services and did not provide specific plans for the creation of sustainable settlements nor did it mention how sectoral plans will be integrated to address a variety of complex urban problems (DEAT, 2006: 77).

Although the NFSD and the NSSD outlined broad plans, the government did not consider human and financial capacity for implementation. Besides, no specific plans for education and health were mentioned and also, the time lines to achieve the desired targets were too short and unrealistic. Further, the NSSD proposed a monitoring and evaluation system consisting of national SDIs, but the NSSD was silent on regional and project indicators useful at the city level.

Among the initiatives of the NSSD was to develop national planning guidelines for strengthening sustainability in land use, planning and economic development at all spheres of the government. The NSSD further outlined that living conditions of the poor would be improved partly by reducing HIV prevalence and improving service delivery. The detailed actions on how sustainable human settlements in urban areas would be addressed were not well defined. Notably, little progress has been made as the national and provincial governments have focused more on monitoring and evaluation as well as in achieving quantitative targets (e.g. provision of basic services to the poor) while little attention is given to provision of quality services (Du Plessis & Landman, 2002; Govender *et al* 2010).

#### 4.1.3 National Spatial Development Perspective

The National Spatial Development Perspective (NSDP) was originally approved by Cabinet in 2003 and later updated in 2006 to address the skewed Apartheid planning that resulted in spatial marginalisation of majority South Africans (SACN, 2006; The Presidency, 2004a & 2006). The NSDP recognised that different regions were potential growth nodes and sources of employment. Aligned with job creation, other cost-effective programmes would include human capital development – through advancing education, providing training opportunities particularly for the youth and the unemployed, and initiating poverty relief programmes to improve the quality of life for the poor (The Presidency, 2006). In addition, the government hoped to improve the provision of basic services particularly for the poor, and also, enhance balanced economic growth by initiating economic activities in areas that were previously neglected, but had economic potential.

According to the Presidency (2004a) the NSDP was to facilitate communication flow from the national level to provincial and municipal levels with a clear outline of priority areas for investment. Also, the NSDP promised to improve policy coordination and implementation plans between all spheres of government, the private sector, and communities premised on a coordinated approach towards infrastructure investment and development decisions to achieve the desired national objectives.

The NSDP highlighted good intentions of supporting growth and competitiveness in specific regions however, the NSDP was weak on innovation, pro-poor growth and knowledge-based development. Further, the NSDP seemed to be silent on environmental sustainability and tended to focus more on spatial development and less on developing sustainable human settlements (DEAT, 2008; Pillay, 2008; Turok, & Parnell, 2009). Further, the NSDP has not considered the possibility of increased migration to these identified growth areas that will impact on increased demand for basic services and environmental sustainability. It is evident that the NSDP has not prioritised the need for improving sustainable human settlements particularly in the urban areas (Du Plessis & Landman, 2002; Pieterse, 2007).

#### 4.1.4 Medium Term Strategic Framework

The Presidency published a Medium Term Strategic Framework (MTSF) to guide government programme for the 2004-2009 electoral mandate period (The Presidency, 2004b). The MTSF hoped to reduce poverty and unemployment by half, develop human capital, empower all South Africans, improve service delivery and also improve monitoring and evaluation mechanisms (The Presidency, 2004b: 2). The MTSF priorities included economic and fiscal policy tradeoffs, increasing the rate of



public and private sector investments, improved economic growth in marginalised areas through EPWP, small and micro enterprises, skills development and land reform, addressing the needs of welfare grants and improved capacity of the local government (The Presidency, 2004b: 5)

The MTSF for the electoral mandate period for 2009 to 2014 as recently published reflected on government's performance during the past fifteen years of democracy with a view of continued improvement. The MTSF aimed at improving SA's economic productivity by identifying growth opportunities that would contribute to poverty reduction and equality in resource distribution (The Presidency, 2009d: 7). The strategic priorities of the MTSF were mainly to address socio-economic challenges and included job creation, sustainable livelihoods, improving economic and social infrastructure, rural development and food security, sustainable resource management use, improved service delivery and strengthening democratic institutions (The Presidency, 2009d: 7).

In addition, outcome indicators as well as performance indicators for local government would be developed to measure outcomes and government performance in the strategic priorities (The Presidency, 2009d: 41). However, the MTSF seems to focus on socio-economic transformation, and is not strong on the linkages of urban and environmental sustainability, particularly on land use and transport in urban areas. The MTSF promises to "*ensure sustained investment growth over the medium-term to achieve 25% GDP growth by 2014*" (The Presidency, 2009d: 16) and "*provide adequate basic services such as water, sanitation and electricity to schools and progressively improve access to facilities such as libraries, classrooms and laboratories*" (The Presidency, 2009d: 24).

The MTSF developed for the 2004-2009 electoral period mainly focused on economic growth, and rarely addressed social and environmental issues while the MTSF for 2009-2014 had different strategic objectives and also seemed to include sustainable resource use. Both MTSFs were weak on indicators and also what monitoring programmes would be developed for implementation of projects other than those mentioned in both documents for monitoring and evaluation programmes for economic development.

Further, the MTSFs did not provide a precise implementation plan for the strategic priorities. For example, it is not clear how the government would achieve a 25% GDP growth by 2014. Recent studies have shown that since 1994, the government has made substantial investment towards provision of services to improve the quality of life of the poor, particularly in the urban areas. Despite these efforts, the quality of the services is poor and the challenges of youth unemployment, inequality and poverty still persist (Swilling, 2006; Wall, 2008; Hendler & Thompson-Smeddle, 2009).

#### 4.1.5 Green Paper on National Strategic Planning

The Green Paper on National Strategic Planning published in 2009 proposed the creation of a national planning commission and an institutional framework for planning that includes a Medium Term Strategic Framework (The Presidency, 2009b). The Green Paper expressed the need for a long term vision and plan, a five year strategic framework, an annual programme of action and a spatial perspective and periodic research to be undertaken by intellectuals and experts outside government.

The Green Paper aimed at improving the quality of life of all South Africans by providing sustainable jobs, quality education and opportunities for skills development, improved health, community safety and social cohesion. However, it is not clear how these objectives would be achieved. According to the Green Paper, the government priorities as outlined in the MTSF, would receive special attention with respect to allocation of resources. The provincial and local governments were also expected to develop their specific plans, undertake policy development and plan for resource allocation. Further, provincial and local governments were expected to implement these plans, followed by regular performance monitoring and evaluation to assess progress in policy implementation and also identify areas that require improvement. The Green Paper failed to specify how the performance, monitoring and evaluation would be implemented.

The Green Paper claimed that social dialogue and partnership with external stakeholders is important and that stakeholders such as the state-owned enterprises should align their plans with national strategies. According to the Green paper, the development of the national Plan would be assigned to consultants that consist of experts and intellectuals who are not part of government (The Presidency, 2009b: 3). It is clear that the Green Paper was not developed in consultation with important stakeholders such as communities, business and the civil society. Further the document is not clear on the roles of the proposed planning agency and the consultative institution. Besides, the Presidency failed to take initiative in developing and implementing an integrated policy to address urban challenges (Edigheji, 2010). The Green Paper mentions that a spatial dimension of planning is critical in the SA cities, yet it is silent on how planning for urban complex systems will address important issues like provision of education, health and sustainable human settlements (The Presidency, 2009: 19).

Following the Green Paper, the National Planning Commission was established in 2010 and published its first report coined *Diagnostic overview* of June 2011, detailing the persisting challenges facing SA (The Presidency, 2011). Among the challenges mentioned by the document were: high levels of poverty, inequality, low quality education for black communities, high levels of unemployment affecting the youth and increasing levels of material consumption. According to the

report, a national vision and a development plan to address these challenges are lacking (The Presidency, 2011: 1).

#### 4.1.6 Improving Government Performance: Our Approach

The *Improving Government Performance: Our Approach* discussion document was published by the Presidency in 2009 detailing the government's plan on performance monitoring and evaluation of government institutions and agencies (The Presidency, 2009c). This document acknowledged that the SA government has not adequately met the needs of its citizens, particularly in provision of quality basic services and would therefore focus on the priorities in the MTSF, with the aim of improving the quality of outcomes such as education and health outcomes.

Among the key objectives were improving efficiency and reducing the cost of services provided for basic services. These objectives would be achieved through outcomes-based planning and performance management where specific outcomes and indicators to measure whether the outcomes have been achieved, would be agreed upon. The process would involve agreeing on expected outcomes and outcome indicators by the government. The Presidency (2009c) would also identify key activities necessary to achieve the desired outputs like the provision of workbooks and core textbooks to 80% of schools. Furthermore, performance agreements between ministers, members of the executive council and the president of SA would be signed, followed by a performance report to the president of SA within six months of the performance agreement. The Presidency would perform annual reviews to identify areas for improvement and also create a delivery unit, whose role would be to analyse failures in delivery and lessons learnt from successes at all spheres of the government (The Presidency, 2009c: 19).

In addition, a ministry of performance, monitoring and evaluation would be created, whose role would include: developing the performance agreements, improving the government-wide monitoring and evaluation system and improving service delivery (The Presidency, 2009c: 19). However, little was mentioned on how these roles would be performed. Although the discussion document promised to coordinate policies and programmes across all spheres of the government, the government has not been consistent in policy development and alignment with budget allocations for addressing key challenges facing SA such as poverty, unemployment and climate change. Besides, municipalities should be empowered to address basic service backlogs in their regions (Turok & Parnell, 2009).

Despite the government promises, studies have shown that the national, provincial and local spheres of the government have not been effective in provision of basic services and have largely excluded the poor from national policy dialogue (Govender *et al* 2010; Pieterse, 2010). For example, the

government has provided low-quality and unreliable infrastructure and basic services in an attempt to meet the needs of the majority poor South Africans. The government seems to have overlooked the long-term benefits of quality service provision and this has resulted to constant protests from communities and sometimes demolition of the already constructed housing units (Govender *et al* 2010; Pieterse, 2010). Other studies have shown that subsidies provided for basic services provision and for infrastructure maintenance are not adequate, resulting in high costs of services like health care, electricity, water, sanitation, education and housing (Freund, 2010). Notably, the provision of services to the middle and high income population groups is heavily subsidised by the government and also the poor have been largely excluded from the national policy dialogue (Bond, 1999; Govender *et al* 2010).

Further, there seems to be unresolved tensions within government departments on the meaning of terminologies like *accelerated growth*, *transformation*, *economic efficiency* and *social equity*. This has resulted in policy inconsistency and lack of long-term planning within all spheres of the government (Turok & Parnell, 2009). Maile (2010) noted that investment for schooling facilities and training is inadequate in most of the public schools, and this has contributed to low quality education services in some public schools. On the other hand, private institutions provide higher quality education which only benefits the middle and upper class segments of the society.

According to a recent study on human settlements in the low-cost subsidised housing settlements in the CCT Metropole, the settlements were poorly constructed and lacked adequate infrastructure such as toilets and wastewater drainage systems (Govender *et al* 2010). As residents could not afford to maintain their units they eventually constructed informal housing units in the backyards of the main houses for income generation. According to Govender *et al* (2010) the subsidised houses were poorly designed, and contributed to unhealthy living conditions, prompting the prevalence of water and air borne diseases. Also, incidences of flooding and fires were frequent because of the proximity of the houses, the flammability of construction materials used and the inadequate drainage systems (Bond, 1999; Govender *et al* 2010).

According to Cloete (2005: 14) despite the policy assessments introduced by the SA government to measure good governance in public institutions, a systemic and co-ordinated implementation of policies is lacking. Also, as Cloete (2005) noted, his review of the SA national policy documents showed that international good practices in measuring SD, such as the performance indicators developed by the World Bank to measure efficiency in resource use, outputs, outcomes, impact and project sustainability have not been developed and implemented in SA.

Several studies have shown that the Apartheid legislation and planning approaches resulted in the fragmenting of SA towns and cities with catastrophic high levels of poverty and unemployment countrywide (NDoH, 1997; DEAT, 1998b; NDoH, 2004; SACN, 2006; City of Cape Town, 2006b & 2006c; DLG & H, undated). The past discriminatory systems included spatial segregation of settlements where communities were grouped based on race. This resulted in unequal distribution of services like water, electricity, sanitation and, transport (NDoH, 1997; DEAT, 1998b; NDoH, 2004; SACN, 2006; City of Cape Town, 2006b & 2006c; DLG & H, undated; The Presidency, 2006).

In several provinces, it is evident that land use developments are largely controlled by the private sector and this has prompted persisting inequality in land distribution (Du Plessis & Landman, 2002; Goebel, 2007; Todes *et al* 2010). In addition, subsidised house are located in areas where property values are low while private sector investments are targeted on prime land, with high property values (Pieterse, 2010; Todes, 2011).

The SA government has acknowledged that cities globally face similar challenges of economic recession and climate change that need redress to promote SD. Following the advent of democracy in 1994, the government made commitments to address the challenges caused by Apartheid regime through the transformation of the legislative and institutional frameworks (NDoH, 1997; The Presidency, 2007a; UNDP - SA, 2003; DLG & H, undated). The government also undertook to implement efficient monitoring and evaluation mechanisms for improving performance in resource distribution and in implementing environmental and developmental programmes.

According to the Presidency (2004a) the policy framework in SA should promote the objectives of SD through collaborative development and joint government action to facilitate sustained efficiency, equity, and environmental sustainability. In an attempt to coordinate the urban policy at the national level as well as a response to the Agenda 21 Principles and the RDP, the SA government developed the Draft Urban Development Framework (UDF) in 1997, and later revised it in 2005 (Pillay, 2008). The intention of the UDF was to promote reconstruction and development in cities through integrating the city, improving housing and infrastructure, promoting economic development, and creating institutions for service delivery (NDoH, 1997 & 2004).

However, the UDF was never finalised and agreed to by Cabinet and consequently, cities started partnering with the private sector to take the aspects of urban policy forward through proposed city development strategies (SACN, 2004). Further, Pillay (2008) noted that national policies such as the NSDP, MTSF and NFSD may lose significance as SACN in partnership with the private sector and major cities including CCT are taking the initiative to develop and implement City Development

Strategies, initiatives supported by the Cities Alliance, a coalition of bi-lateral and multi-lateral development agencies, governments, non-governmental agencies and politicians.

The national policies including the NSDP, The Green Paper on National Strategic Planning, and Improving Government Performance seem to focus on enhancing socio-economic development as well as short and medium term basic service provision, but they rarely address environmental concerns. For example national policies rarely address the environmental impact of increased resource consumption in the cities particularly by the affluent communities as well as by commercial and industrial sectors.

There seems to be concentration of investment in urban areas to promote economic growth and efficiency, improve quality of life and reduce poverty, yet urban agriculture is rarely addressed in policy (Pillay, 2008). Urban agriculture could play a key role in curbing urban sprawl, providing sustainable jobs to local communities as well as providing healthy and cheap healthy food products. Sustainability could possibly be improved through locally generated solutions that will address environmental challenges, while boosting economic development (May & Rogerson, 1995; Pillay, 2008).

The government priorities seem to contradict each other in several policy documents. For example the MTSF priorities are *“to halve poverty and unemployment by 2014, equitable distribution of resources, improve health and skills development, improve the safety of citizens and build a nation free from racism, sexism, tribalism and xenophobia”* (The Presidency, 2009: 2). While the NFSD priorities are *“integration of government systems, efficiency in resource use, equitable distribution of resources, accelerated infrastructure investment, integrated human settlement, reducing the prevalence of HIV/Aids and Malaria and identifying quick win projects”* (DEAT, 2006a: 69).

From the stated priorities there also seems to be an overlap of some activities for example, both the MTSF and the NFSD have addressed *equitable distribution of resources*. The development of national policies seems to have taken a top-down approach, providing guidelines to the provincial and local governments. Further, there are rigid bureaucratic processes required by the national government that consequently limit implementation of SD at the local government level. Such bureaucratic processes include signing of performance agreements between the president of SA and the education sector (The Presidency, 2009c: 8) For example, the municipal IDPs are informed by the NSDP, NSSD, the PGDS and the NSDF and less frequently consider unique local challenges (City of Cape Town, 2007b). Also, the development of the national policies seems to have targeted civil groups with financial capabilities and seems to have excluded the disadvantaged population groups including the poor, women and the youth (DEAT, 2008).

## 4.2 Policy framework in the Western Cape Province

The SA national government required all provinces to prepare detailed policy frameworks and implementation programmes for local municipalities – depending on the specific needs of each metropolitan area (Office of the President, 1994). Municipalities were expected to develop programmes aimed at reconstruction and development, redress of past injustices, and the promotion of SD. To respond to the global and national initiatives, particularly the UNCED, MDGs and the JPOI, the Western Cape Province recognised the interdependencies of economic growth, social equity and environmental integrity as stated in its conceptual framework for SD published in 2005 (DEA & DP, 2005). As such, several policy documents have been developed to integrate sustainability principles into the PGDS and the IDPs in the Cape metropolitan region. For the purpose of this study a few policy frameworks and implementation plans are discussed in the following sections.

### 4.2.1 Environmental framework

One of the key challenges in the Western Cape Province is the inadequate public transport system and the reliance on private transport by the middle class in urban areas. The transport sector accounts for about 54% of the total Cape Town energy consumption and has been identified as a significant contributor to greenhouse gas emissions (DEA & DP, 2007 & 2008). The Western Cape Provincial Transport Policy published in 1997 was to integrate transport issues with other sectoral policies such as energy use, air quality, safety and spatial planning in addressing interrelated challenges and also provide equitable transport access to all residents of Western Cape (Department of Transport and Public Works, 1997). However, recent studies have shown that an integrated public transport network is still lacking in SA cities (Clark & Crous, 2002; City of Cape Town, 2006g; Turok & Parnell, 2009). This could be attributed to limited financial resources and lack of institutional capacity to implement and maintain public transport systems at the local government level.

Besides, integration of land use and transport planning has been hindered by competing policy interests of different government sectors and departments. Although majority South Africans rely on subsidised bus and rail for their transport needs, the public transport system does not sufficiently serve all settlement areas and also the regulation and enforcement of the minibus-taxi industry is weak (Clark & Crous, 2002; City of Cape Town, 2006g; Turok & Parnell, 2009). The dominance of private car use can be reduced by improving the maintenance of transport infrastructures as well as safety on trains, buses, and taxis, in addition to various demand management policies.

The Western Cape Province is among the leading tourist destinations in SA and tourism plays a key role in contributing to economic growth of the province. For instance, tourism has created jobs in

guest houses, hotels, catering and also in arts and crafts business sectors. The Western Cape Provincial Treasury (2009) noted that in 2007, the provincial income from international visitors amounted to 17.7 billion Rand, contributing to about 11% of the total income derived from the tourism industry (DEA & DP, 2005; Western Cape Provincial Treasury, 2009). The White Paper on Sustainable Tourism Development and Promotion in the Western Cape published in 2001 aimed at promoting tourism safety and security. However, tourism growth in the Western Cape Province is constrained by security concerns, inadequate resources, and limited funding (DEAT, 2001; Western Cape Provincial Treasury, 2009). Sustainable tourism requires local resources, such as water, to be used efficiently. In addition, an assessment of environmental and socio-ecological impacts should be undertaken before the implementation of tourism programmes to avoid degradation of sensitive areas (e.g. cultural heritage sites and agricultural land).

A Sustainable Energy Strategy and Programme of Action for the Western Cape published in 2007 aimed to develop a sustainable energy system to reduce negative environmental and human health impacts (DEA & DP, 2007). Through the policy the provincial government committed itself to reduce dependence on fossil fuels by promoting renewable energy and energy efficiency in industry, government departments, and the community. Energy programmes would be targeted to address equal distribution of energy particularly to serve the needs of the poor. According to DEA & DP (2007) the programmes would aid in reducing the carbon footprint in the Western Cape Province.

The Western Cape provincial government recognised the interrelationship between energy and water and the need to optimally address their sustainability through interdepartmental coordination. For instance, energy is required in applications such as water heating systems, cooling systems, industrial processes and transport processes. To address these issues, the Western Cape Province undertook to develop an integrated water management programme to incorporate water management measures like water efficiency through pricing strategies, water systems maintenance and repairs and conservation of wetlands (DEA & DP, 2008). According to the Provincial Spatial Development Framework (PSDF) published in 2005 by the Western Cape Province, it was expected that the province would generate about 25% of its energy from renewable resources by 2020. It was proposed that this would be achieved by developing a renewable energy plan to reduce green house gas emissions by 10% over 20 years. Legislation to install solar thermal water heating systems for all new buildings would also be introduced (DEA & DP, 2008 & 2009).

While the responsibility of reporting on the SoE in SA was assigned to DEAT, it is important to note that sustainability should not only involve measuring and reporting on the state of bio-physical environment but also needs to deal with the interrelationships between the physical environment and



human systems. Therefore, provincial departments, local government, and social partners should jointly address the interrelated socio-economic and ecological challenges.

#### 4.2.2 Western Cape Provincial Growth and Development Strategy – *Ikapa Elihlumayo*

The Western Cape Provincial Growth and Development Strategy (PGDS) known as *Ikapa Elihlumayo*<sup>9</sup>, published in 2006, was aimed at creating an environment for shared growth and integrated development in the Western Cape Province. In order to fulfil the national objectives of ASGI-SA and the NSDP towards improving quality of life, programmes for reducing poverty and inequalities for residents of the Western Cape were to be developed (DEA & DP, 2005; Province of the Western Cape, 2006). The strategic goals of the PGDS are summarised as follows: “*enhance broad economic participation with community participation, efficient connectivity to stimulate sustainable economic growth, effective public and non-motorised transport, liveable communities that nurture the well-being of all residents, resilient and creative communities interconnected through social networks, improved spatial integration, enhance social and cultural diversity and effective governance institutions*” (Province of the Western Cape, 2006: 75).

According to the Western Cape Provincial review and outlook published in 2009 and in 2010, economic growth in the province has in recent years been affected by the global economic recession, particularly in the tourism and manufacturing sectors. Social challenges constraining economic growth in the province have been identified as high levels drug abuse, crime, poverty and poor health (Western Cape Provincial Treasury, 2009 & 2010).

The provincial strategies were outlined over a ten-year period to guide development planning in districts and metropolitan regions. The PGDS seems to contradict the NSDP, MTSF and the City of Cape Town IDPs in addressing developmental needs of the province. The specific economic objectives of the PGDS were not clearly stated, particularly regarding how the quality of the disadvantaged communities will be improved. Further, the responsibilities of sector departments and the Western Cape region social partners in implementing the PGDS were not specified (The Presidency, 2004a; Province of the Western Cape, 2006).

Through the strategy, regional economic development and job creation mechanisms would include skills development programmes as outlined in the ASGI-SA objectives. The strategy hoped to promote spatial integration, environmental management and improved transport systems as included in the urban development frameworks within the context of Western Cape Sustainable Development Implementation Plan (DEA & DP, 2005). For example, economic development requires strong co-

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<sup>9</sup>Ikapa elihlumayo in Xhosa language means ‘growing the Cape’

operative governance within all spheres of governance and the social partners (e.g. government, labour, business and civil society) with clearly defined roles for each stakeholder as outlined in the PGDS.

