Evaluating the spatial and environmental benefits of green space: An international and local comparison on rural areas

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Preface

Gratitude should be given to the persons who aided in the research conducted, without whom many of the conclusions drawn and recommendations made would have been impossible.

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Finally, I thank and dedicate this dissertation to my Abba Father who has guided and moulded me throughout this research which has been a great journey with Him.

"Whatever you do, work at it with all your heart, as working for the Lord, not for men"

~ Col. 3: 23 (NIV)

Abstract

In South Africa, urbanized environments are often studied individually, not taking the surrounding natural environment into account (McConnachie and Shackleton, 2012: 2). Current approaches focussing on the integration of Urban Planning and Urban Ecology seek to address these issues of integrated planning. Urban Ecology practice aims to describe the study of (1) humans in human settlements, of (2) nature in human settlements, and of (3) the joined relationships between humans and nature. Urban Ecology thus forms a major part of Urban and Spatial Planning, with regard to the objectives of sustainable planning and development, green infrastructure planning, and resilience.

The role and impact of green spaces to support sustainable human settlements are no new phenomenon (Byrne & Sipe, 2010: 7). This is related to the different benefits which nature provides, referred to in this research as ecosystem services (or environmental benefits) of green spaces. Green spaces, in this sense, are fundamental areas in human settlements, in need of intentional and structured planning approaches to enhance sustainability and said environmental benefits. It is important to realise that the environment in urbanized areas is dependent on the local communities (in terms of conservation and appropriate planning approaches), but that local communities (society) are also dependent on the environment (in terms of certain benefits which are provided by the said green spaces and environment).

Rural settlements in South Africa experience various problems and challenges in terms of planning for the environment through green spaces (as well as sustainability), mainly as a result of the fragmentation of these rural areas, the existence of lost spaces, urbanisation, urban sprawl and poverty (Trancik, 1986; Barnett, 1995; IIED, 2000; DEAT, 2006; McMahan *et al*, 2002). This research attempted to address the challenges of integrated planning and green space provision in a local rural context, by means of: (1) A literature study encompassing research on Urban Ecology; Urban Planning; environmental dimension of planning; provision of ecosystem services; green infrastructure planning; resilience, and relevant policies and legislation; (2) An empirical investigation and comparative evaluation of international case studies, along with a local case study; and (3) drawing conclusions and recommendations for the local case study, based on the international approaches and identified best-practices.

This research evaluated the spatial and environmental benefits of green space and enhanced the importance of planning for such benefits in rural South African areas.

Key terms:

Ecosystem services

Rural areas

Green spaces

Green Infrastructure Planning

Resilience

Uittreksel

Stedelike omgewings word gewoonlik geïsoleerd en apart bestudeer sonder dat die omliggende natuurlike omgewing in ag geneem word (McConnachie and Shackleton, 2012: 2). Huidige benaderings wat daarop fokus om Stadsbeplanning met Stedelike ekologie te integreer streef veral daarna om die kwessies van geïntegreerde beplanning aan te spreek. Stedelike ekologie mik daarop om die studie van volgende te beskryf: (1) mense in menslike nedersettings, (2) die natuur in menslike nedersettings, en (3) die gekombineerde verhoudings tussen mense en die natuur. Stedelike Ekologie vorm dus   belangrike deel van Stedelike en ruimtelike beplanning met die oog op volhoubare ontwikkeling, groen infrastruktuur beplanning en aanpasbaarheid.

Die rol en impak wat groen ruimtes op die ondersteuning van volhoubare menslike nedersettings het, is al vir jare sigbaar (Byrne & Sipe, 2010: 7). Dit hou verband met die verskillende voordele wat deur die natuur voorsien word aan die mense en word in hierdie navorsing verwys as ekosisteem dienste (of omgewings-voordele). Groen ruimtes is die fundamentele areas in menslike nedersettings wat intensionele beplannings benaderings benodig om volhoubaarheid en dus die omgewings-voordele te bevorder. Dis belangrik om te besef dat groen ruimtes in stedelike areas afhanklik is van die gemeenskap om bewaar te word, terwyl die gemeenskap weer afhanklik is van die groen ruimtes (natuurlike omgewing) om sekere voordele te verkry vanaf die omgewing.

Nedersettings wat geleë is in landelike areas in Suid-Afrika, ondervind verskeie probleme en uitdagings in terme van omgewings-beplanning (asook volhoubaarheid) wat hoofsaaklik uit die volgende gebeurtenisse te voorskyn kom: fragmentasie van nedersettings, ontstaan van verlore ruimtes, verstedeliking, stedelike randsprei en armoede (Trancik, 1986; Barnett, 1995; IIED, 2000; DEAT, 2006; McMahan et al, 2002). Hierdie navorsing fokus daarop om die uitdagings wat gepaard gaan met geïntegreerde beplanning en groen ruimtes in die plaaslike landelike konteks aan te spreek. Dit word in die navorsing gedoen deur middel van: (1)   Literatuur-studie wat navorsing vanuit Stedelike Ekologie; Stadsbeplanning; beplanning in die natuurlike omgewing; voorsiening van ekosisteem dienste; groen infrastruktuur beplanning; aanpasbaarheid en relevante beleide en wetgewing behels; (2)   Empiriese ondersoek wat vergelykende studie tussen internasionale gevallestudies en   plaaslike gevallestudie behels; en (3) die maak van gevolgtrekkings en voorstelle gebaseer op geïdentifiseerde beste praktyke in die internasionale gevallstudies vir die plaaslike gevallestudie .

Hierdie navorsing het dus die ruimtelike en omgewings-voordele van groen ruimtes geëvalueer, asook die belangrikheid van die beplanning vir sulke voordele in landelike areas in Suid-Afrika bevorder.

Sleutelterme:

Ekosisteem dienste

Landelike areas

Groen ruimtes

Groen infrastruktuur beplanning

Aanpasbaarheid

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

1.1   Problem statement and motivation

Urbanized environments are often being studied individually and separate from their surrounding natural environment (McConnachie and Shackleton, 2012: 2). Current approaches focussing on the integration of Urban Planning and Urban Ecology seek to address these issues of integrated planning. According to Marzluff *et al* (2008: vii), Urban Ecology is an emerging interdisciplinary field that aims to understand how human and ecological processes can coexist in systems dominated by humans and help societies with their efforts to become more sustainable (Marzluff *et al*, 2008: vii). Planning for sustainable urban and rural areas is a complex process, especially when addressing the environment (Ahern, 2007: 267).