The strategy also proposed indicators to measure input, outcome performance, and impact to measure the extent to which the Western Cape Province has achieved the set targets. The indicators for measuring each of the eight strategic goals were proposed for monitoring progress in implementation of the PGDS by the Western Cape Province (Department of the Premier, 2007). The results based monitoring and evaluation system was to be aimed at measuring inputs, outputs, outcome and specifically the impact of programmes based on the PGDS framework on accelerated economic growth, environmental integrity, empowerment, and integrated development. The indicator framework would have included the eight strategic goals of the PGDS. The proposed monitoring and review strategic framework for the PGDS is shown in Figure 6. According to the Province of the Western Cape annual report published in 2008, the monitoring and evaluation system was not implemented as there were no effective performance management systems in place. In addition, most municipalities lacked consistent strategies for shared growth (Province of the Western Cape, 2008).

One of the aims of the Western Cape Human Settlements Strategy was to include local communities in planning of human settlements and to align its activities to other related intergovernmental policies, plans and budgets while supporting the municipalities with required resources for implementing human settlement programmes (DLG & H, undated). Through the strategy, the quality of life of the poor would be improved by providing them with decent houses. In addition, the strategy would involve the private sector and the community in designing sustainable settlements and creating a well functioning property market. The property markets would then enable communities to secure loans from financial institutions. Despite these promises, detailed infrastructure policies and strategies for implementation at municipal level were lacking (Province of the Western Cape, 2008).

A major challenge facing the Western Cape Province is to reduce the housing backlog of 410,000 units by 2040 and also to plan for the increasing number of people migrating to the province. For example, in 2004 potential housing demand resulting from population increase and in-migration was estimated at 27,000 per year (DEA & DP, 2005a & 2005c; DLG & H, undated). However, the Western Cape Provincial Treasury (2009) noted that unemployment levels in the Western Cape Province are increasing specifically among the unskilled blacks, coloureds and females between 15-24, and 25-34 age groups. Thus, adequate human settlements are crucial for social integration and an environment where people not only have access to houses but can also work while utilising the local resources and talents (Swilling, 2006; Hendler & Thompson-Smeddle, 2009). Sustainable human

settlements should provide basic needs (e.g. water, energy, schools, hospitals) while being sensitive to the carrying capacity of the local environment.

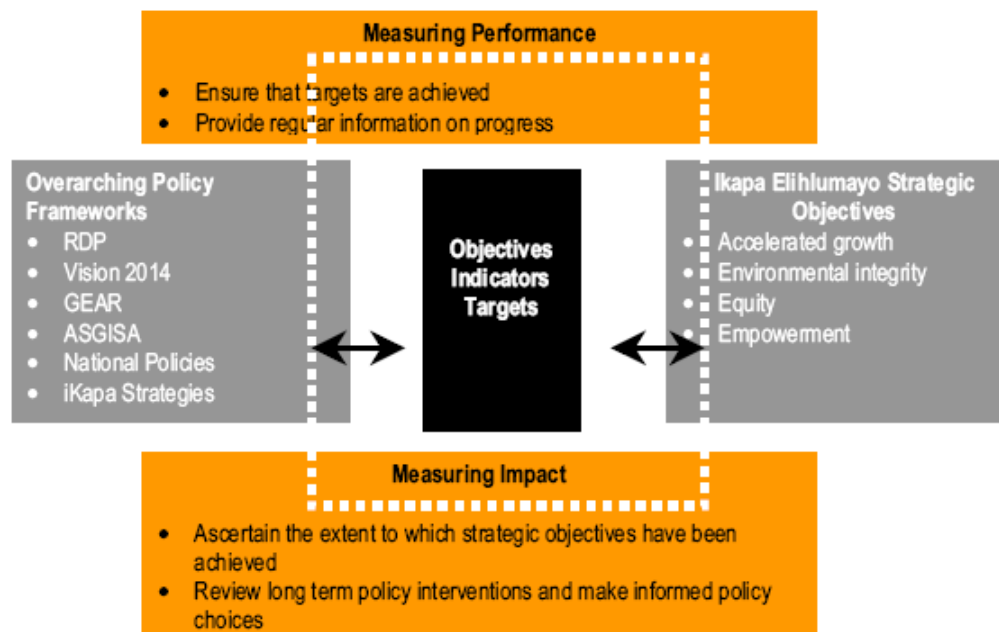


Figure 6: Monitoring and evaluation framework. Source: Province of the Western Cape, 2006: 102

#### 4.2.3 Western Cape Spatial Development Framework

The Western Cape Spatial Development Framework aimed at promoting bioregional planning specifically in creating sustainable human settlements in response to housing, resource use and land use challenges in the Western Cape Province (DEA & DP, 2005b & 2009). Through coordinated spatial planning, the strategy would guide the municipal government in drafting the IDPs and spatial development frameworks for the local communities. Through the strategy, it was envisaged that the provincial and national departments would jointly address SD by prioritisation and alignment of infrastructure plans (DEA & DP, 2005a, 2005b, 2009). Also, sustainable settlements where residents would access employment, education, public transport and recreational opportunities would be created (DEA & DP, 2005b, 2009; DLG & H, undated). This would be achieved by planning for integrated high density settlements, while preserving open spaces, farmlands and heritage resources. For example the integration strategy aimed to ensure that shops, offices, schools and recreation parks are accessible to communities.

#### 4.2.4 Transformation Plan for the Western Cape Province

In order to implement the PGDS principles, a transformation plan focusing on principles of equity, social integration and community participation was published in 2005 by the Western Cape

government to guide equitable distribution of resources, particularly towards the poorly resourced areas. The plan aimed at guiding the Western Cape Province towards achieving its developmental targets. This would be achieved by introducing mechanisms for accountability on use of public funds by the government departments. In addition, clear monitoring and evaluation systems would have been established (Department of Social Services and Poverty Alleviation, 2005). Through the transformation plan, the Western Cape Province aimed to reduce the HIV/Aids infection rate and also reduce levels of poverty. According to the Department of Social Services and Poverty Alleviation (2005), the Western Cape provincial prevalence rate in 2004 was approximated at 12% of the age group between 25-29 years. Increase in infection rate was partly attributed to the high poverty levels in the province particularly in child-headed families.

Literature shows that the Western Cape Province has the highest levels of inequality in SA and the levels appear to be increasing, particularly with regard to provision of education, and health services (Department of Social Services and Poverty Alleviation, 2005; DEA & DP, 2005a; Western Cape Provincial Treasury, 2009). According to recent statistics, unemployment in the Western Cape increased from about 19.7% in 2008 to approximately 22.5% in 2009 (Western Cape Provincial Treasury, 2009: 42). The unemployed residents consisted of approximately 44.2% of the economically active black population and 48.4% of the economically active coloured population and only 6% of the white population, while 32.4% of the young population was unemployed (Western Cape Provincial Treasury, 2009: 42).

Through integrated SD programmes and support services, the Plan aimed at providing health programmes, sporting events as well as leadership programmes to the younger population. The EPWP would also be implemented to reduce poverty levels in the province. Other programmes would include social security for the aged population, women and children (Department of Social Services and Poverty Alleviation, 2005). Although various policies have advocated stakeholder participation and alignment of government priorities, in practice policy alignment and stakeholder participation are lacking (DEA & DP, 2005a, 2005b, 2005c).

The high crime rates specifically in Mitchell's Plain, Khayelitsha, Gugulethu, Nyanga and Oudshoorn informal settlements could be attributed partly to the high unemployment rates and this poses a challenge to SD objectives of the Western Cape Province. In addition, insufficient infrastructure in primary schools deters education especially for lower primary school learners. A disparity in service delivery is still evident in the Western Cape for instance the majority of the primary schools are poorly maintained and are also not sufficiently equipped with learning materials (Department of Social Services and Poverty Alleviation, 2005).

#### 4.2.5 Western Cape Climate Change Strategy and Action Plan

The Climate Change Strategy and Action Plan for the Western Cape Province recognised the vulnerability of the province global climate change as evidenced in occasional rising of the sea level (DEA & DP, 2008). The vulnerable systems are water, coastal and marine systems, agriculture, tourism, energy, health, and air quality. According to DEA and DP (2008) SA is the 19<sup>th</sup> biggest greenhouse gas emitter in the world with over 70% of emissions from electricity production. The transport sector is also a large contributor to greenhouse gas emissions. For example, the transport sector accounts for 54% of the total energy use by the CCT (DEA & DP, 2008: 19). The strategy aimed at providing response mechanisms to address climate change in line with the national and local strategic objectives and also integrate land use and biodiversity planning (DEA & DP, 2008).

In addition, monitoring and evaluation of government programmes would have been introduced. These would include the provincial progress in adaptation and management of risks resulting from climate change. Mitigation programmes identified by the strategy were air quality monitoring, household fuel replacement, waste management, energy conservation and recycling initiatives, developing provincial renewable resources, energy efficiency through pricing strategies, transport fuel replacement and, development of electric cars and solar water heaters (DEA & DP, 2008).

To reduce greenhouse gas emissions and impacts of climate change, planning and adaptation mechanisms are crucial for SD. These would require stakeholder and community education and awareness programmes on climate change, adaptation and response mechanisms as well as detailed research on climate change. As noted in the previous chapters, demand for water and energy in the Western Cape already exceeds supply and therefore alternative sources of water and energy supply, such as ground water and renewable energy options are critical. Also the existing resources should be used efficiently in order to advance socio-economic development while protecting the environment. It is therefore evident that a holistic vision of SD does not strongly feature in the current government planning systems particularly in the Green Paper on National Strategic Planning, the MTSF, NSDP, NSSD, PGDS and the IDPs.

### 4.3 City of Cape Town policy framework and plans

According to various policy documents the CCT is committed to implementing SD objectives stipulated in various global agreements as well as in the SA national, provincial and local policies (City of Cape Town, 2003, 2006g, 2007b, 2008a, 2008b, 2009a). Several small scale projects aimed at addressing the needs of Cape Town communities have been initiated. These include food gardening

at Khayelitsha and Mitchell's Plain, air quality management in Wallacedene, the bicycle recycling project by the Cape Town-Aachen partnership and, Mfuleni integrated water leaks repair project. These projects were rated as having addressed issues pertaining socio-economic and environmental dimensions of SD (City of Cape Town, 2005c).

According to City of Cape Town (2006g) integrating the principles of equity, dignity, and sustainability are crucial for city improvement. The metropolitan government of the CCT recognised the complexity of the City and its dynamism and acknowledged that an integrated system of governance is crucial to respond to the interrelated environmental and socio-economic challenges. Thus, the CCT government committed itself to develop integrated policies to address specific challenges.

The Cape Town website provides various policies and plans developed by the CCT between 1994 and 2009 in an effort to achieve these objectives (City of Cape Town, 2010b). For the purpose of this study, selected policy initiatives and plans are presented in the following sections. These include the Integrated Metropolitan Environmental Policy (IMEP), Integrated Transport Plan for the City of Cape Town, Responsible Tourism Policy for the City of Cape Town, Cape Town Economic and Human Development Strategy (EHDS), Draft City of Cape Town Green Buildings Guidelines, City of Cape Town Integrated Waste Management Policy, Draft Cape Town Spatial Development Framework and, various editions of the IDP.

#### 4.3.1 Integrated Metropolitan Environmental Policy

The IMEP published in 2003, provided a vision for environmental targets to be met by 2020. The City aimed to address environmental challenges of waste management, transport systems, human settlements and resource management through the IMEP, IDP and the sectoral plans for example, by providing environmental education on efficient resource use to all Cape Town communities (City of Cape Town, 2003, 2007b).

The IMEP envisaged that the implementation of the policy would be through sectoral strategies and the IDPs for Cape Town. Among the goals of the IMEP were improvement of air and water quality, biodiversity conservation, developing efficient transport system and improving the living conditions for the poor by 2020. The goals of the Cape Town IMEP are included as Appendix L.

The IMEP aimed at creating partnerships and addressing issues identified in the SoE Reports. Such issues included air quality, water resources, urbanisation, housing, transport, energy and crime. The

City of Cape Town (2009a) noted that global competitiveness, resource constraints and the impact of climate change are key challenges that hinder SD in the CCT. The IMEP identified 17 measurable targets that would be implemented by the local government. For example, the Department of Spatial Planning would define and protect the urban and coastal edge as well as heritage areas by 2014 (City of Cape Town, 2009a).

#### 4.3.2 Integrated Transport Plan for the City of Cape Town

In 2006, a transport plan was published setting out the City's vision, objectives, strategies and projects for developing and managing the public transport system (City of Cape Town, 2006f). One of the priorities of the plan was to improve public transport through safety, efficiency and affordable transport costs in trains, buses and taxis.

The Integrated Transport Plan for the City of Cape Town for 2006-2011 was published in 2009 whose objective was to integrate transport policies into land use planning. Further, investment along economic nodes would ensure densification and mixed land use beginning with Klipfontein corridor, N2 Gateway and Vangate Mall regions (City of Cape Town, 2009d). It was envisaged that the private and public sectors would take advantage of the FIFA World Cup to create short-term employment opportunities through EPWP and procurement services. The targeted sectors were tourism, construction, transport and trade.

The objectives of the transport plan included promoting travel demand management measures by limiting private car use, reducing vehicle emissions, promoting public transport, walking and cycling. The plan aimed at improving safety at interchanges as well as enhancing the maintenance of transport infrastructure. An integrated rapid transport system serving the inner City and surrounding areas would be developed to coordinate metro services, road based services, pedestrian and bicycle access, metered taxi integration and, park and ride facilities. Sectoral strategies would be developed including public transport strategy, transport infrastructure strategy, a travel demand management strategy and a freight logistics strategy.

Key performance indicators to monitor delivery of a sustainable transport system were identified as follows: energy use, emissions, full modal split, public transport (use, coverage, service and quality), congestion on major routes, congestion on peak hour commuter routes, loss of life and livelihoods, urban quality and security (City of Cape Town, 2009d: 21). Despite the development of the transport policy and plan, public transport is constrained by incidences of violence and insecurity particularly

in trains. In addition transport infrastructure in urban areas with low densities is inadequate (Todes, 2011).

#### 4.3.3 Responsible Tourism Policy for the City of Cape Town

The responsible tourism policy was published by the CCT in 2009 to manage tourism in a manner that would promote socio-economic and environmental benefits and minimise costs to destinations through “*economic growth, environmental integrity and social justice*” (City of Cape Town, 2009b: 3). The policy promised to create an enabling environment for job creation, poverty alleviation, economic empowerment and skills development including the local culture and heritage. In addition the policy would reduce resource consumption and enhance environmental resource management.

The Cape Town government also envisaged the development of indicators to monitor progress in implementation of the policy by creating a responsible tourism action team as well as a responsible tourism charter that would commit the CCT to prepare tourism improvement plans. Despite the promises of the tourism policy, the document lacks precise implementation plans on how the desired objectives would be achieved. It is not clear how jobs will be created or how the poor communities will be involved in implementation programmes (City of Cape Town, 2009b).

#### 4.3.4 Economic and Human Development Strategy

The City of Cape Town’s Economic and Human Development Strategy published in 2006 focused on shared growth specifically in promoting local and international trade (City of Cape Town, 2006c). The strategy aimed at reducing poverty and inequality through trade and skills development for the local communities and also support the informal sector by providing job opportunities to the majority of the residents who are either semi-skilled or unskilled (City of Cape Town, 2006c).

The strategy also advocated improving the quality of life of the CCT residents through access to affordable and quality basic services like energy, waste management services, efficient and safe transport, and integrated human settlements. The focus would have been on the tourism sector, call centres, renewable energy, arts and craft, clothing and textiles, boat building and agribusinesses (City of Cape Town, 2006c). Figure 7 illustrates how the City aimed to improve quality of life through advancing its trade competitiveness.

However, what was lacking in the policy was indications on how these activities would be coordinated and also the specific programmes of action. In addition there were no realistic set targets



to guide the implementation programmes. The City failed to take into consideration availability of funds and capacity for implementation.

Enhance global competitiveness ←			→ Targeted poverty reduction	
1 Developed economy:	2 Economies of the poor:	3 Economic bridges:	4 Services:	5 Human, social & natural capital:
Sector support	Skills development and training	Supply chain management and development	City planning	Continuous education – ECD and ABET
Destination brand management and marketing.	Informal trade support.	Use of state owned assets	Basic services including water, sanitation, waste and electricity (& indigent policy)	Youth and other vulnerable groups' programmes
Investment promotion	Low-skilled job creation (e.g. EPWP)	Infrastructure development	Housing – both subsidised and gap housing for the 'un-bankable'	Community development including sports
Area targeting and management.	Business support.	Enabling business environment	Public transport	Environmental management
Business and consumer security.	Business and consumer security.	Research and information	Health and social services including access to grants	Safety, security and risk reduction

Figure 7: EHD Strategy: Implementation plan. Source: City of Cape Town, 2006c: 15

#### 4.3.5 Draft City of Cape Town Green Buildings Guidelines

The CCT published the Draft Green Buildings Guidelines to promote efficiency in the use of resources for construction of new or renovated buildings in Cape Town (City of Cape Town, undated b). The draft guidelines proposed incorporating sustainability into the life cycle of buildings through initiatives like the use of locally available products, use of renewable energy resources for manufacturing of building products and the energy used in buildings. This would be achieved through the development of energy and water efficient technologies as well as efficient management systems. The initiatives would also create job opportunities through procuring local products and services. Implementation guidelines included: redesign of old buildings such as factories and commercial buildings, compact urban development consisting of high density development in urban areas and along transport routes and, promote the use of efficient building designs using energy efficient building materials that would allow natural heating and cooling (City of Cape Town, undated b).

#### 4.3.6 City of Cape Town Integrated Waste Management Policy

An Integrated Waste Management Policy was also published by the CCT with the aim of minimising waste as well as reducing environmental and health risks. The policy would also facilitate the review of the existing waste management policies and introduce a simplified and standardised mechanism of providing waste management services in the Cape Metropolitan Area (City of Cape Town, undated a). City improvement would comprise of: introduction of tariffs and rebates to minimise the levels of waste generated, reduction of waste at source, reuse of waste in its original form, separating types of waste at source, supporting businesses involved in recycling activities and improving socio-economic sustainability, public and environmental health by providing equitable and sustainable waste management services as well as infrastructure upgrade. The policy aimed at 20% reduction of volume of waste generated and disposed, and a further reduction of 10% of waste disposed in landfills by 2012 (City of Cape Town, undated b).

A monitoring and management performance programme would also be created to monitor waste minimisation performance including; efficiency of internally provided services, contracts for waste management services from external providers, outcomes and effectiveness of services. However, the policy is silent on the linkage between waste management and socio-economic development particularly on how employment opportunities will be created (City of Cape Town, undated a).

#### 4.3.7 Cape Town Spatial Development Framework

A recent Draft Cape Town Spatial Development Framework (CTSDF) published in 2010 (City of Cape Town, 2010a), has as aim to guide the spatial form and structure of the City, while managing growth and change. It is expected that the strategy will be supported by detailed District Development Plans and Environmental Management Frameworks. Among the objectives of the plan are to identify urban development priority areas, areas that need to be protected and, regions where investors should invest (e.g. malls, commercial housing etc). The plan would guide public and private investment, changes in land use rights, and industrial, commercial as well as residential developments. It was envisaged that these activities would curb urban sprawl as the plan proposed the development of higher density housing settlements along the corridors served by public transport. In addition, dedicated bicycle and pedestrian routes as well as open spaces would be developed to promote cycling and walking.

The broad strategies of the CTSDF are: *“plan for employment, improve access to economic opportunities, manage urban growth, create a balance between urban development and*

*environmental protection, build inclusive integrated and vibrant city*” (City of Cape Town, 2010a: 4). The initiatives of the CTSDF would include the management of infrastructure in the CCT, promoting residential and commercial development in areas served by public transport and protecting residents from the negative impacts of climate change.

Although several initiatives were promised by the CTSDF, the framework does not suggest a specific plan for implementing the specified strategies and also it is not clear how this policy will be integrated with the IDP and the IMEP (City of Cape Town, 2010a: 4). The CTSDF seems to assume that the private sector will agree to invest in areas already identified by the government as growth nodes. Also, the framework does not align its strategies with the Western Cape PSDP, particularly in addressing sustainable human settlements.

#### 4.3.8 Integrated Development Plans

The IDP approach was introduced in 1996 by the SA national government, inter alia also to guide LA 21 and to respond to SD challenges at departmental and municipal levels. Among the LA 21 principles are meeting basic human needs, using the systems approach to address challenges at the local level and community participation in decision making processes (UNDP SA, 2002: 3). The principles are included as Appendix M. The integrated development planning concept was aimed at achieving the following objectives (UNDP SA, 2002):

- ◆ Alignment of scarce resources with agreed policy objectives and programmes;
- ◆ Integration between sectors within local government;
- ◆ Alignment between national, provincial, and local government; and,
- ◆ Transparent interaction between municipalities and residents, making local government more accountable.

A review of the IDPs by the UNDP SA concluded that IDPs strongly focused on poverty alleviation and equal distribution of resources within municipalities (UNDP - SA, 2002). In particular, the review showed that SA municipalities had initiated programmes towards reducing poverty and promoting equality as required by the principles of LA 21, and the programmes were an outcome of a consultative process between the stakeholders and the community. For example, some of the municipalities involved local communities and a wide range of stakeholders in planning and implementing various programmes. In addition, the IDPs identified local talents and initiatives that were useful in the implementation phase. However, the main focus of the IDPs appeared to be on addressing socio-economic challenges, but with little attention to local and global environmental sustainability (DEAT, 2002).

The Municipal Systems Act (Act No. 32 of 2000) required that IDPs are prepared by all local governments in SA and reviewed every five years (City of Cape Town, 2004 & 2005). The IDPs were also required to reflect local community needs and the developmental objectives of the PGDS and national strategic plans. Focus should be on improving the quality of life of the previously disadvantaged communities, creation of sustainable human settlements and funding mechanisms (The Presidency, 2004a). The IDPs of Cape Town that were published in 2004 and 2005 consecutively focused on five themes namely crime, job creation, land and housing, poverty, and equitable distribution of resources.

The themes were supported by six interrelated strategies namely sustainable job creation, developing the urban core, improving existing settlements, transport and trade. The IDPs identified implementation mechanisms that would focus on mixed land use, high density development, urban design guidelines and transport subsidy systems. In particular, the IDPs aimed at upgrading informal settlements including Philippi, Khayelitsha, Atlantis, Mitchells Plain and the N2 Gateway (City of Cape Town, 2004a).

A new five year Integrated Plan (2007/08 – 2011/12) was published by the CCT in 2007, focussing on seven strategic areas that would address the City's environmental and socio-economic challenges (City of Cape Town, 2007b). The priority areas that were identified were poverty, unemployment, housing backlogs, drug related crimes, HIV/Aids, deterioration in public transport, traffic congestion, inadequate shelter, pollution, shared economic growth and development. Programmes to address some of these challenges entailed facilitating investments, skills development and small-scale businesses. Through the IDP, the city aimed at achieving a GGP growth of 6% per annum and a reduction of unemployment and poverty by approximately 50% through opportunities provided by the 2010 FIFA World Cup.

The CCT government also undertook to address the settlements challenge through the creation of integrated human settlements, targeting approximately 350,000 families. Safety and security would be advanced through activities such as improving urban design, law enforcement, community and youth development programmes and improving the City surveillance. The IDP would also promote health, social and human capital development by introducing programmes that would reduce HIV/Aids, Tuberculosis and poverty. Through the IDP, the City promised to improve its administration, service delivery, regulatory reform processes and, intergovernmental partnerships (City of Cape Town, 2007b). Further, an intergovernmental integrated development task team would be created to address economic development and provision of human settlements (City of Cape Town, 2006g).