Urban Ecology has deep roots in many disciplines such as Sociology, Geography, Urban planning, Landscape architecture, Engineering, Economics and much more. The term 'urban ecology', because of its unique focus on both humans and natural systems, has been used in various ways to describe the study of (1) humans in human settlements, of (2) nature in human settlements, and of (3) the joined relationships between humans and nature (Marzluff *et al* 2008: vii). Urban ecology thus forms a major part of Urban and Spatial Planning. This study therefore focuses on how urban ecology enhances environmental planning in urbanized areas which involves the people, nature and their joined relationship in the settlements.

Studies that aim to enhance environmental planning in urbanized areas have indeed increased over the years internationally, especially by the means of the new effective method, green infrastructure planning (Schäffler & Swilling, 2013: 14-15). In South Africa however, it appears that the integration between urban areas and ecology is not yet as evolved as it is internationally. There was however an attempt of green infrastructure planning made in the Gauteng province earlier in 2013. This study was conducted on macro scale focussing on the whole of Gauteng and not on specific micro areas that endure specific problems because of the lack of integration (Schäffler & Swilling, 2013: 1). One can see that there is thus a lack of such a study on smaller areas (micro scale) where specific environmental problems unique to the specific area can be addressed. There is also a lack of such a study within rural areas that desperately need change in the way the environmental planning (if any) is conducted.

It is important to realise that the environment in urbanized areas is dependent on the people (in terms of planning and conservation) but also that the people (society) is dependent on the environment (in terms of certain benefits which are provided by the said green spaces and environment). Human settlements depend on a healthy environment that continuously provides

these benefits known as ecosystem services (TEEB, 2011: 1). When the benefits that nature provides in the specific area are identified and the value of these benefits is understood, the movement towards creating a sustainable human settlement can progress even more.

In an attempt to bridge the objectives of Urban Ecology and Urban and Spatial Planning, this research aims to answer the following research question: "What spatial and environmental benefits can green spaces provide, and how can South African rural areas be planned and developed to enhance these benefits provided by green spaces?"

1.2 Research goals and objectives

This research will aim to evaluate the spatial and environmental benefits of green spaces and how such spaces can be planned especially in rural areas to enhance said benefits. In this regard, the research goals and objectives for this research are the following:

1.2.1 Primary research objectives:

1) Researching existing literature on spatial, environmental benefits and ecosystem services.
2) Researching green planning approaches in human settlements nationally and internationally.
3) Providing new and innovative approaches to planning for green spaces in rural areas in South Africa.

1.2.2 Secondary research objectives include:

1) Identifying possible problems relating to environmental planning in human settlements in South Africa.
2) Identifying the different ecosystem services which are present in rural areas in South Africa.
3) Evaluating the role of community participation in creating and maintaining green areas with ecosystem services in human settlements.
4) Reviewing urban planning approaches to enhance environmental benefits in human settlements (especially in rural areas) internationally.
5) Finding international best practices with regard to green planning that can possibly be applied locally

6) Reviewing urban planning approaches to enhance environmental benefits in human settlements in South Africa

7) Providing possible recommendations for enhancing the planning of green spaces in human settlements in order to bring forth the ecosystem services and thus the environmental benefits.

1.3   Research questions

The main research questions to address is: "What spatial and environmental benefits can green spaces provide, and how can South African rural areas be planned and developed to enhance these benefits provided by green spaces?"

The sub-questions for the research are the following:

- What are the problems relating to environmental planning in human settlements in South Africa?
- Which ecosystem services are present in rural areas in South Africa?
- Does the community have a role in creating and maintaining green areas and ecosystem services in human settlements?
- What international urban planning approaches exist to enhance environmental benefits in human settlements (especially in rural areas)?
- How can the planning of green spaces in human settlements be enhanced in order to bring forth the ecosystem services and the environmental benefits?

1.4   Methods of investigation

The research methodology comprised of a literature study and empirical investigation. Certain conclusions were drawn and recommendations were made from these investigations.

1.4.1   Literature study

Various literature related to Urban Ecology; Urban Planning; Environmental dimension of Planning; provision of ecosystem services; green infrastructure planning; resilience and environmental challenges in South Africa were included and contributed to the subsequent conclusions drawn and recommendations made. A variety of disciplines and fields were incorporated in the literature as the authors include Urban Planners, Urban Ecologists, Landscape Architects, Environmentalists, and Sociologists.

Relevant policies and legislation were also included, such as the National Environmental Management Act 107 of 1998, the Rural Development Framework of 1997, the White Paper on

environmental management policy for South Africa of 1998, the White Paper on spatial planning and land use management of 2001, the National Spatial Development Perspective of 2006, the National Urban Development Framework of 1997, the White Paper on local government of 1998 and the Spatial Land Use and Management Act of 2013. These local policies and legislative framework provided insight into the South African government's approach to delivering green spaces in rural areas and placed (international) literature in context.

1.4.2 Empirical investigation

Quantitative and qualitative research methods were included, ranging from structured questionnaires and expert views, to the evaluation of international and local case studies by means of site visits and physical surveys.

A site analysis on each of the study areas was conducted by the researcher by means of a check-list approach, while observing the area. The check-list included points on the macro environment, the physical micro area, and the users of the area.

An ecosystem service analysis on each study area was conducted. This entailed the identification of ecosystem services present in the specific study area in table format, indicating the category of the ecosystem service and the provision thereof in the specific area.

Structured questionnaires were distributed personally or via email to key informants who have expert knowledge on the study areas and were in some way directly or indirectly involved in the planning and implementation of the study areas. The questions asked in the questionnaire consisted mainly of closed questions followed by a few open questions. The reason for the closed questions was to enable the structuring of the answers to the questions in a comparative table.