However, the sectoral policies in the CCT, including transport, housing, health, economic development policies, contradict each other and seem to rarely address sustainability. Consequently, the development of a coherent urban policy and implementation plan for addressing interrelated complex issues of urban development is still lacking. Further, local government departments seem to focus on different developmental priorities, resulting into disagreements in sectoral policy directives and implementation (Du Plessis & Landman, 2002; Pieterse, 2010; Todes *et al* 2010; Todes, 2011).

A recent Annual Performance Report published by the CCT in 2010 showed that the City had slightly improved in addressing critical issues in its IDP for 2009/2010 (City of Cape Town, 2010b). The achievements included: reduction of energy consumption in the Cape metropolitan area by about 6.7% by fitting energy efficient lamps to 40,000 streetlights, creation of approximately 8264 jobs during the World Cup, provision of electricity to 92% of households and upgrading the public transport system as well as the informal settlements (City of Cape Town, 2010b: 2). According to the Province of the Western Cape (2008) the IDPs of the Western Cape Province succeeded in addressing community needs at ward level however, several weaknesses of the IDP were poor alignment of organisational structures of the municipalities with the IDPs, minimal public participation, little engagement with provincial and national governments, little focus on environmental sustainability and lack of alignment and integration of the key performance areas identified in the IDPs. In particular, the CCT has focused on competitive economic growth to promote international trade relations, a move that seems to have a negative impact on poor communities as well as on small scale businesses (Province of the Western Cape, 2008).

Evidence suggests that the CCT local government has not been effective in improving service delivery despite the promises of the various editions of the Cape Town IDPs. The challenges of implementing the IDP in the Western Cape Province and particularly in CCT were recruitment, training and retention of staff within municipalities, provision of housing, job creation and skills development (Province of the Western Cape, 2008: 115).

The review of literature showed that although the affluent communities participate in decision making processes, active participation of the poor communities in local governance policy formulation and implementation has been minimal (McEwan, 2003). Notably, black women are rarely involved in decision making processes (McEwan, 2003; Todes, 2011). Also, political tensions exist between the DA and the ANC councillors, resulting to poor decision-making and implementation of policies in CCT. Besides, there is a shortage of capacity and funding at the local government level to implement the IDPs (McEwan, 2003; Todes, 2011).

#### 4.4 Concluding remarks

The review of policy documents at all levels of government clearly showed that despite numerous policies, plans and legislation developed within 17 years of democracy, fragmentation and inequality still persist in SA cities and sustainability seems to be poorly integrated into planning, implementation programmes and decision-making processes. The national government seems to have focused more on monitoring and evaluation of its performance and less on investigating and addressing the core problems of several challenges. For example, signing performance agreements to improve education outcomes and rarely addressing the core problems of poor education outcomes such as poor health and substandard living conditions particularly among black communities. Further, the national government seems to have allocated an insufficient budget towards municipalities for infrastructure maintenance, resulting in poor quality and unreliable services provided by the municipalities. There also seems to be disagreement among the government departments on the development of policies that address accelerated growth, transformation, economic efficiency and social equity resulting in the development of numerous policies as well as inconsistency in policy development in government departments.

The SA government seems to have assumed that overall national development strategies, both at national and sectoral levels, will address urban problems. This has led to the reluctance of the government in developing a coherent urban policy to try and address urban challenges and priorities of diverse interest groups. Also, SA has not invested sufficiently in intensive research and in skills development for effective policy formulation, implementation and monitoring. Further, the national government has widely relied on international best practices which may not be suitable for SA's specific local needs. In addition there are not sufficient resources for planning sustainable human settlements to meet the growing needs of urban inhabitants.

A supportive policy environment is required that includes national laws clearly specifying the powers and roles of the local government and also the specific roles of other stakeholders. The government should also consider encouraging the involvement of the private sector, NGOs and communities in policy development and implementation processes. Financial support, particularly for developing new or upgrading bulk infrastructure as well as investing in training project managers is also crucial for effective implementation of these policies.

Therefore, there is need for practical and easily implementable policies, strong political will, investments towards spatial as well as economic and social integration. Planning should strongly focus on provision of basic services, implementing priority projects and engagement with the private sector to leverage funds for creation of sustainable job opportunities. Furthermore, planning should be

integrated with sectoral budgets and implementation programmes so as to create employment, trade, training and learning opportunities.

## Chapter 5: Findings and Recommendations

### 5.1 Policy analysis and sustainable development

Najam (2005 cited in UNEP, 2011) identified three components of policy: choice, implementation and assessment that should clearly be communicated to the public. According to him, sustainable policies should be developed jointly by the government and other stakeholders who are affected by the problem in question. Before a policy is developed, extensive research is crucial to investigate the *core* problem and what steps will need to be taken to try and address the *core* problem, as well as what alternative policies would address competing needs of all stakeholders. Also a clear understanding is required of what could be the positives and the negatives of the policy, since a policy could create more problems rather than addressing the intended issues (Patton, 2011).

Policy formulation should be followed by its implementation and periodic review to assess whether the policy and implementation programmes are effective in addressing the *core* problem in the context of socio-economic, environmental and institutional interrelationships (UNEP, 2011; Patton, 2011). In addition, skilled personnel and adequate investment will enhance effective implementation of SD programmes.

A communication network and feedback mechanisms should also be part of the engagement because of the dynamic nature of systems, particularly of cities (Button, 2002; Runhaar *et al* 2006). Runhaar *et al* (2006) suggested that governance for SD should include participation of representatives from the private and the public sectors as well the government. A common understanding and support is crucial for effective policy that will address the challenges in question. Faiz (2000) added that the national government needs to precisely define its role and how it is going to support the other stakeholders. SD will require support from the national government, *inter alia* in the form of tax relief and other incentives outlined in the policy framework, so that investors can align their priorities on poverty reduction, economic development and environmental protection with those of the government.

The literature review also showed that fragmentation exists between institutions both in the public and the private sector, each with its own interpretation of SD as well as competing needs (Du Plessis & Landman, 2002; Communities and local government, 2003; Province of the Western Cape, 2008; Pillay, 2008; Turok & Parnell, 2009; Todes, 2011).

The SA government recognised that intergovernmental planning is crucial in the process of drafting policies as mentioned in the NSDP, PGDS, IMEP, and IDPS. Unfortunately, a coordinated and



integrated planning in national, provincial and local spheres of the government is lacking. As Cloete (2005) observed, competition between levels of government resulted in duplication of policy objectives and the lack of involvement of business representatives has also deterred successful business ventures. The policy framework in SA promised to address equity, developmental objectives and environmental protection for present and future generations, however, effective and consistent policies, implementation programmes and monitoring mechanisms for SD have not yet been developed in SA (Turok & Watson, 2001; Du Plessis & Landman, 2002; Pieterse, 2010; Todes, 2011).

Planning in SA in the Post-Apartheid period mainly focused on macro-level restructuring and the majority of plans were too broad, took a long time to develop or became outdated prior to implementation. A lot of emphasis has also been on producing plans with little implementation and monitoring (Du Plessis & Landman, 2002; Todes, 2010).

Various studies have also shown that a coherent urban policy and a concrete plan that integrates the dynamic and complex structures, multiple and competing demands and challenges of the SA cities has not yet been developed (Turok & Watson, 2001; Du Plessis & Landman, 2002; Pillay, 2008; Turok & Parnell, 2009; Todes *et al* 2010; Todes, 2011). Rather, the government seems to focus on piecemeal reactions, as new challenges emerge, without considering the benefits of long-term planning. There also seems to be a lack of consistency on addressing the emerging challenges, such as the rapid urbanisation in cities as well as the new spatial developments that are continuously taking place on the urban peripheries.

In view of the complex nature of cities, urban policies should be developed by the government, with active participation of local communities and relevant stakeholders for policy formulation, planning and implementation of programmes that suit specific community needs. Effective policy formulation will also require improved involvement of inter-departmental partnerships within the government. In addition, stronger relationships with the private and civil sector are needed, coupled with improved capacity in municipalities to effectively provide basic services to communities (Turok & Watson, 2001; Du Plessis & Landman, 2002; Goebel, 2007; Turok, & Parnell, 2009).

The SA government adapted the Brundtland SD definition and made a commitment to improve the quality of life of all South Africans, use resources efficiently, and address intra and inter-generational equity (DEAT, 2002; DEAT, 2006b). Further, the National Environmental Management Act (NEMA) (No. 107 of 1998) acknowledged SD, thus: “*sustainable development means the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations*” (DEAT, 2002; 2006a: 18).

NEMA outlined guiding principles for environmental planning and management in national, provincial and local spheres of government (DEAT, 2002; DEA & DP, 2005). Among the requirements of NEMA was development of Environmental Implementation Plans for provinces and national departments, and Environmental Impact Assessments to guide land use activities at the project level (DEAT, 1998b).

The NSDP, the MTSF and the Green Paper on Strategic National Planning, have addressed environmental challenges as required by NEMA. However, they do not have a clear vision of sustainability and how socio-economic and environmental issues are related. Similarly, provincial growth development strategies and IDPs have not strongly addressed sustainable resource management and biodiversity conservation issues (DEAT, 2008). In addition, policies are silent on transport and land use management resulting in ineffective regulatory instruments that rarely support integrated planning, particularly in urban areas (Du Plessis & Landman, 2002; Goebel, 2007; SACN, 2009; Todes *et al* 2010; Pieterse, 2010; Todes, 2011).

Ecological considerations would entail developing renewable energy sources and the utilisation of sustainable building materials. Therefore, policy improvement in SA will require the development of more flexible policies that will be informed by the realities on the ground, so as to enable effective implementation.

According to Breheny (1997), policies at country level should be geared towards urban renewal, higher densities, mixed land use and public transport particularly along economic nodes. While some initiatives exist at the larger metropolitan areas as noted earlier, SA has not yet developed consistent policies at the national level to address these key issues. For example, Freund (2010) observed that the ANC government has succeeded in providing much better access to basic services through several policies and programmes. However, the government has failed to address the dominance of private car transport and seems to encourage expansion of the national and metro roads. Furthermore, evidence suggests that the national government has encouraged the private sector to take control of new developments particularly through economic policies. This has largely contributed to the persisting environmental degradation, increasing levels of resource consumption, urban sprawl and marginalisation of the poor (DTI, 2010; Freund, 2010; The Presidency, 2011).

The national government did not consider factors that would affect implementation of the policies. For example, increased energy costs would have a negative impact on travel patterns. Also intergovernmental coordination may not be guaranteed, is problematic, as for example in the field of housing provision and public transport, where the set targets may not practically be achievable

without ongoing dialogue and coordination (Todes *et al* 2010). In addition, the lack of involvement of labour unions, civil society organisations and communities in drafting policy can result to the rejection of a policy as it will be regarded as a directive from the government, a top-down approach as opposed to a bottom-up approach.

## **5.2 Sustainable development and challenges**

The interaction between socio-economic and environmental problems is a policy challenge for many governments as this interaction requires important elements including long-term planning, policy integration, setting realistic targets, and integration of sectoral plans with budgets, transparency and accountability.

Economic growth contributes to improved wellbeing by generating revenue for the government and income for individuals as well as resources to address environmental challenges; however, economic growth may indirectly lead to environmental degradation.

The majority of governments, including SA, have not created a central authority or commission within government to deal with overarching issues of SD. Such a central authority would be ideal for dealing with conflicting interests between environmental and socio-economic objectives, in cases where one policy solution in one subsystem creates new problems in other subsystems. It is not yet clear what role the National Planning Commission will play in promoting integrated SD policies.

A forum for dialogue, policy deliberation and consultation consisting of key stakeholders and citizens should be part of the central authority. The central authority would be responsible for disseminating a detailed understanding of policy integration and the importance of incorporating SD in policy objectives to achieve overall national and sectoral SD objectives.

A long-term strategy with realistic targets and political backing, coupled with a monitoring programme for assessing impacts, implementation processes, and target results would advance sustainability. The monitoring programme is crucial in informing future development of sectoral strategies and plans (ProSus, 2002).

The literature points out that cities have unique histories, a present and a future and the events that unfold from the past to the present need to be taken into consideration when developing strategies for urban development (Cilliers, 2000; Uprichard & Byrne, 2005). In the SA context, the legacies of Apartheid led to spatial segregation and inequalities in resource distribution in SA cities, prompting the present government to prioritise social objectives in service delivery, particularly to improve the

quality of life of the poor. The complexity of a city can partly be attributed to the values and choices of its residents that are not easy to change. For example, one of the challenges mentioned by the respondents during the questionnaire survey discussed in section 1.5.3 was that the taxi and bus operators in the CCT are strongly opposed to the integrated bus rapid system for fear of losing their businesses.

The government of SA has acknowledged that housing backlogs and transport in cities is a major challenge due to increased urban populations, lack of skilled personnel and financial constraints. In this respect, planning in advance and projecting future growth in cities will aid in addressing these challenges. It is also important to note that data availability remains a challenge and requires time and support from the stakeholders involved in the process.

Political interference, power struggles and lack of SD awareness at all levels of government have been identified as key constraints to implementation of SD programmes in SA (Pieterse, 2010). In addition, national budget allocation to government departments and sectors is not adequate for implementing integrated projects.

Developing urban policy is a complex process as it involves resolving complex and interrelated urban problems. It is evident that solving one problem may result in other unexpected problems and therefore the need to developing new policies to address emerging problems. The power relations by different stakeholders including government, civil society, private organizations will have an influence on addressing urban problems and for these reasons, a wide range of methods to promote stakeholder involvement in each step of policy development and implementation is critical. Planning for urban development and the development of urban policy are dynamic processes, therefore appropriate policies are crucial to address integrated problems (Pillay, 2008).

### **5.3 Conclusions**

Indicator development in SA seems to have taken a top-down approach where the national government departments develop indicators with little involvement of the provincial and local governments and other stakeholders. For example, the approach taken by DEAT in developing the environmental sustainability indicators involved review of international and national literature on existing indicators, assessment of available data, developing draft indicators, organising a national workshop to review the indicators as well as obtaining written comments from the public. It is clear that the process did not include broad participation of the citizens who were either unable to attend the national workshop or unable to submit written comments, given short deadlines required for submission.

With regard to the CCT, the four questions mentioned under section 1.4 are separately discussed hereafter.

### 5.3.1 Identified areas of priority for sustainability improvement in Cape Town

The study showed that environmental and developmental challenges are increasing in the CCT. The most prevalent challenges are: an increase in pollution of inland and coastal waters, an increase in informal settlements and housing backlogs, inadequate and unsafe public transport and an increase in private car use, dependence on nuclear and coal for energy, high levels of crime, increasing levels of unemployment and poverty, loss of biodiversity, urban sprawl, and bulk infrastructure backlogs. In particular the following specific areas of weakness were identified:

- ◆ The majority of the youth population have not benefited from the capital intensive economic growth;
- ◆ The City lacks a comprehensive plan for the growing population;
- ◆ Development of low income houses on City edges has contributed to increasing social exclusion;
- ◆ Lack of a well integrated public transport system;
- ◆ Lack of interdepartmental policy coordination to address sustainability challenges;
- ◆ Lack of effective plan to address natural calamities;
- ◆ Increasing resource consumption patterns by the middle and upper income groups;
- ◆ Lack of participatory planning and governance for effective urban management; and
- ◆ Instability in policy caused by constant change in political party leadership.

Therefore, improvement in sustainability will require the development of effective land use and transport policies, creation of more open spaces, an increase in the percentage of waste recycling and water use, and also renewable energy options. In addition, the synergy between urban complex subsystems (market, legal, administrative, political and social) is critical for effective feedback that supports policy development, improves decision making and feedback mechanisms. Sustained economic development will help create job opportunities, reduce crime levels and improve the quality of life of CCT communities. Other critical measures would include an improvement of air and water quality, systematic integration of human settlements, enhancing of community education and health as well as participation of the disadvantaged communities in decision making processes.

### 5.3.2 Stakeholders involvement in indicators selection process

The study concluded that the process of developing indicators for the CCT did not seem to include a

wide range of stakeholders, rather the Cape Town Government developed indicators and produced several reports on the socio-economic and environmental state of Cape Town. The process followed by CCT Environmental Resource Management Department in developing its SoE indicators involved scientific research and consultation through; mayoral listening campaigns, public assessment surveys, ward committee consultations, public consultation surveys and submission of written comments from the public which seemed to be procedural rather than genuine active involvement of different segments of communities (e.g. women, youth, people with disabilities, teachers, students, informal traders, the poor). Besides this consultation was limited to selected respondents who were able to access information from the government sources. The limitations of this process were identified as lack of consistency in public consultation processes as well as lack of interest by local communities (City of Cape Town, 2008b).

The CCT compiles annual reports on the City's environment and developmental changes. Socio-economic indicators are periodically compiled by the City's Strategic Development Information and Geographic Information Systems Department and also the Economic and Human Development Department. Data for these indicators is sourced mainly from StatsSA national community survey database, household surveys and other sources including: South African Police Service, Department of Education, Provincial Government of the Western Cape and SACN.

### 5.3.3 Indicators alignment to relevant policies and implementation plans

A comparison of the indicators in the report published by the CCT in 2002 and those published by CCT in 2006 report mainly on the state of the environmental systems in the Cape Town region. These indicators seem in theory to be aligned with the IMEP commitments, the IDPs of Cape Town and the MDG goals. However, the development of indicators seemed to practically exclude participation of key stakeholders such as business, labour and civil society. The SoE Reports showed that data for some indicators such as carbon emissions was either unavailable, non existence or outdated resulting in inaccurate reporting which also influenced poor decision making in some cases. The indicators are too many and do not show the correlation between socio-economic, institutional and ecological dimensions of SD in the urban context.

The sectoral policies in the CCT contradict each other and seem to rarely address sustainability. Besides, a coherent urban policy and implementation plan for addressing interrelated complex issues of urban development has not been developed. It is therefore evident that most of the indicators are fragmented and rarely show a true reflection of linkages between socio-economic, institutional and environmental dimensions. In addition, since 1999, when SoER commenced in Cape Town, the same challenges identified then, like transport, water quality and, informal settlements, have continued to

persist. Based on these findings it is not clear the degree to which issues stated in policy have been translated into planning and implementation programmes that involve other stakeholders, citizens and the local communities.

#### 5.3.4 Linkages of indicators to decision making and corrective actions

The CCT is committed to link the environmental indicators and the development indicators to the City's policy frameworks and plans including the IMEP and the IDPs of Cape Town. For example, key performance indicators have been developed by the City to monitor the implementation of the IDP. Several programmes have also been identified, although implementation of the programmes has been slow due to resource constraints in the CCT. However, indicators for measuring policy performance as shown in Table 4 have not been developed.

Developing indicators however requires stakeholders with a shared vision to agree on key indicators and what trends need to be monitored as well as the types of policies to support corrective measures. Indicators should aim at guiding the public and decision makers to implement programmes that would aid in corrective actions by stakeholders. The government of Cape Town seems to have focused more on selecting indicators (key performance indicators) as well as developing policies with less involvement of other stakeholders. Therefore, indicators to monitor successful implementation of SD programmes have rarely been developed. Indicators should inform policy decisions in improving sustainability for example in reduced unemployment, reduced waste, reduced poverty and improved air quality, yet these challenges have continued to persist in the CCT.

Indicators that are developed will need to be reviewed periodically in order to address and respond to changes and uncertainties occurring in the CCT. The Cape Town residents, public and private sectors should be educated and encouraged to contribute to SD and be made aware that their everyday choices and actions can either improve or damage the city. This will involve actions such as managing growth and taking into consideration the needs of the future generation. Indicators should be policy relevant, easy to understand as well as to implement as means of enhancing their relevance to the Cape Town communities.

The lessons learnt from the Cities of Seattle, Santa Monica and Curitiba are that the process of developing indicators requires sufficient time and resources. The success of the process will also be attributed to patience, commitment and willingness by the stakeholders. Quality of life indicators play a key role in measuring city sustainability. However, indicators need to be integrated to

simultaneously measure and monitor progress in socio-economic, environmental and institutional dimensions of sustainability.

Therefore, the development of SDIs for the CCT will only be meaningful when the affected communities are consulted and allowed to actively participate in identifying their most important areas of concern. The focus should be on the issues of interest associated with the actual proposed policy framework by the government authorities. Additionally, it is important to consult other stakeholders like experts, particularly with a view of establishing links between the indicators as a way of emphasising the interconnectedness of SD. Indicators need to be illustrated and reported in a simple manner as this profoundly contributes in raising awareness as well as educating the public on key areas that require improvement as well as enhancing the quality of life in Cape Town.

The study illustrated that SA is well advanced in the production of several policy documents and plans by the national government, the Western Cape provincial government and the CCT. It is also clear that although several policies documents exist, implementation plans and targeted programmes are often still lacking.

Strong and effective urban governance need to be developed through intergovernmental coordination and the contribution of civil society. Partnerships between stakeholders and the establishment of task teams with a shared vision are crucial. Policy coordination is critical so that indicators can be useful to inform policy and can be used to initiate programmes for corrective action. System indicators and programme level indicators are also vital to monitor the whole city system and effectiveness of sector programmes which involve local programmes and the participation of local communities. There is need for improved monitoring and evaluation of policy and service delivery at the local level to improve the quality of life of poor communities.

This study concludes that a comprehensive set of sustainability indicators that integrate and balance socio-economic, institutional and environmental concerns for the CCT are still lacking. In addition, interdepartmental coordination and planning for policy formulation is inadequate and notably, SD and sustainability indicators are not strongly featured in the policy framework. Therefore, there is need for review and streamlining of existing policies with active participation of the private sector, business and civil society, followed by alignment with sectoral budgets and implementation programmes.

#### **5.4 Recommendations**

The SA government committed itself to SD as evidenced in the NFSD and the Draft NSSD and Action Plan and has consequently adapted several global agreements, national policies, provincial



strategies and local plans. The national government acknowledged the importance of integrating SD and sustainability principles into planning, implementation programmes and decision making processes. The following sections present recommendations on how sustainability in the CCT could be improved.

#### 5.4.1 Integrated policy and legislative framework

The SA Government needs to develop an integrated policy and legislative framework that will facilitate the implementation of SD programmes towards advancing sustainability particularly in urban areas. The roles and responsibilities of the provincial and local governance structures should be clarified to enhance the provision of basic services such as water and sanitation in the areas within the municipalities as well as in areas beyond municipal boundaries. The coordination of inter-governmental policies and alignment of investment programmes will improve the implementation of key programmes such as poverty, unemployment and climate change. The macro-economic and environmental policies will need to support local policies in establishing small businesses and skills development programmes that match market needs.

Effective legislation to control private development on urban edges should be developed as well as improved performance monitoring and evaluation of the CCT metropolitan. Further, the CCT government needs to take the leading role in providing basic services, rather than relying on the private sector to provide basic services. This will enable basic service provision at prices that are affordable to the CCT community.

#### 5.4.2 Types of indicators

While selected indicators should describe the existing state of CCT urban subsystems as well as show undesirable trends, indicators should include policy implementation indicators to assess whether programmes are effective as well as impact indicators to determine whether programmes have improved the quality of life of the poor. The indicators need to be reviewed periodically in order to align them with the evolving urban system and be used to inform new policies and programmes where required. Programme level indicators for implementing SD projects are important in improving sustainability in the CCT. These could include: renewable energy programmes, green buildings programmes and urban organic farming programmes at community level. Indicators should therefore address the linkage between the dimensions of SD, economy, society and the environment.

The types of indicators proposed by Innes and Booher (2000) are important for application in the CCT in accordance to the City's specific needs. For example, system performance indicators on energy could be used to monitor energy use in the City as a whole, while programme indicators for renewable energy use would monitor the City's progress in the use of alternative energy. These indicators would then aid in influencing policy decisions such as initiative consumer awareness programmes on energy conservation.

Rapid feedback indicators aimed at individuals and businesses could also aid in establishing conservation measures. System level indicators were used in the City of Santa Monica particularly for water and energy use and as a result programmes were put in place to respond to the concerns raised by the indicators. In addition, programme indicators were used to monitor the success of these programmes in accordance with agreed targets and objectives. It is evident that the indicators were used to inform policy decisions. For example, in Santa Monica and Curitiba, green buildings regulations were introduced to reduce the amount of energy and materials used in construction as well as the introduction of tax incentives for organisations that adhered to the policy. This led to a reduction in energy and material inputs and thus contributed to the overall sustainability of these 'sustainable cities'.

#### 5.4.3 Process of choosing indicators

The process of choosing indicators discussed in section 2.6 could contribute to improving sustainability in the CCT. Effective implementation of SD will first require raising awareness on the need for sustainable development among the CCT community (e.g. organisations, government departments, business, civil society, local communities and individuals). A broad range of stakeholders would then decide on a few priority issues to be addressed and how data for indicators will be sourced. The stakeholders should also participate in evaluating indicators so as to develop a refined set that is applicable to the CCT community. The target audience for communicating indicators should also be identified as well as methods of communicating sustainability status of the City over time.

#### 5.4.4 Creation of a public forum for sustainable development

A public forum should be established to agree on a clear vision and plan for implementing SD for the CCT. The forum should be represented by local communities, professional, technical and social groups, including youth, women and disadvantaged groups of the CCT population. Active participation of decision makers is critical to enable linkage of indicators to policies and corrective

action. The forum should focus on issues that the CCT can control or influence and agree on what data is required to monitor sustainability and how it will be collected. Further, communication mechanisms need to be established for technical experts to assist in setting targets and in defining the criteria for evaluating indicators. The involvement of technical experts after the indicators have been identified is crucial to advise whether the indicators are practical, suitable, measurable and scientifically acceptable. The CCT needs to improve communication of indicators, policy and reporting to the Cape Town communities. This could be done through local media, workshops and awareness campaigns.

#### 5.4.5 Improving governance mechanisms

Institutional arrangements for effective coordination and integration of sustainability principles and action plans between local, provincial and national government departments, private sector, civil society and the local communities need to be developed. The creation of such institutional arrangements will improve knowledge on challenges facing cities and for capacity building that will be useful in improving urban management and decision making processes. Therefore, to address the complex issues in CCT, participatory planning in policy development and implementation is crucial. For this reason more government officials across various departments as well as representatives from CCT local community, private companies, academic and research institutions, parastatals and NGOs should be involved in decision making processes that influence sustainability in the CCT.

At the municipal level, effective coordination and institutional alignment is important at ward and sub-council levels and also the active participation of communities in planning, policy development and implementation. This should be supported by allowing municipalities to exercise control of their budget allocations in addressing service backlogs.

A top-down and bottom-up integration at local, regional, and city-wide levels should create an environment for learning and understanding the challenges facing SA's urban areas. The knowledge will be crucial for developing appropriate policies and programmes to address the identified challenges and to advance SD. Active participation of the community and other stakeholders like NGOs, research institutions and community groups will result to shared knowledge and application of the knowledge into the process of developing indicators, where the appropriate type of indicators to measure policy outputs as well as progress in implementing SD programmes are identified. In addition, the stakeholders could join efforts to seek funding for SD projects as in the cities of Seattle and Curitiba.

An effective indicator programme will require extensive research and information sourced from successful cities but tailored to suit specific local needs.

#### 5.4.6 Integrated planning

An integrated planning process enables planners and decision makers in government departments, private and public sectors and local communities to develop a common vision for SD. Further, integrated planning contributes to effective policy formulation and tries to resolve conflicts on competing needs while aligning implementation programmes and sectoral budgets. For example, in Curitiba SD plans and programmes were coordinated by a planning office while in Santa Monica, a task force consisting of city staff, community groups and government departments was involved in planning and developing indicators. Further, the local government played a major role in defining and implementing the indicator programme. In the City of Seattle, the indicators were endorsed by the national planning department which clearly shows that the national government supported the SD indicator initiative.

Examples from the Cities of Seattle, Santa Monica and Curitiba showed that transport and land use planning are important elements for sustainability in any city, particularly in improving the environmental quality, mobility and economic efficiency in the overall city system. For example, the introduction of the bus rapid system in Curitiba improved mobility, reduced energy use and led to less dependence on private transport. Also, urban solutions can be enhanced by using inexpensive systems, local talents and addressing only a few issues periodically in an integrated manner.

In each of the three examples cited (Seattle, Santa Monica and Curitiba) the promotion of local core values in master city plans fundamentally enhanced the quality of life for their communities, and contributed largely towards their success in achieving SD objectives. A participatory planning approach was used in these cities as evidenced by community active involvement.

It is therefore recommended that the CCT learn from the Cities of Seattle, Santa Monica and Curitiba and create a task team to discuss and agree on: planning for SD, the process of identifying indicators, actual development of SDIs, communication mechanisms, policy review, and programmes to address challenges. The task team needs to include a wide range of stakeholders consisting of municipal officials, government departments, research institutions, business, NGOs, parastatals and the civil society. The community plays a major role in indicator development as they know the key issues affecting them that should be prioritised and monitored. Implementation programmes should specifically address priority challenges and local communities should actively participate in the

implementation process.

The CCT will need to be consistent with one set of balanced sustainability indicators to address integrated socio-economic, institutional and environmental issues, based on the priority needs for the CCT community. The indicator themes should not be more than ten, so as to be manageable. Important themes applicable to the CCT could be community education, resource conservation, recycling, use of renewable energy, transport and land use, employment, affordable housing and improvement of quality of life through the provision of basic needs.

Further studies are recommended to analyse the complexity and dynamic nature of the CCT urban system to enhance effective urban governance and planning that are core in addressing urban challenges in CCT and in SA in general.

*“If we do not in our lives, in our affective engagement with the city, begin to cross, to transgress, to experience the other cities we are talking about, the kind of diversity and the kind of integrated city we are saying we are longing for, this alternative city, will remain at the level of discourse”. Edgar Pieterse, Islandla Institute (City of Cape Town, 2005b: 19).*

## Bibliography

Abdelal, R. Spar, D. and Cousins, F. (2002): “Remaking the Rainbow Nation: South Africa 2002”. Unpublished article. Harvard Business School: President and Fellows of Harvard College: pp 1-19.

Alberti, M. (1996): “Measuring urban sustainability”. Centre for Conservation Biology, Stanford University. Environment Impact Assessment Review 16: pp 381-424.

Allen, A. (2002): “Urban sustainability under threat: the restructuring of the fishing industry in Mar del Plate, Argentina” In: D. Westerndorff and D. Eade (eds) Development and Cities. Geneva and Oxford: UNRISD and Oxfam: pp 12-42.

American Planning Association (APA) (2003): “Community indicators”. Planning Advisory Service Report No. 517. Research Department of the APA. Available on the web at <http://www.planning.org/pas/reports/subscribers/pdf/PAS517.pdf>. [Retrieved 22/11/2010].

Atash, F. (2007): “The deterioration of urban environments in developing countries: Mitigating the air pollution crisis in Tehran”. Cities. Vol. 24 No. 6: pp 399-409.

Bakshi, R. and Fiksel, J. (2003): “The quest for Sustainability”. Challenges for Process Systems Engineering. Vol. 49 No. 6: pp 1350-1359.

Bell, S. and Morse, S. (2001): “Breaking through the Glass Ceiling: Who really cares about sustainability indicators?” Local Environment. Vol. 6 No. 3: pp 291-309.

Bhorat, H., Kanbur, R. (2006): “Introduction: Poverty and well-being in post-apartheid South Africa: An Overview of data, outcomes and policy”. In: Bharot and Kanbur (eds.) Poverty and Policy in Post-Apartheid South Africa. HSRC Press: pp 1-17.

Bless, C. and Higson-Smith, C. (2000): “Fundamentals of Social Research Methods”. An African Perspective 3<sup>rd</sup> edition: Cape Town: Juta: pp 19-22.

Bohringer, C. and Jochem, E.P. (2007): “Measuring the immeasurable – A survey of sustainability indices”. Ecological Economics 63: pp 1-8.

Bond, R., Curran, J., Kirkpatrick, C., Lee, N., Francis, P. (2001): “Integrated impact assessment for Sustainable Development: a case study approach”. World Development 29 (6): pp 1011-1024.

Bossel, H. (1999): “Indicators for sustainable development: Theory, Method, Applications”. International Institute for Sustainable Development, Winnipeg.

Breheny, M. (1997): “Urban Compactation: feasible and acceptable”. Cities Vol. 14. No. 4: pp 209-217.

Brien, B. (2001): “Curitiba: A sustainable city?” Solar earth ecological architecture. Available on the web at <http://www.solearth.com/pages/art1.htm> [Retrieved 20/09/2010].

Business Dictionary (2011): Available on the web at <http://www.businessdictionary.com/definition/integrated-planning.html>. [Retrieved 19/01/2011].

Business Dictionary, (2011): Available on the web at <http://www.businessdictionary.com/definition/planning.html> [Retrieved 20/01/2011].

Business Dictionary, (2011). Available on the web at <http://www.businessdictionary.com/definition/development.html> [Retrieved 21/01/2011].

Button, K. (2002): “City management and urban environmental indicators. Special section: Economics of Urban Sustainability”. Ecological Economics Vol. 40: pp 217-233.

Capello, R. and Nijkamp, P. (2002): “In search of sustainable human settlements. Prefatory remarks. Special Section: Economics of urban sustainability”. Ecological Economics 40(2002): pp 151-155.

Capra, F. (1983): “The Turning Point: Science, Society, and the Rising Culture”. Chapters 1, 9, 12. Flamingo Press 1983 UK.

Cartwright, Louise E. (2000): “Selecting Local Sustainable Development Indicators: Does Consensus Exist in their Choice and Purpose?” Planning Practice & Research Vol. 15 No.s 1-2: 2: pp 65 – 78.

Cape Town Partnership (2009); “Central City Development Strategy, Cape Town Central City into the Future”. Available on the web at <http://www.capetownpartnership.co.za> [Retrieved 25 /01/2009].

Cape Town Tourism (2008): “Cape Town Tourism Business Plan Summary 2008”. Available on the web at <http://www.capetown.travel/images/uploads/Cape-Town-Tourism-Business-Plan-08-09-Exec-Summary-v4-BLOG-22-Oct-08.pdf> [Retrieved 29/04/2011].

Centre for International Earth Science Information Network (2002): “2002 Environmental Sustainability Index, Global Leaders for Tomorrow World Economic Forum”. Yale Centre for Environmental Law and Policy. Main report.

Centre for Waste Reduction Technology (CWRT) (1998): “Sustainability Metrics”. Centre for Waste Reduction Technology, American Institute of Chemical Engineers: New York.

Cilliers, P. (2000): “What can we learn from a theory of complexity?” Lawrence Erlbaum Associates, Inc. Emergence Vol. 2(1): pp 23-33.

City of Cape Town (2000): “State of the Environment Report for the Cape Metropolitan Area”. Year Two (1999). Available on the web at [http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Year%202%20\(1999\)%20SoE%Report.pdf](http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Year%202%20(1999)%20SoE%Report.pdf). [Retrieved 14/05/2010].

City of Cape Town (2001): “State of the Environment for the City of Cape Town”. Available on the web at [http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Year%204%20\(2001\)%20SoE%Report.pdf](http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Year%204%20(2001)%20SoE%Report.pdf). [Retrieved 14/05/2010].

City of Cape Town (2002a): “IDP Needs Analysis”. An overview of development issues facing the Cape Metropolitan Area. Available on the web at <http://www.capetown.gov.za/en/stats/CityReports/Documents/IDP/IDP-Needs-Analysis-2002-1962003125115-364.pdf>. [Retrieved 23/01/2010].

City of Cape Town (2002b): “State of Environment Report for the City of Cape Town”. Year 5 (2002). Available on the web at [http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Year%205%20\(2002\)%20SoE%Report.pdf](http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Year%205%20(2002)%20SoE%Report.pdf). [Retrieved 14/05/2010].

City of Cape Town (2003): “The Integrated Metropolitan Environmental Policy 2003”. Available on the web at <http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/IMEP-Eng%20v2.pdf>. [Retrieved 17/07/2010].



City of Cape Town (2004a): “Draft Integrated Development Plan for Review and Comment”. Our City, Our Future Integrated Development Plan, Cape Town. Available on the web at <http://www.capecity.gov.za/Text/2004/10/idp-ctn-part-a-intro-2004.pdf>. [Retrieved 20/06/2009].

City of Cape Town (2004b): “Sustainability Report Phase 1: Draft set of Indicators 2004”. Available on the web at <http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Sustainability-Indicators-Report-2004-1642007153240-465.pdf>. [Retrieved 20/06/2009].

City of Cape Town (2004c): “Urban Edge Guidelines Manual for the City of Cape Town”. Available on the web at <http://www.cibra.co.za/downloads/UrbanEdgeGuide.PDF>. [Retrieved 23/11/2010].

City of Cape Town (2005a): “Sustainability Report 2005”. Available on the web at [http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Sustainability\\_Report\\_2005.pdf](http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Sustainability_Report_2005.pdf). [Retrieved 13/03/2009].

City of Cape Town (2005b): “Report of the Cape Town 2025”. Conference Co-hosted by the City of Cape Town and Isandla Institute. Available on the web at <http://www.capetown.gov.za/en/stats/CityReports/Documents/Cape%20Town%202025%20and%202030/Report-of-Cape-Town-2025-Conference-412006131320-359.pdf>. [Retrieved 13/08/2010].

City of Cape Town (2005c): “Portfolio of Sustainability Best Practice 2005/2006”. Available on the web at <http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/PortfolioOfSustBestPrac2005.pdf>. [Retrieved 13/03/2009].

City of Cape Town (2006a): “Sustainability Report 2006”. Available on the web at [http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Sustainability\\_Report\\_2006\\_2372007132223\\_465.pdf](http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Sustainability_Report_2006_2372007132223_465.pdf). [Retrieved 13/03/2009].

City of Cape Town (2006b): “State of Cape Town Report 2006. Development issues in Cape Town”. Available on the web at [http://www.capetown.gov.za/en/stats/CityReports/Documents/IDP/State\\_of\\_Cape\\_Town\\_Full\\_Report\\_2006\\_712200610345\\_359.pdf](http://www.capetown.gov.za/en/stats/CityReports/Documents/IDP/State_of_Cape_Town_Full_Report_2006_712200610345_359.pdf). [Retrieved 23/11/2010].

City of Cape Town (2006c): “Economic & Human Development (EHD) Strategy, Part 2 – Implementation Plan 2006”. Available on the web at [http://www.capetown.gov.za/en/ehd/Documents/EHD\\_Strategy\\_-\\_Part\\_2\\_510200715742\\_.pdf](http://www.capetown.gov.za/en/ehd/Documents/EHD_Strategy_-_Part_2_510200715742_.pdf). [Retrieved 17/07/2010].

City of Cape Town, (2006d): “Framework for Adaptation to Climate Change in the City of Cape Town 2006”. Available on the web at <http://www.erc.uct.ac.za/Research/publications/06Mukheibir-Ziervoge%20-Adaptation%20to%20cc%20in%20Cape%20Town.pdf>. [Retrieved 23/08/2010].

City of Cape Town (2006e): “Draft Cape Town 2025 Implications for Cape Town”. Strategy for taking forward the issues identified by Cape Town 2025. Available on the web at [http://www.capetown.gov.za/en/stats/CityReports/Documents/Cape%20Town%202025%20and%202030/Cape\\_Town\\_2025\\_-\\_Implications\\_for\\_Cape\\_Town\\_1612006144122\\_.pdf](http://www.capetown.gov.za/en/stats/CityReports/Documents/Cape%20Town%202025%20and%202030/Cape_Town_2025_-_Implications_for_Cape_Town_1612006144122_.pdf). [Retrieved 17/04/2009].

City of Cape Town (2006f): “Public Transport Plan 2006”. Draft for public consultation. Available on the web at <http://www.capetown.gov.za/en/Policies/Documents/PublicTransportPlan2006.pdf>. [Retrieved 20/06/2010].

City of Cape Town (2006g): “A Proposed Agenda for Action. An Intergovernmental Approach to the Development challenges of Cape Town”. Initial Report of the Intergovernmental Integrated Development Task Team for the Cape Town Functional Region. Available on the web at [http://www.capetown.gov.za/en/stats/CityReports/Documents/IDP/Intergovernmental\\_Approach\\_to\\_the\\_Development\\_Challenges\\_of\\_Cape\\_Town\\_162006105830\\_359.pdf](http://www.capetown.gov.za/en/stats/CityReports/Documents/IDP/Intergovernmental_Approach_to_the_Development_Challenges_of_Cape_Town_162006105830_359.pdf). [Retrieved 27/06/2010].

City of Cape Town (2006h): “City of Cape Town Annual Report 2006/2007”. Available on the web at [http://www.capetown.gov.za/en/IDP/Documents/Annual\\_Report\\_06-07.pdf](http://www.capetown.gov.za/en/IDP/Documents/Annual_Report_06-07.pdf) [Retrieved 19/04/2011].

City of Cape Town (2007a): “Department of Economic and Human Development. Economic Growth Scenarios Update, First Draft”. Available on the web at <http://www.capetown.gov.za/en/ehd/Documents/EHD-Economic-Growth-Scenario-update-161200813253-pdf>. [Retrieved 24/05/2009].

City of Cape Town (2007b): “5 year Plan for Cape Town, Integrated Development Plan (IDP) 2007/8-2011/12”. 2009/2010 Review. Available on the web at [http://www.capetown.gov.za/en/IDP/Documents/200910/IDP\\_Review\\_2009-10\\_May\\_26\\_09.pdf](http://www.capetown.gov.za/en/IDP/Documents/200910/IDP_Review_2009-10_May_26_09.pdf). Retrieved [24/05/2010].

City of Cape Town (2008a): “State of the Environment Report. Environmental issues in Cape Town 2008”. Available on the web at <http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/state-of-Environment-Report-2008.pdf>. [Retrieved 13/03/2009]

City of Cape Town (2008b): “State of Cape Town 2008. Development issues in Cape Town 2008”. Available on the web at <http://www.capetown.gov.za/en/stats/CityReports/Documents/IDP/State%20of%20Cape%20Town%202008%20Final%20low%20res.pdf>. [Retrieved 23/11/2010].

City of Cape Town (2008c): “2007 Community Survey Analysis for Cape Town”. Strategic Development Information and GIS Department Strategic Information Branch. Available on the web at <http://www.capetown.gov.za/en/stats/CityReports/Documents/2007%20community%20survey%20Report.pdf>. [Retrieved 16/05/2010].

City of Cape Town (2009a): “City of Cape Town Environmental Agenda 2009-2014”. Available on the web at <http://www.capetown.gov.za/en/IDP/Statutory%20comp%20plans%20201011/IMEP-Env-Agenda-2009-2014.pdf>. [Retrieved 22/11/2010].

City of Cape Town (2009b): “Responsible Tourism Policy for the City of Cape Town 2009”. Available on the web at <http://www.capetown.gov.za/en/tourism/Documents/Responsible%20Tourism/Cape%20Town%20Responsible%20Tourism%20Policy%20Action%20Plan.pdf>. [Retrieved 22/11/2010].

City of Cape Town (2009c): “Spatial Development Plan and Environmental Management Framework”. Technical Report. Table Bay District Plan Draft for comment. Available on the web at <http://www.capetown.gov.za/en/sdf/Documents/Table%20Bay%20District-SDP-EMF-Aug%2009-fin.pdf>. [Retrieved 23/11/2010].

City of Cape Town (2009d): “Integrated Transport Plan for the City of Cape Town 2006-2011”. Available on the web at [http://www.capetown.gov.za/en/ITP/Documents/ITP\\_Draft\\_Revised\\_on\\_27-05-09-Finals.pdf](http://www.capetown.gov.za/en/ITP/Documents/ITP_Draft_Revised_on_27-05-09-Finals.pdf). [Retrieved 23/11/2010].

City of Cape Town (2010a): “Draft Cape Town Spatial Development Framework”. Final draft for comment. Available on the web at <http://www.capetown.gov.za/en/sdf/Documents/Nov2010/SDF-Summary-A3-2010s.pdf>. [Retrieved 22/11/2010].

City of Cape Town (2010b): “City of Cape Town Annual Report 2009/2010”. Available on the web at <http://www.capetown.gov.za/en/Reports/Documents/Reports%202009-2010/AnnualReport0910.pdf>. [Retrieved 19/04/2011].

City of Cape Town (undated a): “Annexure A Integrated Waste Management policy”. Available on the web at [http://www.capetown.gov.za/en/solidwaste/Documents/IWM\\_Policy.pdf](http://www.capetown.gov.za/en/solidwaste/Documents/IWM_Policy.pdf). [Retrieved 07/09/2010].

City of Cape Town (undated b): “Draft City of Cape Town Green Buildings Guidelines”. Available on the web at <http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/DRAFT%20City%20of%20Cape%20Town%20Green%20Building%20Guidelines.pdf>. [Retrieved 07/09/2010].

City of Vancouver (2005): “Definition of social sustainability”. Report to Vancouver City Council. Available on the web at <http://vancouver.ca.ctyclerk/cclerk/20050524/documents/p1.pdf>. [Retrieved 06/09/2010].

Clark, P. and Crous, W. (2002): “Public transport in Metropolitan Cape Town: past, present and future”. Transport Reviews Vol. 22 No. 1: pp 77-101.

Clayton, A. and Radcliffe, N. (1996): “Sustainability: A Systems Approach”. Earthscan Publications Limited UK 1996. Copyright 1996 WWF-UK and the Institute for policy analysis and development.

Cloete, F., Merrifield, A., Masiteng, K. (2003): “Assessing sustainability in developing countries: work in progress in South Africa”. Annual Congress of the International Institute of Administrative Sciences 14-18 July 2003: pp 4-33.

Cloete, F. (2005): “Towards a monitoring and evaluation system for sustainable development in South Africa”. Unpublished Paper School of public management and planning, University of Stellenbosch 2005: pp 1-29.

Cloete, F. (2007): “Indicator Framework for the assessment of different levels of sustainable services delivery”. Annual conference of ASSADPAM on sustainable public service reform: challenges and opportunities 30 May - 1 June 2007 Windhoek Namibia: pp 3-18

Colantonio, A. (2007): “Social sustainability: An exploratory analysis of its definition, assessment methods, metrics and tools”. Measuring Social Sustainability: Best Practice from Urban Renewal in the EU. 2007/01: EIBURS Working Paper Series: pp 1-37.