Two areas in Sweden were selected for the international case studies and included:

- Hågaby which is a rural settlement situated on the outskirts of Uppsala City and is also called an eco-village. This eco-village is a resistant, flexible human settlement integrated with green structures including the natural environment, and has a focus on sustainability for future generations.
- Hammarby Sjöstad which is regarded as an eco-city is an urbanized environment developed in order to provide people with healthier and economically productive lives through the planning, conservation and integration of the environment into the city. This was done in this eco-city by integrating various environmental goals.

These two case studies were chosen solely because one is an "eco-village" (rural area) while the other is an "eco-city" (urbanized area), and evaluating these two different types of areas separately provide diverse results, as well as planning approaches.

The local case study was based on the local rural Vaalharts area. The Vaalharts area was compared with Hågaby and Hammarby Sjöstad in a comparative study in order to identify possible approaches to green planning which can be adopted and implemented in South African rural areas. Previously conducted site visits, environmental literature on Vaalharts, governmental information on Vaalharts and structured questionnaires informed the local case study research conducted.

The residents in the rural settlements in Vaalharts are mainly dependant on the environment, making this area a good South African case study to evaluate the spatial and environmental benefits of green spaces in rural areas. The following figure provides the location of the South African case study in context of the country.

Figure 1.1: Case study location within South Africa

Source: Own creation (2014)

The questionnaires were distributed to professionals in the fields of Urban Planning, Urban Ecology, or any other relevant professions such as Architecture and Sociology, in the two international case studies, as well as the local case study.

Recommendations were made for the Vaalharts area which were based on theoretical findings, empirical investigations and best practice scenarios identified in the international case studies. The theoretical and empirical studies were integrated and culminated in a set of conclusions addressing the objectives and research question of this study.

1.5 Research hypothesis

The research hypothesis for this study is as follows:

Rural areas in South Africa (such as the Vaalharts area) can be planned according to specific spatial planning approaches to enhance the green space provision along with environmental benefits (ecosystem services) to benefit the local communities. Such an approach will enhance the provision, conservation and maintenance of the natural environment as green spaces in local areas.

1.6 Limitations to research

Limitations of this research include the following:

- This research focused on the planning and provision of green spaces located in rural areas.
- This research focused on the spatial relevance of green space provision, acknowledging other factors that might have an impact on the planning and provision of such spaces (such as financial constraints, engineering services or transportation) but were not included in the scope of this research.
- Acknowledging that green spaces also provide social and economic benefits, this research focused on the spatial and environmental benefits of green space.

1.7 Definitions and acronyms

The following table contains the definitions (in context of this research) of the most significant concepts used in this research.

Table 1.1: Definitions

Term:	Definition/explanation:
Cultural services	Ecosystem services that people obtain from contact with ecosystems. This includes aesthetic, spiritual and psychological benefits (TEEB, 2009: 4)
Ecosystem services	Goods (such as food) and services (such as waste assimilation) which the human population derive from different ecosystem functions (Costanza *et al*, 1997).
Environmental benefits	These are all the benefits and gains from ecosystem services or other ecological properties which can be attained by the people through actions and proactive planning (Efroymson *et al*, 2003).
Fragmentation	When settlements split apart in two or more fragments creating what is known as the 'old city' and 'new city' (Barnett, 1995: 1).
Green infrastructure planning	An emerging planning concept that is principally structured by a hybrid drainage (hydrological) network, completing and linking relict green areas with built infrastructure that provides ecological functions (Ahern, 2007:1).
Green space	An area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in human settlements (Oxford Dictionary, 2014).
Habitat or supporting services	Ecosystems provide living spaces for plants or animals and can also maintain a diversity of plants and animals (TEEB, 2009: 4).
Herbaceous graminoids	Plants without a persistent stem or shoots above ground and thus lacking definite firm structure (Gregorio & Jansen, 2005: 28).
Human settlement	An area for a population of people to live together and coexist which comprises of (a) physical components of shelter and infrastructure; and (b) services such as education, culture, health and welfare to which the physical elements provide support (United Nations, 1997).
Indigenous plants or animals	A species of plant or animal that occur and live naturally in a specific geographical area (Merriam-Webster Encyclopaedia, 2014).
Informal settlement	Settlements that occur on land which has not been surveyed and proclaimed as residential areas which are usually situated on the outskirts of urban areas. The structures in these settlements are usually informal and temporary (Statistics South Africa, 2003: 187).
Key informant	A person that is used primarily as a source of information on a variety of topics (Tremblay. 1957: 688).

Legislation	A system of rules and regulations which gives order to society by means of enforcement through various government institutions (Kleyn & Viljoen, 1998:12).
Lost space	The undesirable urban areas that are in need of redesign because they make no positive contribution to the surroundings and users (Trancik, 1986: 4).
Policy	A set of guidelines which are developed in accordance with legislation in order to assist the various role players in legislation implementation (Torjman, 2005:2).
Provisioning services	Ecosystem services which are mainly material or energy outputs of ecosystems (TEEB, 2009: 3)
Regulating services	Ecosystem services provided by regulating the quality of air and soil or providing flood and disease control (TEEB, 2009: 3-4).
Resilience	The capacity of a system to respond to change or disturbances without changing its basic state (Ahern, 2011: 341).
Rural area	The thinly populated areas in which people mostly farm or is dependent on natural resources. These areas include small towns and villages that are dispersed through these areas and are usually located outside of city borders (South Africa, 1997).
Site analysis	The determination of the suitability of a specific area (parcel of land) for a specific use (Investor Words Glossary, 2014).
Sustainable development	Development that ensures the present generation of meeting their needs without compromising the ability of future generations to meet their needs (IISD, 2014).
Urban area	A city area which is considered as the inner city and includes the built-up environments around the inner city (Collins English Dictionary, 2003).
Urban ecology	An interdisciplinary field that aims to understand how human and ecological processes can coexist in systems dominated by humans and help societies with their efforts to become more sustainable (Marzluff *et* al, 2008: vii),
Urbanisation	Urbanisation describes the movement of great numbers of the population from rural areas to urban areas (Business Dictionary, 2014).
Urban sprawl	the spread of urban development into areas that used to be countryside (Longmon Dictionary, 2014)

Sources: Oxford Dictionary (2014); Costanza et al (1997); Ahern (2007); Ahern (2011); Trancik (1986); Barnett (1995); Longmon Dictionary (2014); Kleyn & Viljoen (1998); Torjman (2005); Tremblay (1957); TEEB (2009); Gregorio & Jansen (2005); United Nations (1997); Statistica South Africa (2003); South Africa (1997); Collins English Dictionary (2003); Efroymson et al (2003); IISD (2014); Business Ditionary (2014); Investor Words Glossary (2014); Marzluff et al (2008).