Communities and local government (2003): “Participatory planning for sustainable communities: International experiences in mediation, negotiation and engagement in making plans”. Report

Available on the web at <http://www.communities.gov.uk/archived/publications/planningandbuilding/participatory-planning>. [Retrieved 10/03/2011].

Craglia, M., Leontidou, L., Nuvolati, G., Schweikart, J. (2004): "Towards the development of quality of life indicators in the 'digital' city". Environment and Planning B: Planning and Design 2004, Vol. 31: pp 51-64.

Curitiba (2010a): "Curitiba designing a sustainable city". Available on the web at <http://home.clara.net/heureka/gaia/curitiba.htm>. [Retrieved 20/09/2010].

Curitiba (2010b): "Curitiba: The Green changemakers Urban solutions from Curitiba, Brazil". Available on the web at <http://green-changemakers.blogspot.com/2010/04/urban-solutions-from-curitiba-brazil.html>. [Retrieved 20/09/2010].

Curitiba (2010c): "Curitiba: The Green Capital". Available on the web at <http://sustainablecities.dk/en/city-projects/cases/curitiba-the-green-capital>. [Retrieved 20/09/2010].

Dashboard (2010): "Dashboard of sustainability". Available on the web at <http://esl.jrc.it/envind/dashbrds.htm> [Retrieved 19/12/2010].

Davids, I. Theron, F. and Maphunye K. (2005): "Participatory Development in South Africa". A Development Management Perspective 1<sup>st</sup> edition: Pretoria: Van Schalk Publishers.

Department of Transport and Public Works (1997): "White Paper on Western Cape Provincial Transport Policy".

Department of Environmental Affairs (DEA) (2010): "Draft National Strategy on sustainable development and Action Plan 2010-2014". Notice No. 393 of 2010.

Department of Environmental Affairs and Tourism (DEAT) (1998a): "Report to the United Nations Commission on Sustainable Development. Results from testing of CSD indicators of Sustainable Development in South Africa": pp 2-24.

Department of Environmental Affairs and Tourism (DEAT) (1998b). "White Paper on Environmental Management Policy for South Africa".

Department of Environmental Affairs and Tourism (DEAT) (2000): “White Paper on integrated pollution and waste management for South Africa. A policy on pollution prevention, waste minimisation, impact management and remediation”. Government Notice No. 227.

Department of Environmental Affairs and Tourism (DEAT) (2002): “Environmental indicators for National State of the Environment Reporting 2002”.

Department of Environmental Affairs and Tourism (DEAT) (2006a): “People-Planet-Prosperty. A Strategic Framework for Sustainable Development in South Africa”.

Department of Environmental Affairs and Tourism (DEAT) (2006b): “Provisional Environmental Headline Indicators 2006”.

Department of Environmental Affairs and Tourism (DEAT) (2006c): “South Africa Environmental Outlook. A report on the state of the environment 2006”.

Department of Environmental Affairs and Tourism (DEAT) (2008): “Environmental Sustainability Indicators. Technical Report 2008”.

Department of Environmental Affairs and Tourism (DEAT) (2004): “Development of a core set of Environmental Performance Indicators. Final Report and set of indicators”.

Department of social services and poverty alleviation (2005): “Draft Transformation Plan for consultation”.

Department of Environmental Affairs and Development Planning (DEA & DP) (2005a): “Towards a Sustainable Development Implementation Plan for the Western Cape. Concept Paper on Sustainable Development 2005”.

Department of Environmental Affairs and Development Planning (DEA & DP) (2005b): “Western Cape Provincial Spatial Development Framework. Statutory Report 2005”.

Department of Environmental Affairs and Development Planning (DEA & DP) (2007): “Sustainable Energy Strategy and Programme of Action for the Western Cape”.

Department of the Premier (2007): “Compendium of indicators for the Provincial Growth and Development Strategy.” Chief Directorate: monitoring, evaluation and review.

Department of Environmental Affairs and Development Planning (DEA & DP) (2008): “A Climate Change Strategy and Action Plan for the Western Cape”.

Department of Environmental Affairs and Development Planning (DEA & DP) (2009): “Western Cape Provincial Spatial Development Framework 2009. Settlement Restructuring: An Explanatory Manual”.

Department of Environmental Affairs and Development Planning (DEA & DP) (2005c): “Western Cape State of the Environment Report 2005 (Year One)”. Provincial Government of the Western Cape.

Dresner, S. (2002): “What does ‘sustainable development’ mean?” Chapter 5, In: The Principles of sustainability, Earthscan, London: pp 63-74.

Department of Finance, National Treasury (undated): “Growth, Employment and Redistribution”. A Macro Economic Strategy.

Department of Local Government and Housing (DLG & H) (undated): “Enabling Dignified Communities”. Western Cape Sustainable Human Settlements Strategy.

Department of Trade and Industry (DTI) (2007): “Industrial Policy Action Plan”. Available on the web at <http://www.dti.gov.za/publications/ipapa.pdf>. Retrieved 17/10/2009].

Department of Trade and Industry (DTI) (2010): “Industrial Policy Action Plan 2”. Available on the web at <http://www.aeroafrica-eu.org/download/ipap-2010.pdf>. Retrieved 23/10/2011].

Du Plessis, C. and Landman, K. (2002): “Sustainability analysis of human settlements in South Africa”. Report prepared for the National Department of Housing: pp 1-138. Available on the web at <http://researchspace.csir.co.za/dspace/bitstream/10204/3522/1/Du%Plessis-2002.pdf> [Retrieved 18/10/2010].

Du Plessis, S. and Venter, C. (2010): “The home team scores. A first assessment of the economic impact of World Cup 2010”. Stellenbosch Economic Working Papers 21/10: pp 1-22. Available on the web at <http://zunia.org/uploads/media/knowledge/worldcup-wp-21-2010/285054624.pdf> [Retrieved 07/02/2011].

Edigheji, O. (2010): “Rethinking national planning institutions. A critical appraisal of the Green Paper”. Human Sciences Research Council (HSRC) research outputs 6342. Available on the web at <http://www.hsrc.ac.za/research/output/output/outputDocuments> [Retrieved 11/12/2010]

European Commission (2010): “Dashboard of Sustainability”. Available on the web at <http://esl.jrc.it/dc/index.htm> [Retrieved 17/12/2010].

Eurostat (2009): “Sustainable development in the European Union”. Monitoring report of the EU Sustainable Development Strategy. Eurostat Luxembourg 2009.

European Economic Area (EEA) (2006): “Sustainable Development Policy and Guide for EEA Financial Mechanism and The Norwegian Financial Mechanism”.

Esty, Daniel C., M.A. Levy, C.H. Kim, A. de Sherbinin, T. Srebotnjak, and Mara, V. (2008): “2008 Environmental Performance Index”. New Haven: Yale Center for Environmental Law and Policy.

Ellin, N. (2006): “Integral Urbanism”. New York: Routledge. Chapters 2-3, “What is intergral urbanism’ & Five qualities of integral urbanism: pp 5-15.

Faiz, A. (1999): “Sustainable transport for the developing world: The social and environmental nexus”. Journal of Transportation Engineering. Vol. 11: pp 451-454.

Fraser, E., Dougill, A., Mabee, W., Reed, M. and McAlpine, P. (2005): “Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management”. Journal of Environmental Management 78 (2006): pp 114-127.

Freund, B. (2010): “Is there such a Thing as a Post-Apartheid City?” Urban Forum doi 11.1007/s12132-010-9087-4 pp: 283-298.

Gagliardi, F., Roscia, M. and Lazaroiu, G. (2006): “Evaluation of sustainability of a city through fuzzy logic”. Energy 32 (2007): pp 795-802.

Gallopin, G. (2003): “A systems approach to sustainability and sustainable development”. ECLAC/Government of the Netherlands, project NET/00/063 “Sustainability Assessment in Latin America and the Caribbean: pp 1-42.



Gasson, B. (2002): “The ecological footprint of Cape Town: Unsustainable resource use and planning implications”. Unpublished paper presented at the National Conference of the South African Planning Institution; Planning Africa. Durban 17-20 September 2002. Available on the web at <http://www.saplanners.org.za/SAPC/papers/Gassonpaper.pdf> [Retrieved 11/10/2010].

Girardet, H. (2004): “Cities. People. Planet. Liveable cities for a Sustainable World”. Wiley Academy. Chapter 6: pp 108-130.

Goebel, A. (2007): “Sustainable urban development? Low-cost housing challenges in South Africa”. Habitat International. Vol. 31: pp 291-302.

Govender, T., Barnes, J, Pieper, C. (2010): “Housing conditions, sanitation status and associated health risks in selected subsidized low-cost housing, settlements in Cape Town, South Africa”. Habitat International. Article in Press doi: 10.1016/j.habitatint.2010.11.001: pp 1-8.

Graedel, E., Klee, J. (2002): “Getting Serious about Sustainability”. Centre for Industrial Ecology. School of Forestry and Environmental Studies, Yale University, 205 Prospect Street, New Haven, Connecticut.

Hattingh, J. (2003): “Faultlines in the concepts of sustainability and sustainable development”. Unit for Environmental Ethics, University of Stellenbosch: pp 1-7 Available on the web at <http://www.iied.org/pubs/pdfs/Go2464.pdf>. [Retrieved 16/08/2010].

Hartley, J. and Benington, J. (2006): “Copy and Paste, or Graft and Transplant? Knowledge sharing through inter-organizational networks”. The Authors Journal compilation. Public money and management: pp 101-108.

Haughton, G. (1997): “Developing sustainable urban development models”. Cities. Vol. 14 No. 4: pp 189-195.

Healey, P. (2004): “Creativity and Urban Governance”. Policy Studies 25(2): pp 87-102.

Healey, P. (2008): “Knowledge flows, spatial strategy making, and the roles of academics”. Environment and Planning C. Government and Policy 2008. Vol. 26: pp 861-881.

Heink, U. and Kowarik, I. (2009): “What are indicators? On the definition of indicators in ecology and environmental planning”. Ecological indicators Vol. 10: pp 584-593.

Hendler, P. and Thompson-Smeddle, L. (2009): “Sustainable alternative technologies: Indicators and performance areas for sustainable human settlement”. The Southern African Housing Foundation, Regional Housing conference and exhibition, Swakopmund, Namibia: pp 1-39.

Hezri, A. and Dovers, S. (2006): “Sustainability indicators, policy and governance: Issues for ecological economics”. Ecological Economics Vol. 60: pp 86-99.

Hille, J. (1997): “The concept of Environmental space: Implications for policies, Environmental Reporting and Assessments”. Experts’ corner no. 1997/2. European Environment Agency: pp 1-58.

Hodge, A. (2007): “Progress BC: An Assessment of British Columbia’s Progress Towards Sustainability”. In: Assessing Sustainable Development: Principles in Practice. International Institute for Sustainable Development. Winnipeg, Manitoba: pp 37-52.

Holden, M. (2007): “Revisiting the local impact of community indicators projects: Sustainable Seattle as prophet in its own land”. Applied Research in quality of life. Vol. 1: pp 253-277.

Independent Electoral Commission (IEC) (2010): Available on the web at <http://www.elections.org.za> [Retrieved 24/08/2010].

Innes, J.E. and Booher, D.E (2000): “Indicators for Sustainable Communities: A strategy Building on Complexity Theory and Distributed Intelligence”. Planning Theory and Practice Vol. 1 No. 2: pp 173-186.

International Institute for Sustainable Development (IISD) (1997): “Assessing sustainable development. Principles in practice”, Winnipeg Manitoba.

International Council for Local Environmental Initiatives (ICLEI) (2002): “Curitiba. Orienting urban planning to sustainability”. No.77 Municipality of Curitiba Brazil: pp 1-6.

Jacobs, G. and Slaus, J (2010): “Indicators of economic progress: The power of measurement and Human welfare”. CADMUS Vol. 1 No.1: pp 53-113.

Kenworthy, J. (2006): “The eco-city: ten key transport and planning dimensions for sustainable city development”. Environment and Urbanization Vol. 18 No. 1: pp 67-85.

Kline, E. (2000): "Planning and Creating Eco-cities: indicators as a tool for shaping development and measuring progress". Local Environment Vol. 5 No. 3: pp 343-350.

Krausmann, F., Gingrich, S., Eisenmenger, N., Erb, K., Haberl, H., Fischer-Kowalski, M. (2009): "Growth in global materials use, GDP and population during the 20<sup>th</sup> century". Article in Press Ecological Economics: pp 1-10.

Krippendorff, K. (2004): "Content analysis. An introduction to its methodology". Second edition Sage publications USA.

Lee, Y. and Huang, C. (2007): "Sustainability index for Taipei". Environmental Impact Assessment Review. Vol. 27: pp 505-521.

Lemanski, C. (2007): "Global Cities in the South: Deepening social and spatial polarisation in Cape Town". Viewpoint Cities Vol. 24(6): pp 448-461.

Lopez-Ridaura, S., Masera, O., Astier, M. (2002): "Evaluating the sustainability of complex social-environmental systems". The MESMIS Framework. Ecological Indicators Vol. 2 (1/2): pp 135-148.

Li *et al* (2009): "Measurement of indicators and an evaluation approach for assessing urban sustainable development: A case study for China's Jining City". Landscape and Urban Planning 90(2009): pp 134-142.

Linderman *et al* (2004): "Integrating quality management practices with knowledge creation processes". Journal of Operational Management 22 (2004): pp 589-607.

Lundqvist, M. (2007): "Sustainable cities in Theory and Practice: A comparative study of Curitiba and Portland". Unpublished thesis, Karlstads Universitet, 2007: pp 1-32.

MacDonald, D & Smith, L. (2004): "Privatising Cape Town: from Apartheid to Neo-liberalism in the mother city". Urban studies Vol. 41 No. 8: pp 1461-1484.

Macedo, J. (2004): "City profile, Curitiba". Cities Vol. 21 No. 6: pp 537-549.

Madgetla, N. and Meelis, V. (2005): "Trade and development in South Africa". Unpublished article. Available on the web at <http://us-cdn.creamermedia.co.za/assets/articles/attachments/01590/tradeanddev.pdf>: pp 1-21

McEwan, C. (2003): "Bringing government to the people: women, local governance and community participation in South Africa". Geoforum Vol. 34: pp 469-481.

McLaren, D. (2003) "Environmental Space, Equity and the Ecological Debt". Chapter one In: Agyeman, J., Bullard, R., D. & Evans, B., (eds.), Just Sustainabilities: Development in an Unequal World. Earthscan, London: pp 19-37.

Maile, S. (2010): "Education and poverty: Development policy options in a democratic era". Chapter 10 In: Education and poverty reduction strategies: issues of policy coherence. Available on the web at <http://www.hsrc.ac.za/research/output/outputDocuments/5520-maile-Educationpovertydevelopmentpolicy.pdf> [Retrieved 17/12/2010].

Manson, S., O'Sullivan, D. (2006): "Complexity theory in the study of Space and Place". Environment and Planning A 2006, Vol. 38: pp 677-692.

May, J. and Rogerson, C. (1995): "Poverty and sustainable cities in South Africa: The role of urban cultivation". Habitat Vol. 19, No. 2: pp 165-181.

Mayer, A. (2008): "Strengths and weaknesses of common sustainability indices for multidimensional systems". Environment International Vol. 34: pp 277-291.

Mebratu, D. (1998): "Sustainability and sustainable development: Historical and conceptual review". Environment Impact Assessment Review. No. 18: pp 493-520.

Menegat, R. (2002): "Participatory democracy and sustainable development: integrated urban environmental management in Porto Alegre". Environment and Urbanisation Vol. 18(2): pp 275-295.

Meth, C. (2007): "What is Pro-Poor Growth: What are some of the things that hinder its achievement in South Africa?" Unpublished article prepared for Oxfam GB South Africa: pp 60-132.

Milman, A. and Short, A. (2008): "Incorporating resilience into sustainability indicators: An example for the urban water sector". Global Environmental Change Vol. 18: pp 758-767.

Mouton, J. (Ed). (2001): "How to succeed in your Master's and Doctoral Studies". A South African Guide and Resource Book: Pretoria: Van Schaik Press 2001.

- Moriguchi, Y. (2007): “Material flow indicators to measure toward a sound material-cycle society”. Journal of Material Cycles of Waste Management 2007 Vol. 9: pp 112-120.
- Muller, A. (2003): “What is planning?” Unpublished class notes. School of Public Management and Planning, University of Stellenbosch: pp 1-8.
- Muller, A. (2006a): “Sustainability & Sustainable Development as the making of connections: Lessons for integrated development planning in South Africa”. In: Proceedings of Planning Africa 2006. Making the Connections”. Cape Town, South Africa. March 22-24: pp 1027-1079.
- Muller, A. (2006b): “Planning theoretical positions”. Unpublished class notes. School of Public Management and Planning. University of Stellenbosch: pp 1-5.
- Muller, A. (2010): “Memorandum on research thesis for the Degree MPhil Sustainable Development Planning and Management”. Unpublished guideline document, School of Public Management and Planning 2010.
- Muller, E. and Burns, M. 2007. “Indicators – Are we on the right track?” In Enhancing the effectiveness of Strategic Environmental Assessment in South Africa. Council for Scientific and Industrial Research (CSIR) Report . CSIR/NRE/RBSD/EXP/2007/0068/A: pp 75-83.
- Musee, N. and Lorenzen, L. (2007): “Assessing Sustainability of Gold Mining Operations Using Fuzzy Logic Methodology” In: By- and Co-products and the environment, J. Avraamides, G. Deschênes, D. Turker (eds), Australasian Institute of Mining and Metallurgy Carlton Victoria, Australia: pp 261-263.
- National Department of Housing (NDoH) (2004): “Breaking New Ground”. A Comprehensive Plan for the development of sustainable human settlements. 2004.
- Ness, B., Piirsalu, E., Anderberg, S., Olsson, L. (2007): “Categorising tools for sustainability assessment”. Ecological Economics Vol. 60 pp: 499-508.
- New Economics Foundation (2003): “Making indicators count: Using quality of life indicators in local governance - Identifying the missing link”: pp 1-20.
- Newman, P. (2006). “The environmental impact of cities”. Environment and Urbanisation Vol. 18(2): pp 275-295.

Niemeijer, D. and De Groot, R. (2008): "Framing environmental indicators: moving from causal chains to causal networks". Environ Dev Sustain: pp 89-106.

Nooteboom, S. (2007): "Impact assessment procedures for sustainable development: A complexity theory perspective". Environmental Impact Assessment Review 27: pp 645-665.

Organization for Economic Cooperation and Development (OECD) (2008): "OECD Key environmental indicators 2008". OECD Environment Directorate, Paris.

Organization for Economic Cooperation and Development (OECD) (2009): "Society at a glance". 2009 - OECD social indicators. Available on the web at [www.oecd.org/els/social/indicators/SAG](http://www.oecd.org/els/social/indicators/SAG) [Retrieved 08/09/2010].

Organization for Economic Cooperation and Development (OECD) (2010): "Main economic indicators". Available on the web at <http://stats.oecd.org/mei/default.asp?rev=4&lang=e> [Retrieved 08/10/2010].

Office of the President (1994): "White Paper on Reconstruction and Development. Government's strategy for fundamental transformation". Available on the web at <http://www.info.gov.za/view/DownloadFileAction?id=70427> [Retrieved 17/05/2010].

O'Sullivan, D., Manson, M., Messina, P., Crawford, W. (2006): "Space, Place, and Complexity Science". Guest editorial. Environment and Planning A 2006, Vol. 38: pp 611-617.

Olsson, A., Hilding-Rydevik, T., Aalbu, H., and Bradley, K. (2004): "Indicators for Sustainable Development". Paper for discussion Cardiff, 23-24 March 2004. European Regional Network on Sustainable Development: pp 1-29.

Patton, V. (2011): "Steps for a successful policy analysis. Unpublished article. Available on the web at <http://www.socialresearchmethods.net/tutorial/Barrien/barrien.htm> [Retrieved 22/08/2011].

Palmer, K., Conlin, R. (2007): "Sustainable Seattle: The Indicators of Sustainable Community". In: Assessing Sustainable Development: Principles in Practice. International Institute for Sustainable Development. Winnipeg Manitoba: pp 117-128.

Patlitzianas, K., Doukas, H., Kagiannas, A., Psarras, J. (2007): “Sustainable energy policy indicators: Review and recommendations”. Renewable Energy Vol. 33: pp 966-973.

Pereira, J. and Othman, A. (undated): “Sustainable Development Indicators – Providing Environmental Statistics for National Reporting”. Available on the web at <http://www.statssa.gov.za/commonwealth/presentations/Paper-B-Othman.pdf>. [Retrieved 07/06/2010].

Pieterse, E. (2007): “Tracing the ‘integration’ thread in the South African urban development policy tapestry”. Urban Forum Vol. 18 No.1: pp 1-30.

Pieterse, E. (2010): “Recasting urban integration and fragmentation in post-apartheid South Africa”. Development Update. Available on the web at <http://islandla.org.za/publications/research-papers-reports/page/4/> [Retrieved 26/11/2010].

Pillay, U. (2008): “Urban Policy in Post-Apartheid South Africa: Context, Evolution and Future Directions”. Urban Forum. Vol. 19: pp 109-132.

Pirie, G. (2007): “Reanimating a Comatose Goddess: Reconfiguring Central Cape Town”. Urban Forum Vol. 18: pp 125-151.

Program for Research and Documentation for a sustainable society (ProSus) (2002): “Adapting Government practice to the goals of sustainable development”. Working Paper No. 1/02. Centre for Development and the Environment. University of Oslo.

Province of the Western Cape (2006): “Ikapa Elihlumayo. Draft Western Cape Provincial Growth and Development Strategy”. (PGDS) 2006. Available on the web at <http://www.mcgregor.org.za/images/Documents/ikapa-elihlumayo-28aug06-22september-2.pdf>. [Retrieved 23/07/2010].

Province of the Western Cape (2008): “Consolidated annual municipal performance report for the province of the Western Cape 2006/07”. Available on the web at [http://www.capegateway.gov.za/other/2009/12/prov-gaz\\_6584.pdf](http://www.capegateway.gov.za/other/2009/12/prov-gaz_6584.pdf) [Retrieved 19/04/2011].

Ramo, S. and Clair, R. (1998): “The Systems Approach”. Fresh solutions to complex problems: Through combining science and practical common sense. Copyright 1998 By TRW Inc USA.

Available on the web at <http://www.incose.org/productspubs/doc/systemsapproach.pdf> [Retrieved 19/04/2011].

Rabinovitch, J. (1992): "Curitiba: towards sustainable urban development". Environment and Urbanization Vol. 4(2): pp 62-73.

Ravetz, J. (2000): "City – Region 2020: Integrated Planning for a Sustainable Environment". London: Earthscan. Chapter 1, 'Introduction': pp 3-23.

Rebelo, A., Holmes, P., Dorse. C., Wood, J. (2010): "Impacts of urbanization in a biodiversity hotspot: conservation challenges in Metropolitan Cape Town". South African Journal of Botany. Article in Press doi: 10.1016/j.sajb.2010.04.006: pp 1-16. Available on the web at <http://www.sciencedirect.com>. [Retrieved 19/01/2011].

Rochi, E., Federico, A., Musmeci, F. (2002): "A system oriented integrated indicator for sustainable development in Italy". Ecological Indicators Vol. 2 (1.2): pp 197-210.

Rodrigues Regional Assembly (2009a): "Part V Strengthening the soft infrastructure for a thriving Rodriguan community". Available on the web at <http://www.gov.mu/portal/sites/rraportal//chiefcomm/download/sipdr/finalsipdr/18sipdir.pdf>. [Retrieved 07/06/2010].

Rodrigues Regional Assembly (2009b): "Part IV Promoting economic sustainability". Available on the web at <http://www.gov.mu/portal/sites/rraportal//chiefcomm/download/sipdr/finalsipdr/11sipdir.pdf>. [Retrieved 07/06/2010].

Rodriquez A. (2007): "Costa Rica's National Development Strategy". In: Assessing Sustainable Development: Principles in Practice. International Institute for Sustainable Development. Winnipeg, Manitoba: pp 25-36.

Rocholl, M. (2001): "From Environmental space to Ecological Debt – a European perspective". Speech at a Conference on 'Globalisation, Ecological Debt, Climate change and sustainability. Republic of Benin, November 27-30 2001. Available on the web at <http://www.foeeurope.org>. [Retrieved 14/06/2010].

Roseland, M. (2000): "Sustainable community development: integrating environmental, economic, and social objectives". Process in Planning 54 (2000): pp 73-132.



Rubin, A. and Babbie, E. (2008): “Research methods for social work”. Sixth edition. Thomas Learning Inc. USA. Copyright 2008.

Runhaar, H., Dieperink, C., Driessen, P. (2006): “Policy analysis for sustainable development”. The toolbox for the environmental social scientist. International Journal of Sustainability in Higher Education Vol. 7 No. 1: pp 34-56.

Ryan, A. (2008): “What is a systems approach”. Unpublished article: Available on the web at [http://arxiv.org/PS\\_cache/arxiv/pdf/0809/0809.1698v1.pdf](http://arxiv.org/PS_cache/arxiv/pdf/0809/0809.1698v1.pdf) [Retrieved 29/04/2011].

Rydin, Y. (2006): “Joined-up knowledge for the sustainable city? Environment and Planning A 2006 Vol. 38: pp 1005-1007.

Sandstrom, U. (2002): “Green infrastructure planning in urban Sweden”. Planning Practice and research Vol. 17 No. 4: pp 373-385.

Sanjaykumar, G. (2008): “Urban sprawl – A system dynamic approach”. Paper presented at the 44<sup>th</sup> ISOCARP Congress 2008. Available on the web at <http://www.isocarp.net/Data/casestudies/1232.pdf>. [Retrieved 2/9/2010].

Santa Monica (2006): “Santa Monica Sustainable City Plan”. Available on the web at <http://santa-monica.org>. [Retrieved 2/9/2010].

Santa Monica (2010): “Santa Monica Sustainable City Programme”. Available on the web at <http://www.sustainable-org/casestudies/SIA-PDFs/SIA-california.pdf>. [Retrieved 2/9/2010].

Scipioni, A., Mazzi, A., Mason, M., Manzardo, A. (2009): “The Dashboard of sustainability to measure local urban sustainable development. The case study of Padua Municipality”. Ecological Indicators. Vol. 9: pp 364-380.

Seattle (2010): “Sustainable Seattle and Indicators”. Available on the web at <http://sustainableseattle.org/Programs/RegionalIndicators/index-html> [Retrieved 08 /06/2010].

Seekings, J. (2000): “Introduction: Urban studies in South Africa after Apartheid”. International Journal of urban and regional research. Vol. 24 No. 4: pp 832-840.

Sikdar, K. (2003): “Sustainable Development and Sustainability Metrics”. Office of Research and Development. United States Environmental Protection Agency (EPA) Cincinnati Vol. 49 No. 8: pp 1928-1932.

Singh R., Murty, H., Gupta, S., Dikshit, A. (2009): “An overview of sustainability assessment methodologies”. Ecological Indicators Vol. 9: pp 189-212.

South African Cities Network (SACN) (2004): “State of the Cities Report 2004”. Available on the web at <http://www.sacities.net/2006/pdfs/cities-2006.pdf>. [Retrieved 13/05/2009].

South African Cities Network (SACN) (2006): “State of the Cities Report 2006”. Available on the web at <http://www.sacities.net/2006/pdfs/cities-2006.pdf>. [Retrieved 13/05/2009].

South African Cities Network (SACN) (2009): “Sustainable cities 2009”. Available on the web at [http://www.sacities.net/2009/pdfs/sustainable\\_cities2009.pdf](http://www.sacities.net/2009/pdfs/sustainable_cities2009.pdf). [Retrieved 12/09/2010].

South African Government Information (2010): “The New Growth Path: The Framework”. Available on the web at <http://www.info.gov.za/view//DownloadFileAction?id=135748> [Retrieved 23/08/2011].

South Pacific Applied Geoscience Commission (SOPAC) (2010): “Building Resilience, Environmental Vulnerability Index”. Available on the web at <http://www.sopac.org/index.php/environmental-vulnerability-index>. [Retrieved 23/11/2010].

Spalding-Fecher, R., Williams, A., Horen, C. (2000): “Energy and environment in South Africa: charting a course to sustainability”. Energy for Sustainable Development. Vol. 4 No. 4: pp 1-17.

Statistics South Africa (StatsSA) (2010): “Mid-year population estimates 2010”. Statistical release P0302. Available on the web at <http://www.statssa.gov.za>. [Retrieved 20/07/2010].

Steinbuka, I. and Wolff, P. (2007): “Indicators and better policy-making: the case of sustainable development”. Unpublished article. Available on the web at <http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/files/LISBON%20IS%20AUG%202007%20REV2.PDF>. [Retrieved 5/05/2010].

Swilling, M. (2004): “Rethinking the Sustainability of the South African City”. Development Update Vol. 5(1): pp 215-242.

Swilling, M. (2006): “Sustainability and infrastructure planning in South Africa: A Cape Town case study”. Environment and Urbanization. Vol. 18, No 1: pp 23-51.

The Department of Housing (1997): “Urban Development Framework 1997”. Available on the web at <http://www.info.gov.za/view/DownloadFileAction?id=70505>. [Retrieved 15/09/2010].

The Presidency (2004a): “The National Spatial Development Perspective, Provincial Growth and Development Strategies and Municipal Integrated Development Plans Report. Annexure 1 Harmonising and Aligning”. Available on the web at <http://www.thepresidency.gov.za/docs/pcsa/planning/alignmentreport1.pdf>. [Retrieved 20/09/2010].

The Presidency (2004b): “Medium Term Strategic Framework. A framework to guide government’s programme in the electoral mandate period (2004-2009)”. Available on the web at <http://www.thepresidency.gov.za/docs/pcsa/general/mtfs.pdf> [Retrieved 20/04/2011].

The Presidency (2006): “National Spatial Development Perspective 2006”. Available on the web at <http://www.info.gov.za/view/DownloadFileAction?id=94476> [Retrieved 14/08/2010].

The Presidency (2007a): “Development Indicators Mid-Term Review 2007”. Available on the web at <http://www.sarpn.org.za/documents/d0002635/SA-dev-indicators-mid-term-review.pdf>. [Retrieved 14/08/2010].

The Presidency (2007b): “ASGISA Annual Report 2007”. Accelerated and Shared Growth Initiative for South Africa. Available on the web at <http://www.info.gov.za/view/DownloadFileAction?id=80162> [Retrieved 07/04/2011].

The Presidency (2009a): “Republic of South Africa Development Indicators 2009”. Available on the web at <http://www.thepresidency.gov.za/learning/me/indicators/2009/indicators.pdf>. [Retrieved 14/08/2010].

The Presidency (2009b): “Green Paper: National Strategic Planning 2009”. Available on the web at <http://www.info.gov.za/view/DownloadFileAction?id=106567>. [Retrieved 14/08/2010].

The Presidency (2009c): “Republic of South Africa: Improving Government Performance: Our Approach 2009”. Available on the web at <http://www.info.gov.za/view/DownloadFileAction?id=106599>. [Retrieved 14/08/2010].

The Presidency (2009d): “Republic of South Africa: Together doing more and better: Medium Term Strategic Framework: A Framework to guide Government’s Programme in the Electoral Mandate Period 2009-2014”. Available on the web at <http://www.thepresidency.gov.za/docs/pcsa/planning/mtsf-july09.pdf>. [Retrieved 23/11/2010].

The Presidency (2011): “Diagnostic overview”. Available on the web at <http://www.npconline.co.za> [Retrieved 23/07/2011].

Todes, A., Karam, A., Klug, N., Malaza, N. (2010): “Beyond master planning? New approaches to spatial planning in Ekurhuleni, South Africa”. Habitat International. Vol. 34: pp 414-420.

Todes, A. (2011): “Reinventing Planning: Critical reflections” Urban Forum. doi 10.1007/s12132-011-9109-x.

Tourism Cape Town (2010a): “Cape Town Stadium Panorama”. Available on the web at <http://www.capetown.travel/2010/gallery-entry/1380/> [Retrieved 24/11/2010].

Tourism Cape Town (2010b): Available on the web at <http://www.capetown.gov.za> [Retrieved 24/08/2010].

Tress, B., Tress, G., and Fry, G. (undated): “Defining concepts and the process of knowledge production in integrative research”. Chapter Two: pp 13-26. Available on the web at [http://library.wur.nl/frontis/landscape\\_research/02\\_tress.pdf](http://library.wur.nl/frontis/landscape_research/02_tress.pdf). [Retrieved 14/06/2010].

Troyer E. (2002): “A spatial approach for integrating and analysing indicators of ecological and human condition”. Ecological Indicators 2: pp 211-220.

Turok, I. and Watson, V. (2001): “Divergent development in South African cities: strategic challenges facing CapeTown”. Urban Forum Volume 12, No. 2: pp 119-138.

Turok, I and Parnell, S. (2009): “Reshaping cities, rebuilding nations: The role of national urban policies”. Urban Forum. Vol. 20: pp 157-174.

United Nations Commission on Sustainable Development (UNCSD) (1996): “Indicators of Sustainable Development: Framework and Methodologies”. United Nations New York.

United Nations Commission on Sustainable Development (UNCSD) (2001): “Indicators for Sustainable Development Guidelines and Methodologies”, United Nations, New York.

United Nations Development Programme - South Africa (UNDP SA) (2003): “Millennium Development Indicators for South Africa 2003”.

United Nations Development Programme - South Africa (UNDP SA) (2007): “Millennium Development Goals mid-term country report 2007”.

United Nations Population Fund (UNPF) (2001): “The State of World Population, Footprints and Milestones: Population and Environmental change”. Chapter 3: pp 35.

United Nations Department of Economic and Social Affairs (UNDESA) (2001): “Indicators of Sustainable Development: Guidelines and Methodologies”. United Nations New York.

United Nations Habitat (UN Habitat) (2002): “Global Urban Indicators Database version 2 Global Urban Observatory”. United Nations Human Settlement Programme. United Nations Publication 2002.

United Nations Development Programme (UNDP) (2002): “Case Studies on sustainability in Local Governance”. DPLG, UNDP SA and SALGA. Towards Sustainable Development in South Africa 2002.

United Nations (UN) (2003): “Indicators for Monitoring the Millennium Development Goals: Definitions, Rationale, Concepts and Sources 2003”.

United Nations Habitat (UN Habitat) (2006): “State of the World’s Cities Report 2006/2007”. Chapter 1.1

United Nations Educational, Scientific and Cultural Organization - Scientific Committee on Problems of the Environment (2006): “Indicators of sustainability: Reliable tools for decision making”. UNESCO-SCOPE, Policy Briefs, May 2006. No.1 UNESCO-SCOPE Paris.

United Nations (UN) (2006): “Millennium Development Goals report 2006”. New York: United Nations 2006.

United Nations Habitat (UN Habitat) (2009): “Planning Sustainable cities: Policy Directions”. Global report on Human settlements 2009. United Nations Human Settlements programme Earthscan London.

United Nations Development Programme (UNDP) (2008): “Human Development Indices: A statistical Update 2008”. 1 UN Plaza, New York.

United Nations Environment Programme (UNEP) (2011): “What is policy analysis”. Integrated environment Assessment Training Manual – Module 5. Available on the web at <http://www.unep.org/ieacp/iea/training/manual/module5/1231.aspx> [Retrieved 22/08/2011].

United Nations (UN) (2010): “Social indicators”. Available on the web at <http://unstats.un.org/unsd/demographic/products/socind/>. [Retrieved 09/09/2010].

Uprichard, E. and Byrne, D. (2006): “Representing complex places: a narrative approach”. Environment and Planning A 2006, Vol. 38: pp 665-676.

Venetoulis, J. and Talberth, J. (2005): “Ecological Footprint of Nations 2005 update”. Redefining Progress. Sustainability indicators program: pp 1-16.

Vevela, V. and Ellenbecher, M. (2001): “Indicators of sustainable development. Framework and methodology”. Journal of Cleaner Production Vol. 9: pp 519-549.

Vevela, V., Hart, M., Greiner, T., Crumbley, C. (2001): “Indicators of Sustainable Development”. Journal of Cleaner Production Vol. 9: pp 447-452.

Walle, S., Steenberghen, T., Paulley, N., Pedler, A., Martens, M. (2004): “The role of indicators in the assessment of integrated land use and transport policies in European cities”. International Planning Studies Vol. 9 No. 2-3: pp 173-196.

Wackernagel, M. and Rees, W. (1996): “Footprints and sustainability”: Chapter 2 In: Our ecological footprint: Reducing human impact on earth, British Columbia, New Society Publishers: pp 31-60.

Wall, K. (2008): “Managing infrastructure and underpinning the planned environment”. Planning Africa Conference 14-16 April 2008 Sandton Convention Centre, Johannesburg, South Africa: pp 112-119.

Wackernagel, M., Monfreda, C., Deumling, D. (2002): “Ecological Footprint of Nations November 2002 update”. Sustainability issue Brief. Redefining Progress for People, Nature, and The Economy. Available on the web at <http://www.rprogress.org/publications/2002/ef1999.pdf>. [Retrieved 06/09/2010].

Weber, R. (1990) “Basic content analysis”. Second edition Series: Quantitative applications in the social sciences. Vol. 49 Sage publications USA.

Weiland, U. (2006) “Sustainability indicators and Urban development”. In: Wuyi, W., Krafft, T., Kraas, F. Global change, urbanization and Health. China Meteorological Press, Beijing: pp 241-250.

Western Australian Council of Social Service (WACOSS) (2002): “Stage 1 Report – Model of social sustainability”. Housing and sustainable communities indicators project. Available on the web at <http://wacoss.org.au/images/assets/sp-sustainability/HSCIP%20stage%201%20Report.pdf> [Retrieved 06/09/2010].

Western Cape Department of Economic Affairs, Agriculture and tourism (DEAAT) (2001): “White Paper on Sustainable Tourism Development and Promotion in the Western Cape”.

Western Cape Province (2006): “Social Economic Profile: City of Cape Town 2006”. Available on the Web at <http://www.capegateway.gov.za/Text/2007/1/city-of-cape-town-se-profile-optimised.pdf>. [Retrieved 14/09/2009].

Western Cape Provincial Treasury (2009): “Provincial Economic Review and Outlook 2009”. Available on the web at <http://www.capegateway.gov.za/other/2009/11/2009-per&o-final.pdf>. [Retrieved 22/07/2010].

Western Cape Provincial Treasury (2010): “Provincial Economic Review and Outlook 2010”. Available on the web at <http://www.capegateway.gov.za/Text/2010/11/2010-per&o.pdf>. [Retrieved 03/01/2011].

Williams, R. and Kingma, R. (undated): “Cape Town’s strategic public transport network”. Unpublished article. Available on the web at <http://repository.up.ac.za/upspace/bitstream/2263/7847/1/062.pdf> [Retrieved 25/01/2011].

World Bank (1996): “Performance Monitoring Indicators. A handbook for Managers”. Operations Policy Department World Bank, Washington 1996.

World Bank (2010): “Social indicators of development”. Available on the web at <http://www.ciesin.org/IC/wbank/sid-home.html>. [Retrieved 08/09/2010].

World Bank (2010): “Development indicators”. Available on the web at <http://www.data.worldbank.org/data-catalog/world-development-indicators> . [Retrieved 08/10/2010].

World Commission on Environment and Development (WCED) (1987): “Our Common Future”. Oxford University Press Oxford 1987.

Wuppertal, (2010): “Towards sustainable development. Alternatives to GDP for measuring progress”. Wuppertal Institute for Climate, Environment and Energy. Wuppertal Spezial 42, 2010.

Yale Center for Environmental Law & Policy (2010): “Environmental Performance Index 2010”. Available on the web at <http://epi.yale.edu/> [Retrieved 20/04/10].



## List of Appendices

### *Appendix A: Sustainability Development Indicators Questionnaire*

1. In your opinion what is sustainable development?

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2. (a) Is the City of Cape Town a ‘sustainable city’?

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(b) What do you think is the reason for this?

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3. How would you define ‘sustainable development indicators’?

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.....

4. In your view, what are the five most critical issues that need urgent redress by the City of Cape Town to improve the City’s sustainability status?

- (a)
- (b)
- (c)
- (d)
- (e)

5. In the previous processes of developing sustainable development indicators and reporting for the City of Cape Town that you participated in, what challenges had to be faced?

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(b) Which strategies were applied to address these challenges?

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6. What kind of process was followed in the choice of indicators?

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(b) Do you think this process was adequate?

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(c) What would you change about the process?

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7. Who were the stakeholders involved in the choice of indicators? (Examples: local communities, NGOs etc).

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8. To your knowledge, which criteria were applied in the selection of stakeholders?

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9. How was the expert knowledge/inputs obtained and shared (appointed consultants, desktop study of available expert knowledge, discussion groups, training sessions, etc)?

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(b) What do you think the role of expert knowledge should be in the process of choosing indicators?

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.....

(c) What type of expert knowledge needs to be included in the process?

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.....

10. (a) In your opinion, have the sustainable development indicators influenced decision making in the City of Cape Town since they were published?

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.....  
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(b) What do you think is the reason for this?

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11. In your opinion, has the City of Cape Town improved her sustainability status since the adoption of sustainability development indicators and annual progress reporting (if it is being done)?

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12. What types and categories of indicators do you think should be part of the indicators used in monitoring and evaluating the development of Cape Town?

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Your time and effort are highly appreciated. Thank you for your inputs.

## Appendix B: South African Cities Network: Proposed set of Urban Sustainability Indicators

Source: SACN 2009: 58

Theme	Rationale
<b>ENERGY</b>	The South African economy is heavily dependent on energy use and availability. And while the majority of our energy is generated from coal – a situation that is unlikely to change in the foreseeable future – there is growing awareness about the need to increase energy efficiency and accelerate the development and application of renewable energy alternatives. Quantifying existing energy use is the first step towards realising the goal of sustainable energy use across all sectors of the city. The suggested energy indicators therefore focus on quantifying and disaggregating energy consumption. Energy generation by renewable and non-renewable technologies also needs to be quantified. Once energy supply and consumption are known for the city per sector, hotspots of energy consumption can be identified and targets set for sustainable use of energy.
Indicator	Measure/definition
Electricity generation	kWh/year or GJ/year <ul style="list-style-type: none"> <li>• Breakdown of electricity generation by type.</li> <li>• Include trend data if available.</li> <li>• Energy generated by the city (as opposed to Eskom, whose electricity mix is known)</li> <li>• Renewables in separate section (but can be included here).</li> </ul>
Energy/fuel type	kWh/year or GJ/year <ul style="list-style-type: none"> <li>• Breakdown of energy usage across all sectors by source or type. Include trend data if available</li> <li>• Renewables in separate section (but can be included here).</li> </ul>
Renewable energy	kWh/year or GJ/year <ul style="list-style-type: none"> <li>• Breakdown of renewable energy generated/used. Include trend data if available.</li> </ul>
Energy consumption	<ul style="list-style-type: none"> <li>• Sectoral breakdown of energy consumption by activity. Include trend data if available.</li> <li>• If data is available, residential energy consumption can be considered for different income levels.</li> <li>• Residential energy consumption: kWh/year or GJ/year</li> <li>• Transport energy consumption: GJ/year</li> <li>• Industrial energy consumption: kWh/year or GJ/year Industrial sub-sectors will be specific to individual cities. Examples: pulp and paper, textiles, food and beverage, manufacturing, etc.</li> <li>• City council energy consumption: kWh/year or GJ/year</li> </ul>
Energy intensity	<ul style="list-style-type: none"> <li>• Energy intensity by activity:                             <ul style="list-style-type: none"> <li>• public and private transport: GJ/passenger-km</li> <li>• freight: GJ/tonne-km</li> <li>• residential activities: GJ/capita</li> <li>• industrial subsectors: Units specific to output or R-value of products</li> <li>• commercial activities: Units specific to output or R-value of products</li> <li>• city council activities: GJ/capita</li> </ul> </li> </ul>
Energy cost	<ul style="list-style-type: none"> <li>• Cost of electricity: R/kWh</li> <li>• Cost of solar energy: R/kWh</li> <li>• Cost of wind energy: R/kWh</li> </ul>
Energy efficiency	<ul style="list-style-type: none"> <li>• Energy savings due to conservation and efficiency improvements: kWh/year or GJ/year</li> <li>• Number of new developments meeting energy efficient criteria.</li> </ul>
Renewable energy	<ul style="list-style-type: none"> <li>• Number of households: uptake of renewable/ecological technologies (e.g. solar heating).</li> </ul>
Theme	Rationale
<b>CLIMATE CHANGE</b>	Climate change and greenhouse gas emissions are strongly linked to energy use, but have been purposefully put into a separate theme. This is because climate change is still largely perceived as an environmental issue and therefore outside of the direct responsibility of many local government departments. However, much of the data collected to support the energy indicators will be used here.
Indicator	Measure/definition
Climate change	<ul style="list-style-type: none"> <li>• Breakdown of greenhouse gas emissions (CO<sub>2</sub>, nitrous oxide, methane) per sector/activity. Include trend data if available.</li> <li>• Can be derived from energy data using conversion factors. Greenhouse gas intensities can be calculated similarly.</li> <li>• Greenhouse gas emissions per sector:                             <ul style="list-style-type: none"> <li>• residential: tonnes CO<sub>2</sub>-e/capita</li> <li>• transport: tonnes CO<sub>2</sub>-e/passenger-km; tonnes CO<sub>2</sub>-e/tonne-km</li> <li>• industrial sub sectors: specific to each city</li> <li>• commercial: specific to each city</li> <li>• city council: specific to each city</li> </ul> </li> <li>• Carbon footprint: tonnes CO<sub>2</sub>-e/capita (total city greenhouse gas emissions converted to CO<sub>2</sub> equivalents divided by the total population)</li> <li>• Mean annual temperature: degrees celsius</li> </ul>
CDM and carbon trading	Tonnes CO <sub>2</sub> -e/year <ul style="list-style-type: none"> <li>• Total annual tonnages of CO<sub>2</sub>-e "saved" as a result of Clean Development Mechanism (CDM) and/or other trading scheme projects.</li> </ul>