The following table contains the acronyms used in this research.

Table 1.2: Acronyms

Acronym:	Meaning:
DEAT	Department of Environmental Affairs and Tourism
FBDM	Frances Baard District Municipality
IDP	Integrated Development Plan
IIED	International Institute for Environment and Development
IISD	International Institute for Sustainable Development
MEA	Millennium Ecosystem Assessment
NEMA	National Environmental Management Act
NP	National Party
NSDP	National Spatial development Perspective
NUDF	National Urban Development Framework
RDF	Rural Development Framework
RDP	Reconstruction and Development Programme
SA	South Africa
SDF	Spatial development Framework
SRC	Stockholm Resilience Centre
UCLG	United Cities and Local Governments
UN	United Nations

Source: Own creation (2014)

1.8   Structure of the research

The remainder of this research is structured as follows:
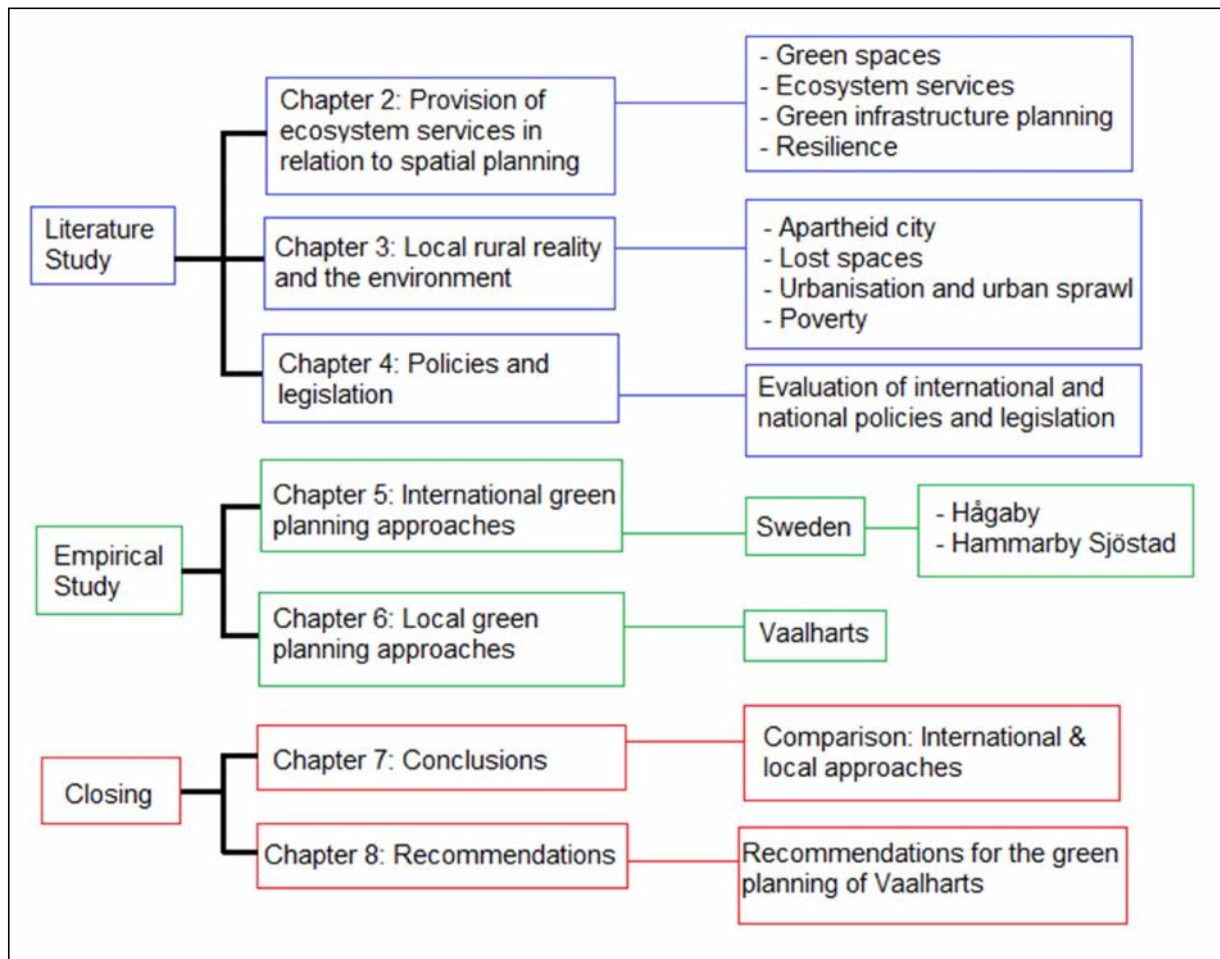
Figure 1.2: Document structure

Source: Own creation (2014)

SECTION A: LITERATURE STUDY

Chapter 2: Provision of ecosystem services in relation to spatial planning
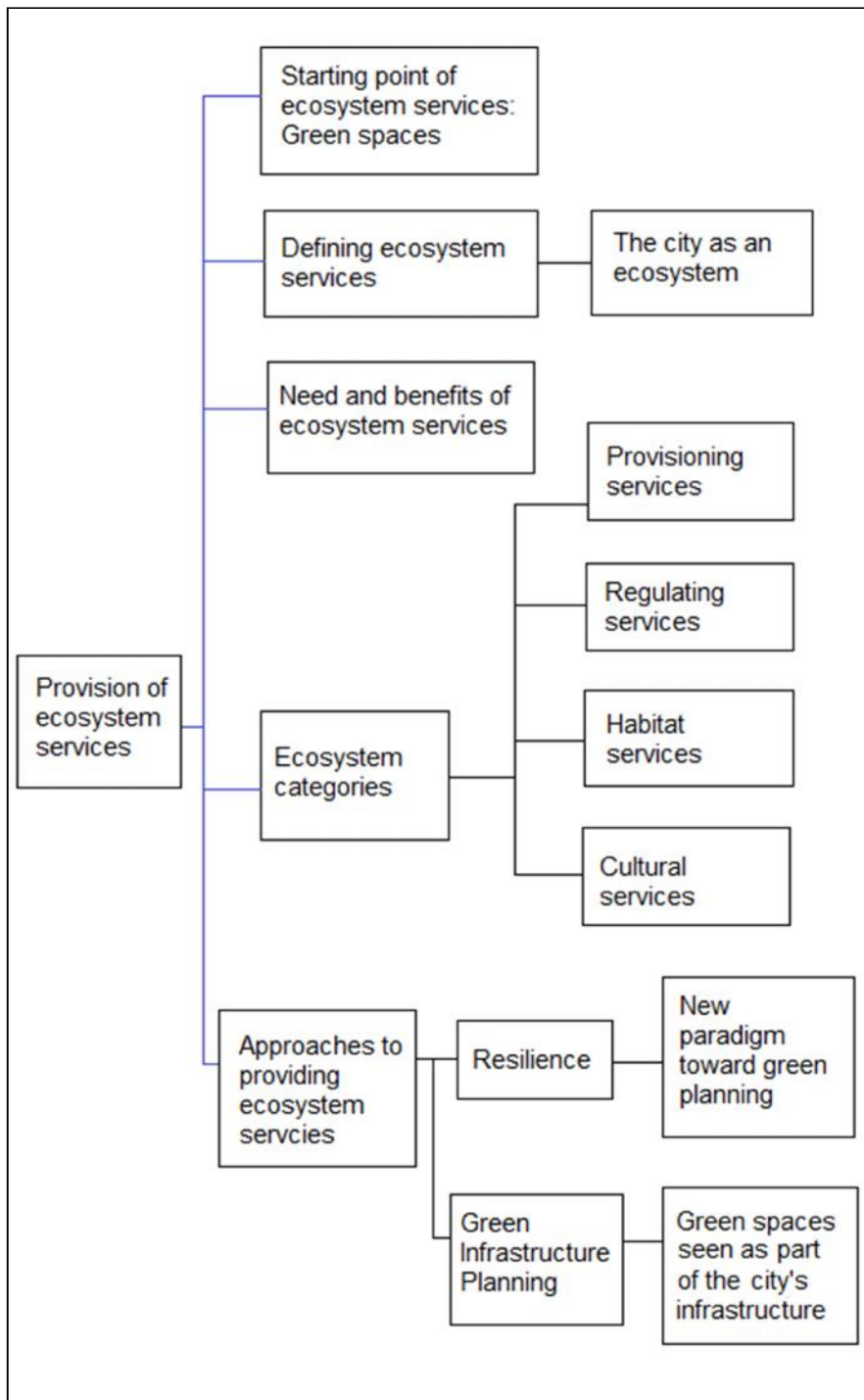
Figure 2.1: Structure of Chapter 2

Source: Own creation (2014)

The following Chapter aims to clarify the understanding of the importance of planning for the environment in urban areas, which leads to, and enhances the importance and relevance of ecosystem services in human settlements. This Chapter will firstly explain green spaces in context of this research, thereafter define and discuss the concept of 'ecosystem services' and how it is relevant and beneficial in spatial planning. Two new emerging concepts (green infrastructure planning and resilience) accompanying the planning and provision of ecosystem services will also be discussed in this Chapter.

2.1   Green spaces as point of departure

According to Byrne & Sipe (2010: 7) parks and other green spaces play multiple roles in making urban and rural areas more sustainable. This is mainly due to the different benefits which nature provide as will be discussed in the following sections. Parks and green spaces are fundamental areas in human settlements that need intentional planning as it provides the opportunity to enhance sustainability and the appearance of environmental benefits (CABE, 2011: 1). The new approach of green infrastructure planning as will be discussed in section 2.6 refers to green spaces as green infrastructure that forms part of the whole infrastructure of a human settlement (Sandström, 2002: 375). Green infrastructure can also be seen as a linked network of multi-functional green spaces which provide the basis for delivering sustainable development (CABE, 2011: 36).

Green space can be defined as an area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment (Oxford Dictionary, 2014). It is important to note that green space is divided into different typologies which mainly depend on the geographical area of the specific place where the green spaces are situated (CSIR, 2011: 41). The following table captures the different types of green spaces which can be found in human settlements, derived from national and international literature.

Table 2.1: Types of green spaces in human settlements

Type:	Examples:	Purpose of the green space type:
Parks and gardens	Parks as well as formal gardens in urban areas which receives maintenance from the government.	Informal recreation and community events.
Natural and semi-natural green spaces	Natural woodlands, urban forestry, scrub, grasslands, wetlands, open and running water and wastelands.	Conservation of wildlife and the biodiversity; Education and awareness of the environment.
Green corridors	Paths along canals and riverbanks, cycle ways, rights of way and disused railway lines which are usually associated with areas rich in biodiversity.	Leisure activities as well as travel opportunities for people; Opportunities for wildlife migration.
Amenity green space	Commonly found in housing areas and includes informal recreation spaces.	Enhances the physical appearance of residential areas; Opportunity for informal activities close to the home or work-areas.
Coastal amenities	Linear public open space along coastal regions, managed by Municipal Parks Department.	Conservation of coastal biodiversity and provides location for tourist activities.
Playgrounds and other areas provided for children and young people	Play areas that are equipped for young people which include playgrounds, ball courts and skateboard areas.	Enhances the social interaction, recreation and physical as well as mental health of children and young people.
Outdoor sport facilities	Sport facilities such as outdoor sports pitches, tennis courts, golf courses, athletics stadiums, playing fields (including school playing fields) and water sports.	Sport and recreation activities
Allotments and community gardens	Gardens to grow vegetables and other crops.	Opportunities for people who doesn't own private gardens to grow their own produce as part of the long term promotion of sustainability, health and social inclusion.
Cemeteries and churchyards	Open green areas situated around churches which also include gardens as well as cemeteries and other burial grounds.	Establishment of a quiet place of peace with aesthetic value for the burial of the dead and can also serve as a place for recreational activities, wildlife conservation and the promotion of biodiversity.