Theme	Rationale
<b>AIR QUALITY AND NOISE</b>	Improving air quality by reducing pollution from urban development, industry and transport is a key requirement of sustainable development. This theme is linked to the energy and climate change themes as improving air quality is often linked to minimising energy use from fuels that give rise to pollutants (wood fuel, coal, petrol, diesel etc.) as well as preventing and reducing waste releases and noise. An essential aspect of any air quality strategy is monitoring to determine whether actions taken at local and national level are effective in meeting sustainability objectives.
Indicator	Measure/definition
Air quality	<ul style="list-style-type: none"> <li>• Concentrations of: <ul style="list-style-type: none"> <li>• sulphur dioxide: ppm</li> <li>• nitrogen dioxide: ppm</li> <li>• particulate (PM10): ppm</li> <li>• lead: ppm</li> </ul> </li> <li>• Annual number of air pollution events</li> <li>• Number and proportion of population affected by air pollution events. Some definition of "affected" population required. Trends in respiratory diseases may also be useful here.</li> </ul>
Stratospheric ozone depletion	<ul style="list-style-type: none"> <li>• Consumption of ozone depleting substances by sector</li> <li>• Stratospheric ozone levels</li> </ul>
Air toxics	<ul style="list-style-type: none"> <li>• Concentrations of air toxics if considered necessary</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Number of complaints</li> </ul>
Odour	<ul style="list-style-type: none"> <li>• Number of complaints</li> </ul>
Theme	Rationale
<b>HUMAN SETTLEMENTS</b>	Inadequate housing in overcrowded neighbourhoods without access to green space, transport and opportunities has negative consequences in terms of health, sanitation, education, employment and other issues. Providing decent affordable housing can therefore form the basis for beginning to address some of these wider issues. Thus, the governance question under this theme is whether or not the city has a unit dedicated to the management of the delivery of housing; and further, how does this unit interface and align with the provincial housing department.
Indicator	Measure/definition
Human settlements	<ul style="list-style-type: none"> <li>• Housing density per zone/suburb: dwelling units/ha</li> <li>• Zones/suburbs to be defined as specific to each city. An alternative is fraction of zones exceeding high density (expressed in persons per household).</li> <li>• Overall population density: population/km<sup>2</sup> (per zone/suburb if applicable)</li> <li>• Incidence of TB: number of cases</li> <li>• Incidence of TB and/or other communicable diseases is seen as a proxy indicator of density.</li> <li>• Percentage dwelling types per settlement category/zone: <ul style="list-style-type: none"> <li>• formal backyard dwelling</li> <li>• informal backyard dwellings</li> <li>• 1 room dwellings not in backyards</li> <li>• other types (e.g. homes built with traditional materials, rental housing vs. owned housing)</li> </ul> </li> <li>• Total delivery of new subsidised (e.g. RDP) housing</li> <li>• Number of new subsidised households on greenfield</li> <li>• Percentage reduction in the housing backlog (requires definition of adequate/inadequate housing)</li> </ul>
Urban green space	<ul style="list-style-type: none"> <li>• Area of urban green space: km<sup>2</sup> (urban green space is defined as good quality, well maintained public green space)</li> <li>• Percentage of population with access to urban green space (access is defined as within 300 metres or 5 minutes walk from their homes)</li> </ul>
Additional Indicators <i>These indicators are either more "tricky" to quantify or they provide additional information/insights into the core set of indicators</i>	<ul style="list-style-type: none"> <li>• Area of urban agriculture area (reported under land use): km<sup>2</sup></li> <li>• Number of new and existing trees planted by species: <ul style="list-style-type: none"> <li>• Indigenous</li> <li>• fruit-bearing</li> </ul> </li> <li>• Unit cost of street trees (including maintenance)</li> </ul>
Theme	Rationale

<b>TRANSPORT</b>	<p>Impacts associated with transport include congestion, noise and air pollution, global warming, and health effects. A sustainable transport system provides access to facilities, services, goods and employment while minimising these adverse impacts of transport on human health and the environment. In particular, people from vulnerable groups are placed at a disadvantage without access to key services including clinics and employment opportunities. Providing an efficient and reliable transport service should be at the forefront of sustainable city planning. The governance questions under this theme aim to determine how far along the city is in terms of providing sustainable transport alternatives:</p> <p>Is there an Integrated Transport Plan for the city?</p> <p>How does the city guide development along transit corridors?</p> <p>Does your city have authority for public transport? And are you performing this function?</p> <p>Are pedestrian and cycle paths planned in conjunction with new roads?</p>
Indicator	Measure/definition
Transport	<ul style="list-style-type: none"> <li>• Average travel time to work: minutes</li> <li>• Breakdown (no. and %) of transport mode to work and public vs. private transport:             <ul style="list-style-type: none"> <li>- public transport: bus</li> <li>- b)public transport: train</li> <li>- public/private transport users: taxi</li> <li>- private transport users: car</li> <li>- private transport users: motorcycle</li> <li>- non-motorised transport: walking</li> <li>- non-motorised transport: cycling</li> </ul> </li> <li>• This will give the split between public and private transport, and can be used to derive the proportion of the population using public transport</li> <li>• Number of private cars/1000 population</li> <li>• Capacity and availability of public transport             <ul style="list-style-type: none"> <li>- number of municipal buses per capita</li> <li>- number of taxis per capita</li> <li>- number of train seats per capita (during peak travel times)</li> </ul> </li> </ul>
Transport Infrastructure	<ul style="list-style-type: none"> <li>• Availability of pedestrian and bicycle paths:             <ul style="list-style-type: none"> <li>- length of dedicated cycle routes per km<sup>2</sup></li> <li>- length of dedicated pedestrian routes per km<sup>2</sup></li> </ul> </li> <li>• Length of road by type per km<sup>2</sup> (road types and quality to be specified if possible e.g. paved, unpaved, dirt roads, etc.)</li> <li>• Length of road dedicated to public transport (i.e. bus/taxi lanes): km<sup>2</sup></li> <li>• Length of rail per km<sup>2</sup></li> </ul>
Additional Indicators	<ul style="list-style-type: none"> <li>• Rand cost of transport per km:             <ul style="list-style-type: none"> <li>- bus</li> <li>- train</li> <li>- taxi</li> <li>- car</li> <li>- motorcycle</li> </ul> </li> <li>• Number of traffic signal outages per year</li> </ul>
Theme	Rationale
<b>WASTE MANAGEMENT</b>	<p>Increased waste generation, brought about by unsustainable consumption and inefficient use of resources, can, if inappropriately managed, lead to air and land pollution, pollution of fresh and marine waters, disruption of ecosystem services, destruction of habitats, and species loss. It also increases pressure on scarce landfill space. Integrated waste management aims to avoid and reduce waste generation where possible by using energy, materials and resources more efficiently, increase re-use and recycling activities, and manage residual waste appropriately. Whether the city has an Integrated Solid Waste Management Plan is therefore one of the governance questions under this theme, as well as qualifying what waste minimisation and recycling initiatives, strategies and/or policies are in place.</p>
Indicator	Measure/definition
Waste generation	<ul style="list-style-type: none"> <li>• Tonnes/year and % of solid waste generated by type:             <ul style="list-style-type: none"> <li>- household waste</li> <li>- industrial waste</li> <li>- hazardous waste</li> <li>- commercial waste</li> <li>- medical waste</li> <li>- construction and demolition waste</li> <li>- radioactive waste</li> </ul> </li> <li>• Household waste composition (tonnes/year, tonnes/capita and/or %):             <ul style="list-style-type: none"> <li>- kitchen waste</li> <li>- garden waste</li> <li>- paper</li> <li>- plastic</li> <li>- metal</li> <li>- glass</li> </ul> </li> </ul> <p>By region or income level if data exists</p>
Indicator	Measure/definition

Waste reduction and recycling	<ul style="list-style-type: none"> <li>• Tonnes and % of solid waste recycled per year: <ul style="list-style-type: none"> <li>• household waste</li> <li>• industrial waste</li> <li>• commercial waste</li> <li>• construction and demolition waste</li> </ul> </li> <li>• Household waste recycled or composted per year (tonnes/year; tonnes/capita and/or %): <ul style="list-style-type: none"> <li>• kitchen waste</li> <li>• garden waste</li> <li>• paper</li> <li>• plastic</li> <li>• metal</li> <li>• glass</li> </ul> </li> <li>• Value of waste recycled: R/year</li> <li>• Number and locality of waste to energy projects</li> <li>• Tonnes/year of waste utilised in waste to energy projects</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Tonnes of waste disposed by method (tonnes/year and/or %): <ul style="list-style-type: none"> <li>• sanitary landfill</li> <li>• incinerated</li> <li>• open dump</li> <li>• composted</li> <li>• burned openly</li> <li>• other</li> </ul> </li> </ul>
Additional Indicators	<ul style="list-style-type: none"> <li>• Waste reduction and recycling <ul style="list-style-type: none"> <li>• Tonnes/year of waste avoided as a result of waste minimisation activities and initiatives <ul style="list-style-type: none"> <li>• industrial</li> <li>• commercial</li> <li>• city council</li> <li>• household</li> </ul> </li> </ul> </li> <li>• Waste disposal <ul style="list-style-type: none"> <li>• Areas of illegal dumping plus amounts illegally dumped (or number of times cleared)</li> </ul> </li> </ul>
<b>Theme</b>	<b>Rationale</b>
<b>LAND USE AND PLANNING</b>	Land use is a key theme for sustainable development as it influences resource and energy use, transportation requirements, access to services and employment, air quality, water supply and quality, biodiversity and the natural environment, as well as the built environment. While Integrated Development Plans are now commonplace in South African cities, the governance questions under this theme probe a bit more deeply to determine whether or not they have been updated; if there is a Spatial Development Framework; how many precinct level development plans are currently in place, and how the city enforces land use restrictions.
<b>Indicator</b>	<b>Measure/definition</b>
Land use	<ul style="list-style-type: none"> <li>• Area of greenfield developments: km<sup>2</sup></li> <li>• Area of brownfield developments: km<sup>2</sup></li> <li>• Area of developed green space: km<sup>2</sup></li> <li>• Area of undeveloped green space: km<sup>2</sup></li> <li>• Area of urban green cover: km<sup>2</sup></li> <li>• Loss of agricultural land and metropolitan open space to urban and peri-urban development: km<sup>2</sup></li> </ul>
Planning	<ul style="list-style-type: none"> <li>• Land use ratios (total km<sup>2</sup> and %): <ul style="list-style-type: none"> <li>• industrial</li> <li>• residential</li> <li>• commercial</li> </ul> </li> <li>• New developments: <ul style="list-style-type: none"> <li>• number of new industrial and commercial development</li> <li>• extent of new industrial and commercial developments: km<sup>2</sup></li> <li>• number of new mixed use developments</li> <li>• extent of new mixed use developments: km<sup>2</sup></li> </ul> </li> <li>• Area of land set aside for conservation or as natural and cultural heritage sites: km<sup>2</sup></li> </ul>
Additional Indicators	These indicators are either more 'tricky' to quantify or they provide additional information/insights into the core set of indicators <ul style="list-style-type: none"> <li>• Land condition: <ul style="list-style-type: none"> <li>• desertification</li> <li>• soil loss</li> <li>• soil acidification</li> <li>• soil salinisation</li> <li>• land degradation</li> <li>• persistent organic pollutants</li> </ul> </li> </ul>

Theme	Rationale
<b>WATER AND WASTEWATER</b>	After energy, water is probably the next most pressured resource. Ensuring water availability and supply is a key concern in our cities. A water management plan at the city level is therefore necessary and is the first governance question under this theme. The indicators under this theme cover water quantity in terms of consumption demands and availability, and water quality. Wastewater management considers the volume of wastewater generated, the fate of wastewater, wastewater treatment capacity and performance, and the status of wastewater infrastructure. Additional indicators include indicators to measure freshwater, marine, coastal and estuarine ecosystem integrity.
Indicator	Measure/definition
Wastewater management	<ul style="list-style-type: none"> <li>• Volume of wastewater generated (MI/year):               <ul style="list-style-type: none"> <li>- industrial</li> <li>- domestic</li> <li>- commercial</li> <li>- other</li> </ul> </li> <li>• Fate of wastewater (MI/year and/or %):               <ul style="list-style-type: none"> <li>- treated</li> <li>- not treated</li> <li>- recycled/reclaimed</li> <li>- unaccounted for</li> </ul> </li> <li>• Wastewater treatment works:               <ul style="list-style-type: none"> <li>- total capacity: MI/day</li> <li>- number and type</li> </ul> </li> <li>• Sludge and effluent compliance:               <ul style="list-style-type: none"> <li>- Percentage wastewater discharge that meets discharge standards</li> <li>- Percentage sludge that meets discharge standards</li> </ul> </li> </ul>
Wastewater Infrastructure	<ul style="list-style-type: none"> <li>• Age of network: years</li> <li>• Sewer blockages per 100km of pipe per year: no/100km.year</li> <li>• Leaks per km of pipe per year: MI/km.year</li> <li>• Current investment: % of asset value spent in maintenance per year: R/year</li> </ul>
Water quantity	<ul style="list-style-type: none"> <li>• Breakdown of water consumption (surface water and groundwater):               <ul style="list-style-type: none"> <li>- residential water consumption per activity: MI/year</li> <li>- industrial water consumption: MI/year</li> <li>- commercial water consumption: MI/year</li> <li>- council water consumption (per activity e.g. developed vs. undeveloped open space): MI/year</li> </ul> </li> <li>• Locality and capacity of reservoirs: MI total, % full</li> <li>• Intensity of use (groundwater and surface water): MI/capita</li> <li>• In terms of salinity, nutrients, microbiology, toxics etc:               <ul style="list-style-type: none"> <li>- surface water quality</li> <li>- groundwater quality</li> <li>- drinking water quality</li> </ul> </li> <li>• Proportion (%) of population affected by violation of drinking water quality criteria (definition required for "affected" population)</li> <li>• Number of pollution events in water bodies</li> <li>• Number and locality of algal blooms</li> </ul>
Additional indicators	<ul style="list-style-type: none"> <li>• Wastewater Infrastructure               <ul style="list-style-type: none"> <li>• Network density in terms of metres of pipe per connection: m/connection</li> <li>• Length of pipe per km<sup>2</sup></li> <li>• Backlog in maintenance</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>• Water quantity               <ul style="list-style-type: none"> <li>• MI/year: Reduction in drinking quality water demand as a result of educational initiatives, technological interventions (e.g. low flow showerheads, low flush toilets)</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>• Freshwater ecosystem integrity</li> <li>• Riparian vegetation</li> <li>• Number of new developments near wetlands</li> <li>• Pollutant loading entering freshwater systems from land based sources</li> <li>• SASS biological Index (disaggregated)</li> <li>• Number of households in 50 year and 100 year flood zone (or number of households affected by flooding)</li> </ul>
	<ul style="list-style-type: none"> <li>• Marine, coastal and estuarine ecosystem integrity</li> <li>• Concentrations of heavy metals in sediments or biological tissues</li> <li>• Number of new developments in the coastal zone</li> <li>• Pollutant loading entering freshwater systems from land based sources</li> <li>• Number and locality of oil pollution accidents along the coast</li> </ul>



Theme	Rationale
<b>BIODIVERSITY / CONSERVATION</b>	The natural environment provides us with ecosystem services, ensuring clean air, water, food and raw materials. While these services and resources have historically been treated as unlimited, ever increasing impacts from unsustainable activities has raised awareness of the need to conserve and protect our natural environment and resources.
Indicator	Measure/definition
Species diversity	<ul style="list-style-type: none"> <li>• Biodiversity rating/Index</li> <li>• Lists of threatened and extinct species, populations and ecological communities</li> <li>• List of endemic species, populations and ecological communities</li> <li>• List of alien (non-Indigenous) species</li> </ul>
Habitat change	<ul style="list-style-type: none"> <li>• Extent of conserved area: <ul style="list-style-type: none"> <li>• total area: km<sup>2</sup></li> <li>• percentage lost or gained on previous years</li> </ul> </li> <li>• Extent of natural areas: <ul style="list-style-type: none"> <li>• total area: km<sup>2</sup></li> <li>• percentage lost or gained on previous years</li> </ul> </li> <li>• Disturbance regimes: fire frequency: <ul style="list-style-type: none"> <li>• number of fires</li> <li>• area affected: km<sup>2</sup></li> </ul> </li> <li>• Disturbance regimes: flood and drought: <ul style="list-style-type: none"> <li>• number of events</li> <li>• area affected: km<sup>2</sup></li> </ul> </li> </ul>
Resource value	<ul style="list-style-type: none"> <li>• List of commercially utilised natural resources (list and Rand value generated): <ul style="list-style-type: none"> <li>• Indigenous species</li> <li>• freshwater species</li> <li>• marine, coastal and estuarine species</li> <li>• terrestrial species</li> </ul> </li> </ul>
Theme	Rationale
<b>CULTURE AND HERITAGE</b>	Preserving our culture and heritage for future generations is an integral part of sustainable development, but does not get the same attention as more pressing environmental concerns. The governance question here is a self-evaluation of how actively the city is protecting and developing cultural and heritage sites.
Indicator	Measure/definition
Culture	<ul style="list-style-type: none"> <li>• Number, status and locality of cultural sites</li> <li>• Investment into developing new and maintaining existing cultural heritage resources (budget allocation)</li> <li>• Number of local and international visitors to cultural heritage sites</li> </ul>
Natural heritage	<ul style="list-style-type: none"> <li>• Number, status and locality of natural heritage sites</li> <li>• Investment into maintaining and developing natural heritage resources (budget allocation)</li> <li>• Number of (local and international) visitors to natural heritage sites</li> <li>• Number of blue flag beaches</li> <li>• Number of listed buildings</li> </ul>
Theme	Rationale
<b>OVERALL SUSTAINABILITY</b>	The governance question posed under overall sustainability is: Does the city produce a sustainability report? Such a report should cover most if not all of the themes listed above, although it may follow a different framework. The primary aim of ecological footprint studies to date has been the promotion of public awareness and education, although its use to support policy-making is increasing. Calculation of a city's ecological footprint requires the collection and collation of data on resource availability and consumption, and thus provides an established and consistent framework for gathering and organising data, setting targets and monitoring progress. It is also a good visualisation tool and can help to highlight the problem areas if calculated in sufficient detail.
Indicator	Measure/definition
Ecological footprint	<ul style="list-style-type: none"> <li>• Global hectares/capita:</li> <li>• Ecological footprint calculated using the footprint network's methodology. Disaggregated consumption data used in the calculation is useful for informing policy and should be recorded.</li> </ul>

*Appendix C: City of Seattle Indicator Model*

Source: Bossel 1999: 86

orientor	subsystem	subsystem performance	contribution to total system
existence	human	Children living in poverty	Low birthweight infants
	support	–	–
	natural	–	–
effectiveness	human	Health care expenditures	Distribution of personal income
	support	Residential water consumption	Work required for basic needs
	natural	Impervious surfaces	Solid waste generated and recycled
freedom of action	human	High school graduation	Housing affordability ratio
	support	Real unemployment	Voter participation
	natural	Renewable and nonrenewable energy use	Farm acreage
security	human	Employment concentration	Juvenile crime
	support	Community capital	Emergency room use for non-ER purposes
	natural	Soil erosion	Pollution prevention and renewable resource use
adaptability	human	Adult literacy	Youth involvement in community service
	support	Library and community centre usage	Vehicle miles travelled and fuel consumption
	natural	Biodiversity	Wetlands
coexistence	human	Volunteer involvement in schools	Ethnic diversity of teachers
	support	Air quality	Asthma hospitalization rate for children
	natural	Wild salmon	Population
psychological needs	human	Equity in justice	Neighbourliness
	support	Pedestrian friendly streets	Perceived quality of life
	natural	Gardening activity	Open space in urban villages

**Appendix D: Santa Monica indicator matrix**

Source: Santa Monica 2006: 21

	Resource Conservation	Environmental and Public Health	Transportation	Economic Development	Open Space and Land Use	Housing	Community Education and Civic Participation	Human Dignity
<b>Resource Conservation Indicators</b>								
Solid waste generation	●			●				
Water use	●	●		●			●	
Energy use	●	●	●	●		●		
Renewable energy use	●	●					●	
Greenhouse gas emissions	●	●	●	●	●	●		
Ecological Footprint for Santa Monica	●	●	●	●	●	●		
Indicator of sustainable procurement	●	●		●				
“Green” construction	●	●	●			●		
<b>Environmental and Public Health Indicators</b>								
Santa Monica Bay – beach closures		●			●			
Wastewater (sewage) generation	●	●		●				
Vehicle miles traveled	●	●	●		●	●		
Air quality	●	●	●	●				
Residential household hazardous waste		●						
City purchases of hazardous materials		●						
Toxic air contaminant releases		●						
Urban runoff reduction	●	●	●		●			
Fresh, local, organic produce		●	●	●				
Organic produce – Farmer’s markets		●	●	●				
Restaurant produce purchases		●	●	●				
Food choices	●	●	●	●				
<b>Transportation Indicators</b>								
Modal split	●	●	●		●			
Residential use of sustainable trans. options	●	●	●		●		●	
Sufficiency of transportation options			●					
Bicycle lanes and paths			●		●			
Vehicle ownership	●	●	●	●				

	Resource Conservation	Environmental and Public Health	Transportation	Economic Development	Open Space and Land Use	Housing	Community Education and Civic Participation	Human Dignity
Bus ridership	●	●	●					
Alternative fueled vehicles – City fleet	●	●	●					
Traffic congestion			●	●	●			
Pedestrian and bicycle safety			●					
Traffic impacts to emergency response			●	●	●			
<b>Economic Development Indicators</b>								
Economic diversity				●				
Business reinvestment in the community				●			●	
Jobs / Housing balance			●	●		●		●
Cost of living				●		●		●
Quality Job Creation				●				●
Income disparity				●				●
Resource efficiency of local businesses	●	●		●				
Local employment of City staff			●	●		●		
<b>Open Space and Land Use Indicators</b>								
Open Space		●			●			
Trees	●	●			●			
Parks - Accessibility			●		●	●	●	
Land Use and Development			●		●	●		
Regionally appropriate vegetation	●				●			
<b>Housing Indicators</b>								
Availability of affordable housing				●		●		●
Distribution of affordable housing				●	●	●		●
Affordable housing for special needs groups						●		●
Production of “livable” housing	●		●	●	●	●		
Production of “green” housing	●	●				●		
<b>Community Education and Civic Participation Indicators</b>								
Voter participation							●	
Participation in civic affairs							●	
Empowerment							●	●
Community involvement							●	
Volunteering							●	
Participation in neighborhood organizations							●	
Sustainable community involvement 1	●	●	●		●			
Sustainable community involvement 2	●	●	●	●	●	●	●	●
<b>Human Dignity Indicators</b>								
Basic Needs - Shelter						●		●

	Human Dignity	Community Education and Civic Participation	Housing	Open Space and Land Use	Economic Development	Transportation	Environmental and Public Health	Resource Conservation
Basic Needs – Health Care	●							
Basic Needs – Economic Opportunity	●				●			
Basic Needs – Public Safety	●							
Residents' perception of safety	●							
Incidents of abuse	●							
Incidents of discrimination	●		●		●			
Education / Youth	●							
Empowerment	●				●			
Ability to meet basic needs	●		●	●	●			

**Appendix E: Goals and targets of the UN Millennium Declaration**

Source: City of Cape Town 2008a: 59

Goal	Goals and targets
<b>Goal 1</b>	<b>Eradicate extreme poverty and hunger.</b>
	Halve between 1990 and 2015 the proportion of people whose income is less than \$1 a day.
	Halve between 1990 and 2015 the proportion of people who suffer from hunger.
<b>Goal 2</b>	<b>Achieve universal primary education.</b>
	Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.
<b>Goal 3</b>	<b>Promote gender equality, and empower women.</b>
	Eliminate gender disparity in primary and secondary education preferably by 2005, and in all levels of education no later than 2015.
<b>Goal 4</b>	<b>Reduce child mortality.</b>
	Reduce by two thirds between 1990 and 2015 the under-five mortality rate.
<b>Goal 5</b>	<b>Improve maternal health.</b>
	Reduce by three quarters between 1990 and 2015 the maternal mortality ratio.
<b>Goal 6</b>	<b>Combat HIV/Aids, malaria and other diseases.</b>
	Have halted by 2015, and begun to reduce the spread of HIV/Aids.
	Have halted by 2015, and begun to reverse the incidence of malaria and other major diseases.
<b>Goal 7</b>	<b>Ensure environmental sustainability.</b>
	Integrate the principles of sustainable development with country policies and programmes, and reverse the loss of environmental resources.
	Halve by 2015 the proportion of people with sustainable access to safe drinking water.
	Have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers.
<b>Goal 8</b>	<b>Develop a global partnership for development.</b>
	Develop further an open, rule-based, predictable, non-discriminatory trading and financial system (includes a commitment to good governance, development and poverty reduction – both nationally and internationally).
	Address the special needs of the least developed countries (includes tariff and quota-free access for exports, enhanced programme of debt relief for and cancellation of official bilateral debt, and more generous official donor assistance (ODA) for countries committed to poverty reduction).
	Address the special needs of landlocked countries and small island developing states (through the Programme of Action for the Sustainable Development of Small Island Developing States and 22nd General Assembly provisions).
	Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term.
	In co-operation with developing countries, develop and implement strategies for decent and productive work for youth.
	In co-operation with pharmaceutical companies, provide access to affordable essential drugs in developing countries.
	In co-operation with the private sector, make available the benefits of new technologies, especially information and communications technologies.