Source: Own creation based on CSIR (2011: 41) & Maidstone Government (2014)

It is thus evident that green spaces in its different types and functions serve as the main starting point and opportunity to provide and enhance environmental benefits in human settlements as green space forms part of a settlement's infrastructure. It is thus important to realize the significance of green spaces in this study and how it is planned for according to specific approaches such as green infrastructure planning and the concept of resilience as will be discussed in sections 2.5 and 2.6.

2.2 Defining ecosystem services

The basic unit of ecology is the ecosystem, therefore when an ecological study is done it focuses on the composition and operation of the ecosystem. According to Miller & Spoolman (2009: 57) an ecosystem consists of living (biotic) organisms and their non-living (abiotic) environment which acts together as a functional unit. An ecosystem can thus be defined as a single unit of different living organisms which are in interaction with their physical environment in a given area (Miller & Spoolman, 2009: 52). According to Marzluff, Shulenberger, Endlicher, Alberti (2008: vii), human settlements can be seen as unique ecosystems which forms a unit where humans and other organisms live interactively with their environment (cities). It is important to understand that although ecosystems function as units, it doesn't imply that they are isolated from other ecosystems. Different ecosystems are closely connected to each other which provides for the need of transporting and receiving energy, matter and organisms from one ecosystem to another. Figure 2.2 illustrates this connection between different ecosystems as well as the connection of living organisms and their physical environment inside an ecosystem.
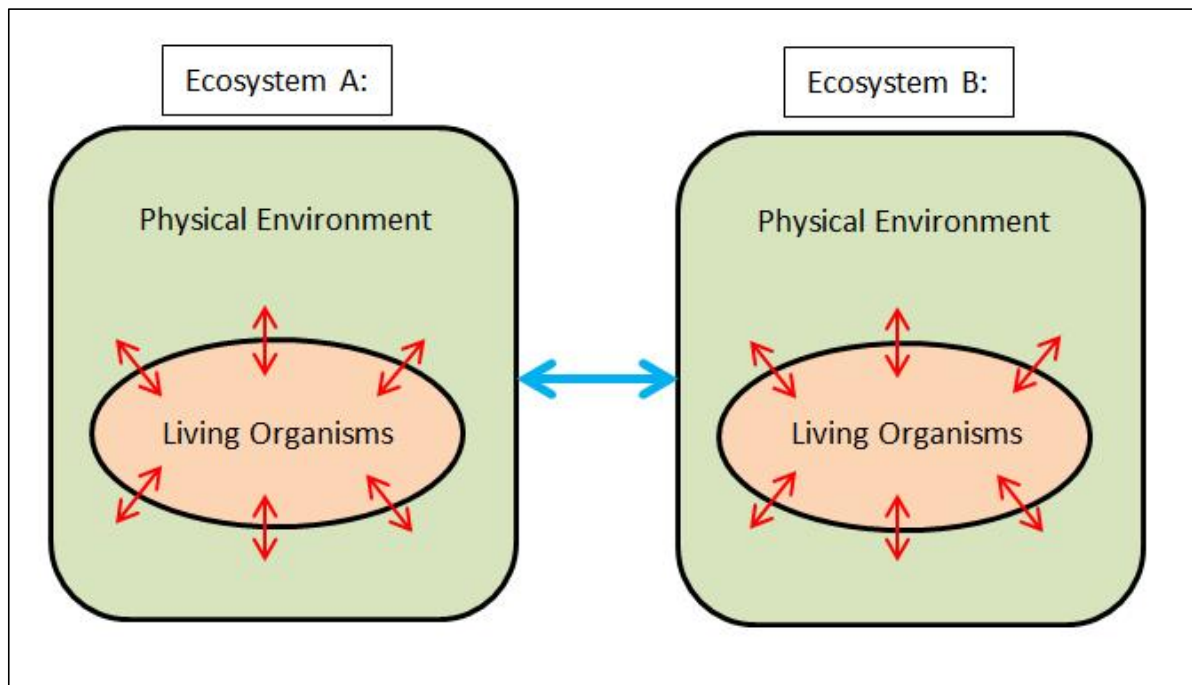
Figure 2.2: Connections in and between ecosystems

Source: Own creation (2014)

Ecosystems cannot be studied without taking the environment into consideration as it provides the energy, mineral elements and living space for the living organisms in order to grow and maintain themselves (Miller & Spoolman, 2009: 58). The living organisms are dynamic and display a measure of change and adaptation in changing environmental conditions which contributes to sustainability. According to Miller and Spoolman (2009: 8-9, 23-24) sustainability is an important consideration in ecological studies and can be defined as the ability of the earth's natural systems, as well as the people's cultural systems and economies, to survive and adapt to future environmental changes.

An important component of sustainability is natural capital which refers to the (1) natural resources which are the matter and energy from nature that are essentially important and useful to people and animals; and (2) natural services (or in present day also known as ecosystem services) which are functions of nature, such as purification of air and water, regulation of climate and pollination of plants by insects. These services and resources (natural capital) maintain life and have been doing so for billions of years. The following four scientific principles of sustainability based on the concept of natural capital, explains how nature has, and is still maintaining itself:

1) Dependence on solar energy: The planet is warmed by the sun, and light energy is converted by plants to potential chemical energy (photosynthesis). Thus nutrition is provided for the living organisms (including humans).

2) Biodiversity: A great variety of organisms exist which are important to take into consideration, especially in urbanized areas as there is also a great significance of biodiversity in urbanized environments.

3) Control of population growth: This is done by competition among different species for the limited resources that nature offers. Humans are obviously included in this competition and the increasing urbanisation has a great effect on other species.

4) Cycling of nutrients: Natural processes recycle chemical substances that plants and other living organisms need in order to live and be able to reproduce. There is thus little or no waste material in natural systems.

(Miller & Spoolman, 2009: 60-61)

Natural capital thus includes the services which the ecosystems conduct free of charge in order to maintain life on this planet. Human beings form part of this world and it is our responsibility to ensure that the human activities don't break down these services; in fact humans can possibly learn from this and might be able to apply these aspects to daily lifestyles and economies.

In order to define the concept of ecosystem services it is thus important to understand that healthy ecosystems are the foundation of sustainable human settlements and in order for a settlement to be 'healthy' it depends on the natural environment that continuously provides a range of benefits which are known as ecosystem services (TEEB, 2009:1). Ecosystem services are thus the benefits that humans derive directly or indirectly from ecosystem functions.

2.3   Relevance of ecosystem services to spatial planning

The concept of ecosystem services is still new and unfamiliar in terms of spatial planning, but its issues have been included in various land use planning principles based on sustainable development (Niemelä *et al*, 2011). Ecosystem services is applied in a variety of disciplines such as ecological economics, agricultural economics and conservation biology, and thus different definitions for this term exist (Escobedo *et al.* 2011). Costanza *et al* (1997) defines ecosystem services as goods (such as food) and services (such as waste assimilation) as the benefits which human population derive from different ecosystem functions. On the other hand, the Millennium Ecosystem Assessment (MEA 2003) considered it more as a new conceptual framework that can be used to analyse and understand the effects of environmental change on ecosystems and human well-being (Ring *et al.* 2010).

It is important to realize that the provision of ecosystem services is directly linked to human well-being and thus the well-being of the human settlements (Cilliers *et al.* 2013: 1). According to TEEB (2009:1) ecosystems are the foundation of human well-being and most economic activity, because almost every resource which humans utilize everyday relies directly or indirectly on nature. Human settlements (urban or rural) therefore have the opportunity to make positive changes to the people's well-being by saving on municipal costs, boosting local economies, enhancing quality of life and securing livelihoods which are all examples of benefits resulting from successful use of ecosystem services (TEEB, 2009:1).

In order to understand the need and value of ecosystem services in human settlements, the different types of ecosystem services will be explained accordingly.

The Millennium Ecosystem Assessment (MEA) of 2005 divided ecosystem services into four categories, namely Provisioning services, Regulating services, Habitat or supporting services and Cultural services, as illustrated in Figure 2.3. A variety of ecosystem service types can be found under each category. The importance of specific types of ecosystem services in specific areas is dependent on the specific location and functions of the ecosystem as well as the needs of the organisms in the ecosystem (Escobedo *et al.* 2011).
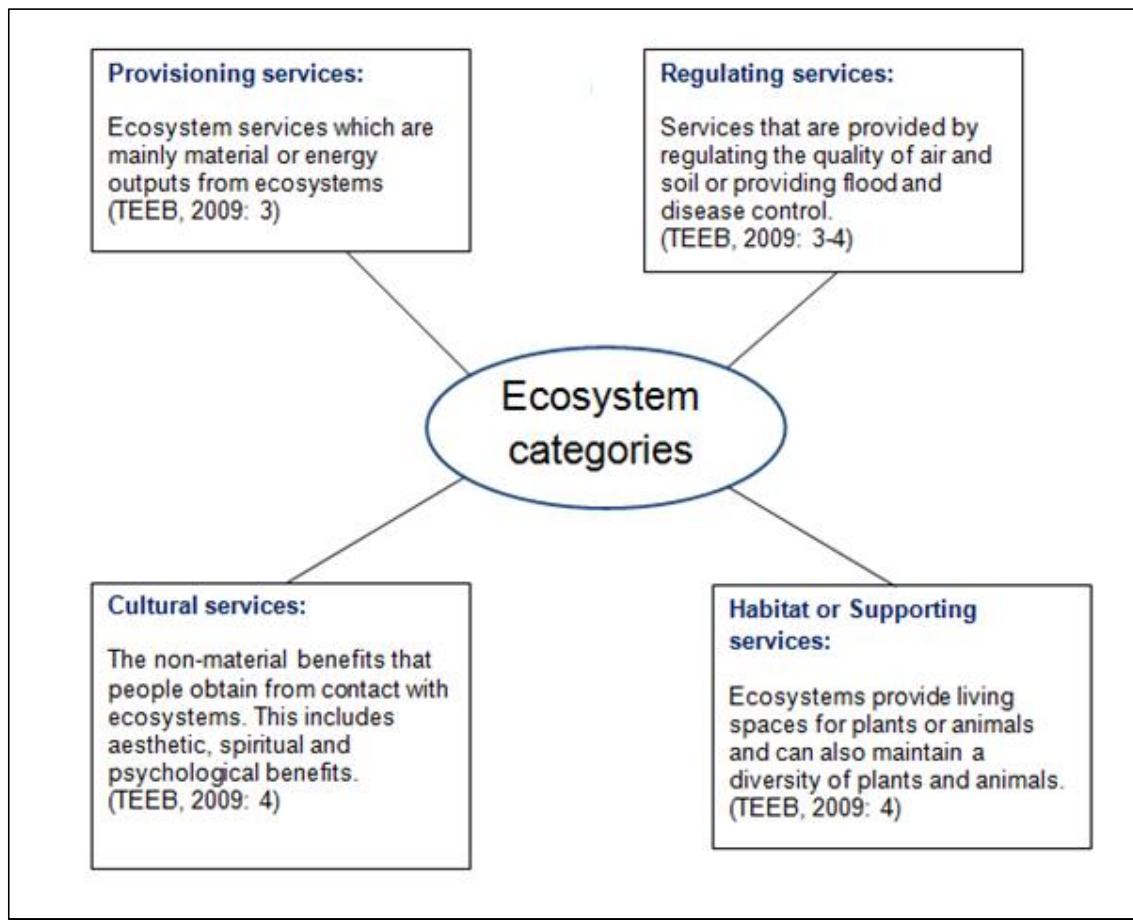
Figure 2.3: Different ecosystem categories

Source: Own creation (2014)

The following table indicates the different types of ecosystem services structured under each category. It is important to notice that each type under each category plays a significant role for people and is thus important to consider in spatial planning.