## *Appendix F: Ecological Footprint Analysis – case study of Cape Town*

Source: Gasson 2002: 4

A recently developed tool for measuring sustainability is Ecological Footprint analysis. It is based on the fact that the earth is a closed system in which all material inputs required by humanity (air and water, food and fibre, energy and minerals) and supplied by a finite area of productive land and water. Equally, all waste outputs have to be absorbed by natural systems. Nature, functioning as a system of sources and sinks, is therefore our ecological life support system.

Ecological Footprint analysis calculates the total resource consumption and the waste generation of a person, city, or nation (in tons) and, using absorption factors (e.g. output in tons/hectares) converts this into the corresponding area needed to produce the resources and consume the wastes. The 'areal' figure, in hectares per person, is the ecological footprint of the individual, city or nation.

In 2000 Barry Gasson at the University of Cape Town's School of Architecture and Planning<sup>75</sup>, conducted an Ecological Footprint Analysis of the City of Cape Town. Covering an administrative area of 2 487km<sup>2</sup> and a built-up area of 774km<sup>2</sup>, Cape Town depends upon an area of about 128 300km<sup>2</sup> for the supply of its resources and the absorption of its wastes. This is equal to about 10% of the total surface of South Africa (1 225 815km<sup>2</sup>) or approximately the area of the Western Cape, which is 129 370km<sup>2</sup>.

With a population of about 3 million this translates into an Ecological Footprint of 4.28 ha/person, indicating that Capetonians are consuming more than double the 'fair Earthshare' of 1.9 ha/person – the amount of productive land on the planet available to supply each person's resource needs and absorb their outputs.

The energy footprint, in particular, was estimated at 10 920km<sup>2</sup> comprising 8.5% of Cape Town's overall Ecological Footprint. It includes the area needed to supply the fossil fuels and absorb the carbon dioxide emissions. Cape Town's industrial-urban metabolism depends on the flow of fossil energy (40%) and nuclear-electrical energy (58%).

**Appendix G: Environmental Indicators for National SoER**

Source: DEAT 2002: 36.

ATMOSPHERE & CLIMATE	
Climate Change	AC01 - Greenhouse gas emissions (carbon dioxide, nitrous oxide & methane) AC02 - Energy use (fossil vs non-fossil fuels) AC03 - Size of the national carbon sink AC04 - Malaria: morbidity and mortality AC05 - Mean annual temperature AC06 - Cost of carbon abatement AC07 - Cost of natural disaster relief AC08 - Energy intensity
Stratospheric Ozone	AC09 - Consumption of ozone depleting substances AC10 - UV-B trends AC11 - Stratospheric ozone level
Air Quality	AC12 - Ambient sulphur dioxide concentration AC13 - Ambient nitrogen dioxide concentration
WASTE MANAGEMENT	
Waste Generation	WM01 - General waste produced per income group per year WM02 - General waste produced per capita per year WM03 - Hazardous waste produced per sector per year
Waste Reduction	WM04 - Waste recycling WM05 - Value of waste recycled WM06 - General waste correctly disposed through landfill WM07 - Hazardous waste correctly disposed WM08 - Available landfill lifespan WM09 - Provincial expenditure on waste management WM10 - Provincial waste collection capacity
HUMAN WELL-BEING	
Human Settlements	HW01 - Green space per settlement HW02 - Contaminated land per settlement HW03 - Housing density HW04 - Urban/rural population HW05 - Proportion of urban area in South Africa
Vulnerability	HW06 - GDP/capita HW07 - Life expectancy HW08 - Adult literacy rate HW09 - Employment rate HW10 - Population growth rate HW11 - HIV/AIDS incidence HW12 - Household energy use HW13 - Access to water HW14 - Access to sanitation
ENVIRONMENTAL MANAGEMENT	
Environmental Management	EM01 - Multilateral environmental agreements EM02 - Budgetary allocation to natural resource management EM03 - Budgetary allocation to environmental education EM04 - Budgetary allocation to environmental research EM05 - Inclusion of IEM into IDPs and SDIs EM06 - Conciliation cases EM07 - Voluntary adoption of environmental management systems EM08 - Voluntary use of environmental accounting and reporting EM09 - Government capacity for environmental management EM10 - Environmental reporting by government departments



INLAND WATER	
Water Quantity	IW01 - Intensity of use of surface water resources IW02 - Intensity of use of ground water resources IW03 - Total surface water used per sector IW04 - Total ground water used per sector IW05 - Total surface water resources per capita IW06 - People dependent on ground water resources IW07 - Surface water affordability
Water Quality	IW08 - Surface water salinity IW09 - Ground water salinity IW10 - Surface water nutrients IW11 - Ground water nutrients IW12 - Surface water microbiology IW13 - Ground water microbiology IW14 - Surface water toxicity
Freshwater Ecosystem Integrity	IW15 - Riparian vegetation IW16 - Aquatic macro-invertebrate composition IW17 - Fish community health IW18 - Aquatic habitat integrity
MARINE, COASTAL & ESTUARINE	
Resource Management	MC01 - Catches and Maximum Sustainable Yield per fishery sector MC02 - Distribution and abundance of resource species MC03 - Catch per unit effort per fishery sector MC04 - Commercial fishing rights supporting SMME development
Resources Quality	MC05 - Estuarine Health Index (State of South African estuaries) MC06 - Pollutant loading entering the seas from land-based sources MC07 - Blue Flag beaches MC08 - Concentration of heavy metals in sediments or biological tissues MC09 - Oil pollution accidents along the coast MC10 - Land cover change in the coastal zone MC11 - Population density change in the coastal zone
BIODIVERSITY & NATURAL HERITAGE	
Species Diversity	BD01 - Threatened and extinct species per taxonomic group BD02 - Endemic species per taxonomic group BD03 - Alien (non-indigenous) species per taxonomic group BD04 - Population trends of selected species BD05 - Distribution and abundance of selected alien species
Habitat Change	BD06 - Extent of conserved areas BD07 - Extent of natural areas remaining BD08 - Disturbance regimes : fire frequency BD09 - Disturbance regimes : flood and drought
Resource Value	BD10 - Contribution to job creation : conservation areas BD11 - Contribution to job creation : eradication of alien species BD12 - Economic contribution of commercially utilised indigenous species BD13 - Economic contribution of commercially utilised freshwater species BD14 - Economic contribution of commercially utilised marine, coastal & estuarine species BD15 - Economic contribution of commercially utilised terrestrial species
Natural Heritage Resources	NH01 - Status of natural heritage resources NH02 - Investment into natural heritage resources NH03 - Visitors to natural heritage resources
LAND USE	
Land Use	LU01 - Land cover LU02 - Land productivity vs potential
Land Condition	LU03 - Desertification LU04 - Soil loss LU05 - Soil acidification LU06 - Soil salinisation LU07 - Land degradation LU08 - Persistent organic pollutants

## Appendix H: DEAT Environmental Sustainability Indicator Framework

Source: DEAT, 2008: 18

	Indicator number	Indicator	Variable number	Variable description
Environmental systems	1	Air quality	1	Domestic fuel burning
	2	Biodiversity	2	Threatened bird, mammal amphibian and reptile species (known)
	3	Land	3	Threat and protection status of vegetation types per biome
	4	Marine	4	Degraded and transformed land
			5	Status of west coast rock lobster
			6	Catches of selected marine species (harvesting)
			7	Marine protected areas
	5	Freshwater	8	Available water per capita
			9	Capacity and levels of dams in South Africa
			10	Freshwater quality
	6	Groundwater	11	Groundwater quantity
12			Groundwater quality	
13			Coal consumption	
14			Vehicles in use per populated area	
Industry environmental stresses	7	Air pollution	15	Invasion of alien species
	8	Ecosystem stress	16	Percentage change in projected population, 1950-2050
			17	Total fertility rate (TFR)
	9	Population pressure	18	Migration
			19	Ecological footprint
			20	Energy use
	10	Waste and consumption pressures	21	Grazing capacity
22			Fertilizer sales	
11	Water stress	23	Water stress	
		24	Households with access to sanitation	
Reducing human vulnerability	12	Basic human sustenance	25	Access to water
			26	Access to refuge removal
	13	Environmental health	27	Death rate from respiratory diseases and tuberculosis
			28	HIV prevalence
			29	Malaria
Socio-institutional capacity	14	Eco efficiency	30	Under 5 mortality
			31	Energy efficiency
	15	Environmental governance	32	Hydropower and renewable energy production as percentage of total energy consumption
			33	Percentage of total land area under protected status
	16	Private sector responsiveness	34	Percentage of variables missing from the "Rio to Joburg Dashboard"
			35	Environmental management systems
	17	Science and technology	36	Budget for the environment
			37	Digital access index
38			Number of researchers per 1 000 total employment	
39			Budget for research and development (R&D)	
40			Gross tertiary enrolment rate	
Global Steward Ship	18	Greenhouse gas emissions	41	Education (primary secondary and adult basic education and training)
			42	Carbon emissions per capita
	19	Participation in international collaborative efforts	43	Multilateral environmental agreements
			44	Production and consumption of CFCs
20	Reducing transboundary environmental pressures	45	Transfrontier conservation areas (TFCAs)	

## Appendix I: Western Cape State of the Environment Indicators

Source: DEA&DP 2005: 140

	ISSUE	HOW WE ARE DOING	COMMENTS
Air and Climate	Air pollution in the Cape Metropolitan Area	☹️	The number of air pollution events and exceedances of guidelines in the Cape Metropolitan Area has reduced, but the intensity of the events is worsening.
	Air pollution in the rest of the Western Cape	😊	Air quality in the rest of the Western Cape is generally acceptable or good.
	GHG emissions	☹️	The Western Cape releases fewer emissions than many of the other provinces in SA, but demand for energy in the Western Cape contributes to elevated South African GHG emission levels.
Biodiversity	Biodiversity conservation	☹️	63% of the vegetation in the Western Cape occurs in the least threatened category, while 9% is critically endangered. Of South Africa's 21 critically endangered vegetation types, 17 occur in the Western Cape.
	Species threatened with extinction	☹️	Although data is still being collected, the number of plant and animal species threatened with extinction appears to be increasing.
	Alien plant invasion	☹️	The Western Cape has a very serious alien plant problem compared to the rest of SA, with some catchments being 80% infested.
	Alteration of fire regimes	☹️?	Although extensive trend data is not yet available, it is evident that fires are occurring too frequently and are too intense. This is influencing vegetation composition.
In-land Water and Water Supply	Demand for water in a water poor environment	☹️	Water demand exceeds supply in nearly all of the Western Cape's Water Management Areas.
	Pollution and degradation of rivers	☹️☹️	Pollution and degradation of the rivers in the Western Cape is severe and is getting worse.
	Access to potable water	😊	The Western Cape has the highest percentage of dwellings with access to piped water in the whole of SA.
The Coastal Zone	Habitat modification due to development (estuary status)	☹️	The state of the Western Cape's estuaries is worse than in the rest of SA. Estuaries near urban areas are particularly poor, while those in the southeast are healthier.
	Pollution associated with development	☹️	The Western Cape's marine environment receives 32% of the effluent discharged into the marine environment in SA. Trends indicate an increase in the amount of cadmium and a decrease in the amount of lead found in mussels along the Western Cape coast.
	Overs exploitation of marine resources	☹️	A number of marine species have experienced significant decline in the Western Cape and some populations, such as abalone, face collapse.
Land	Soil and veld degradation	😊	The Western Cape has the third lowest combined land degradation index in SA.
	Loss of land for agricultural use	?	The Western Cape has very little land suitable for agriculture. However, insufficient data exists to establish if agricultural land is being lost.
Waste and Sanitation	Increasing waste generation	☹️	Waste generation estimates differ, however trends indicate that waste generation is increasing.
	Waste collection	😊	Waste collection services in the Western Cape have improved significantly since 1996, and most households are serviced.
	Permitting of landfill sites and airspace available	☹️	Only 52% of the Western Cape's landfills are permitted and many areas are running out of landfill airspace.
	Sanitation and the provision of associated services	😊	The number of households with access to flush or chemical toilets in the Western Cape has improved and is generally high (about 89%), although the percentage has decreased over the past few years.
	Re-cycling of waste	?	There is no accurate data on waste re-cycling in the Western Cape.
Energy	Access to energy	😊	The majority of people in the Western Cape, especially in urban areas have access to electricity.
	Use of renewable and nuclear energy	☹️?	The percentage usage of renewable energy in the Western Cape is not known. In SA only 5.6% of the energy used comes from renewable sources. The Western Cape has the only nuclear power plant and the only two wind farms in the country.

	ISSUE	HOW WE ARE DOING	COMMENTS
Health	Prevalence of HIV	☹️	The Western Cape has a lower HIV/AIDS prevalence than the rest of SA. However it is still high compared to international standards.
	Prevalence of TB	☹️☹️	The Western Cape has a far higher TB prevalence than the rest of SA and compares very poorly to international standards.
	Access to health services	☹️	The Western Cape has better health care infrastructure than most other provinces in SA. However these are not always appropriated located relative to population densities.
Education	Adult literacy	☺️	The Western Cape has the highest adult literacy rate in South Africa, with 94% of all adults being able to read.
	Access to basic education	☺️	For the past five years there has been almost universal enrolment in Grade 1 in the Western Cape.
	Quality of education	☹️	About half of learners in the Western Cape who enrol in Grade 1 finish Grade 12. The number of pupils that finish school with a matric endorsement is low and results still follow racial patterns. Additionally more than 60% of the learners tested in Grade 3, had literacy and numeracy skills below a Grade 3 level.
Economics and Poverty	Unemployment	☹️	The provincial unemployment rate is well below the national average but is still high (17.6%).
	Gini-coefficient (an index of income inequality)	☹️	There has been an increase in the Gini Coefficient in the Western Cape, representing an increase in income inequality, although it is still the lowest in SA.
	Human development index (HDI) (an index measuring literacy, life expectancy and income)	☹️	The Western Cape's HDI has declined, but is still well above the national average.
	Poverty	☹️	The Western Cape's GDP per capita far exceeds the national average, but an estimated 21% of the population lived in poverty in the 2003.
Tourism	Tourism market and future potential	☺️	The Western Cape received the second highest number of visitors and sold the second highest number of bednights in SA. There is potential for expanding the tourism market in the Western Cape.
	Seasonality	☹️	The seasonality of tourism in the Western Cape, as in the rest of SA, is getting more pronounced.
	Spatial and racial imbalances in tourism market	☹️	Spatial and racial imbalances exist in the Western Cape tourism market. However, there are less well known destinations and new markets that are expanding and the Tourism BEE Charter and Scorecard has been released for comment.
Urban Development	Provision of houses	☹️	There is currently a large housing backlog (approximately 306 000 units) in the Western Cape, most of these are in the City of Cape Town. This is estimated to increase by 27 000 units a year, over the next few years.
	Densification and urban sprawl	☹️	Densification and urban sprawl are critical issues in the Western Cape. Some urban areas are too dense and some not dense enough. New development continues to occur outside the urban edge.
	Integration	☹️?	Urban settlements in the Western Cape are not well integrated racially. However, there is currently insufficient data to monitor integration trends.
Transport	Transport Provision of safe public transport	☹️	The public transport commuter network is relatively well developed, in the CMA but less efficient in other parts of the province. Security and the age of the public transport fleet remain issues.
	Percentage of accidents involving public transport vehicles	☺️	The percentage of accidents involving public transport vehicles is still low (about 7% of accidents involve public transport vehicles).
	Infrastructure maintenance and backlogs	☹️	The Western Cape currently has a large infrastructure maintenance and rehabilitation backlog.
	Port and Airport Capacity	☹️	The port of Cape Town and Cape Town International Airport is operating close to or above capacity. Expansion plans are underway.
Safety and Security	Crime levels	☹️☹️	The Western Cape has the highest overall crime levels in SA. However, recently crime levels have begun to stabilise in the Western Cape and in SA.
	Natural disasters	☹️	The Western Cape is regarded as a high risk area, and there has been a dramatic increase in the total number of natural disasters recorded in the province.

## ***Appendix J: CSIR proposed Sustainability Indicators for the City of Cape Town***

Source: City of Cape Town 2004b: 9

1. Number of times the World Health Organisation (WHO) hourly mean guideline value for nitrogen dioxide were exceeded
2. Water use per capita per annum
3. Extent of green spaces within the City of Cape Town per capita
4. Biological indicator of water quality
5. Extent of natural vegetation conserved
6. Renewable energy supplied as a percentage of the total energy supply per annum
7. Energy use per capita per annum
8. Extent of urban sprawl
9. Spatial extent of alien invasive species infestation
10. Number of visitors to national and local formally protected areas
11. Access to water
12. Access to sanitation
13. Percentage of informal housing
14. HIV/AIDS prevalence
15. TB prevalence
16. Proportion of effluent reused
17. Landfill lifespan (general and hazardous)
18. Amount of waste generated per annum per capita
19. Amount of waste recycled, reduced and reused per annum
20. Number of commuters per transport mode
21. Incidence of murder per 100,000 of population
22. Incidence of rape per 100,000 of population
23. Incidence of house break-ins per 100,000 of population
24. Adult literacy
25. Average number of pupils per teacher [for primary schooling
26. Percentage of the working population that is unemployed by gender and population group
27. Gross Geographic Product
28. Percentage of households living below the household subsistence level
29. Percentage of households earning below/above average per capita income
30. Number of interdepartmental (within Cape Town) or intergovernmental ( between spheres of government) initiatives per year
31. Number of joint initiatives within civil society and business per year
32. Number and extent of City of Cape Town education and awareness programmes
33. Number and extent of City of Cape Town volunteer programmes
34. Percentage of City of Cape Town budget spent per year

## ***Appendix K: Johannesburg Plan of Implementation***

Source: DEAT 2006: 3

Johannesburg plan of Implementation:

- ◆ Poverty eradication
- ◆ Changing unsustainable patterns of consumption and production
- ◆ Protecting and managing the natural resource base of economic and social development
- ◆ Sustainable development in a globalising world
- ◆ Health and sustainable development
- ◆ Sustainable development in Africa
- ◆ Means of implementation
- ◆ Institutional framework for sustainable development

## *Appendix L: Goals of the Cape Town IMEP*

Source: City of Cape Town 2003: 9

Goal	Description
<b>1. Air</b>	A commitment to reducing the incidence of all forms of air pollution, and the potential environmental health risks associated with air pollution
<b>2. Water resources</b>	A commitment to ensuring that the quality of coastal, marine and inland waters of Cape Town is suitable for the maintenance of biodiversity, and the protection of human health, and a commitment to the principle that all Cape Town inhabitants have the right to clean, potable and adequate water sources
<b>3. Landforms &amp; soils</b>	A commitment that recognises that the conservation and enhancement of landforms and soils in Cape Town is essential
<b>4. Fauna &amp; flora</b>	A commitment to the conservation of biodiversity in Cape Town
<b>5. Cultural heritage</b>	A commitment to ensuring that the diverse cultural heritage of Cape Town is preserved, protected and enhanced
<b>6. Urbanisation &amp; housing</b>	A commitment to recognising that shelter and services are needed for a growing population, while at the same time recognising that environmental features and systems need protection
<b>7. Infrastructure</b>	The recognition that the supply and delivery of infrastructure can both improve our living conditions, and cause environmental impacts
<b>8. Transportation</b>	A commitment to the recognition that transportation is needed for access to facilities and work opportunities, but consumes valuable resources and contributes to environmental degradation
<b>9. Energy</b>	Recognising the importance of energy and its role in development, and the negative effects that energy production may have on the environment; a commitment to sources of energy with the least impact on the environment and health of communities.
<b>10. Waste</b>	A commitment to the need for an integrated waste management strategy that addresses both the production and disposal of solid and liquid wastes, as well as the safe collection, transport and disposal thereof, as well as the reduction of illegal dumping
<b>11. Economy</b>	A commitment to the recognition that the environment of Cape Town is its greatest asset, and that sustainable development requires economic growth, the creation of jobs, and the reduction of currently high levels of poverty in Cape Town
<b>12. Environmental health</b>	A commitment to the Constitution of South Africa, which guarantees the right of all South Africans to an environment which is not detrimental to their health and well-being
<b>13. Environmental education</b>	A commitment to supporting and promoting appropriate environmental education and awareness throughout Cape Town, and within local government structures
<b>14. Safety &amp; security</b>	A commitment to supporting crime prevention and the reduction of crime, recognising that many communities in Cape Town experience an unacceptable incidence of crime
<b>15. Environmental governance</b>	Recognising that effective environmental governance in Cape Town is in the process of being established, and a commitment to this establishment

## ***Appendix M: Local Agenda 21 Principles***

Source: UNDP SA 2002:3

- ◆ Satisfaction of basic human needs
- ◆ Economic viability/integrity
- ◆ Conservation of biodiversity and maintenance of ecological integrity
- ◆ Social justice and equity
- ◆ Participation of individual communities in activities and decision affecting them
- ◆ Partnerships between government, community and the private sector
- ◆ Accountability
- ◆ Systemic approach
- ◆ Concern for future generations
- ◆ Linkage between local and global dimensions
- ◆ Use of local skills and talents
- ◆ Commitment to training and capacity building of the local community
- ◆ Existence of monitoring and evaluation procedures