Table 2.2: Types of ecosystem services

Provisioning Services		
Ecosystem service (Type):	**Illustration:**	**Description and significance of service for humans:**
Food	Source: Blogspot.com (2014)	The specific conditions for growing food are provided by ecosystems. Managed agro-ecosystems usually provide food, but water systems, forests and urban horticulture are also used for the provision of food. Humans thus need these managed ecosystems in order to grow food in or near settlements.
Raw materials	Source: Wordpress.com (2014)	A great diversity of materials used by humans is provided by ecosystems for construction and fuel. Biofuels, wood and plant oils are examples that are directly derived from wild and cultivated plant species.
Fresh water	Source: Blogspot.com (2014)	Ecosystems ensure the flow, storage and purification of water. The local vegetation influences the quantity of water available in the specific area which then influences the availability and usage of water for human beings in the settlements.
Medicinal resources	Source: Nativeplants.ku.edu (2014)	Ecosystems provide a diversity of plants which are used as traditional medicines. All ecosystems serve as a potential source of medicinal resources which are used by humans and thus contribute to health and the economy.

Regulating Services		
Local climate and air quality regulation

Source: Wikimedia.org (2014) | The temperature in urban areas is lowered by trees and green spaces, whilst rainfall and water availability is influenced by forests. Vegetation removes pollutants from the atmosphere thus regulating the air quality and improves the liveability and health in human settlements. |
| Carbon sequestration and storage |

Source: Localecology.org (2014) | Greenhouse gases are stored by ecosystems which regulates the global climate. While growing, the trees and plants remove carbon dioxide from the atmosphere and lock it away in their tissue also purifying the air and enhancing human health. |
| Moderation of extreme events |

Source: Wildlifedirect.org (2014) | Ecosystems can act as buffers against natural disasters such as extreme weather events, landslides, floods and more. The ecosystems and living organisms thus can prevent damage to human settlements and cities from these natural disasters. An example is plant roots that stabilize slopes which prevents landslides. |

21

Waste-water treatment	 Source: Boroondara.vic.gov.au (2014)	Ecosystems such as wetlands can act as filters of water. The microorganisms in soil break down the waste in water through biological activities. This eliminates disease causing microbes and reduces pollution.
Erosion prevention and maintenance of soil fertility	 Source: News.ca.msn.com (2014)	Vegetation cover prevents soil erosion because of the roots pressing the loose ground together. Soil fertility is an essential service which provides well-functioning ecosystems with nutritious soil. Soil is thus then stabilized and strong for the development of buildings and also nutritious for the growing of medicinal plants and food.
Pollination	 Source: Discovermagazine.com (2014)	Pollination is an ecosystem service provided mainly by insects, birds and wind in the ecosystems. The plants in the ecosystem gets pollinated all around which provides more fruits, vegetables and seeds (food sources) for the living organisms.
Biological control	 Source: Sciencedaily.com (2014)	Ecosystems regulate pests and diseases by means of predator and parasite activities. This is called the 'natural control' of pests and diseases, because it is done through natural activities. Predator birds for example will control pests such as mice and cockroaches carrying disease in human settlements.

Habitat or Supporting Services		
Habitats for species	 Source: Studiocpg.com (2014)	Habitats are a very important service which the ecosystems provide for living organisms. Habitats enable individual plants and animals to survive by providing food, water and shelter. There exist different habitats essential for specific species' in every ecosystem.
Maintenance of genetic diversity	 Source: Wisegeek.com (2014)	Genetic diversity is the variety of genes that can be found between, and within species populations. This distinguishes different breeds or races of living organisms from each other. 'Biodiversity hotspots' are habitats with an exceptionally high number of species, making these habitats more genetically diverse.

Cultural Services		
Recreation and mental and physical health	 Source: City-runs.co.uk (2014)	Green spaces play a massive role in maintaining mental and physical health of people. It is thus an area where people can practise physical exercise and also relax.
Tourism	 Source: Wyomingtourism.org (2014)	Ecosystems and biodiversity creates great tourism opportunities. This provides economic benefits which can be a vital source of income for the city and country. Tourism can also educate people about the importance of biological diversity.

Aesthetic appreciation and inspiration for culture, art and design	Source: Centralpark.com (2014)	The natural landscape, ecosystems and biodiversity serves as a source of inspiration for art and culture.
Spiritual experience and sense of place	Source: Americanforests.org (2014)	There are a lot of natural features in the world such as caves and forests that are considered as sacred places with religious meaning. The different cultural customs associated with the specific natural features, creates a sense of belonging which can also be found in human settlements.

Source: Own creation based on TEEB, 2009: 3 – 4

2.4   Benefits of ecosystem services in human settlements

When the focus of human settlements is on ecosystem services, it can be beneficial to the settlement in various ways. Spatial planning, budget allocations and municipal service delivery will especially be influenced by these ecosystem services. One can thus see that ecosystem services will benefit city authorities in a way that these services will support the authority's work (TEEB, 2009: 6). There are three main ways in which ecosystem services support the municipalities of settlements:

1) The benefits derived from functioning ecosystems become visible at the local level. A focus on ecosystem services emphasizes its relation to municipal service delivery and is thus more included in the local municipality's delivery of the specific service to the residents in the settlement (Cilliers & Siebert, 2012: 3). An example is the provision of clean water to the residents of a settlement by its local authority. If the settlement's authority has a focus on ecosystem services, the natural water source or natural water purifier can be identified and included in future planning and development of the settlement (TEEB, 2009:6).

2) A focus on ecosystem services enables decision makers to have a better understanding and anticipation of the consequences of decisions or policies. The benefits of choices and costs can be compared. An example is when a forested area is valued by local decision makers and residents for its ecosystem services and it is threatened by a new development. The loss of the valued benefits will have to be considered before a decision can be made for the new development (TEEB, 2009:6).

3) Communication between the authorities and general public about specific topics, such as environmental consequences and economic or social implications of a decision, will be more effective if the authorities have a focus on ecosystem services (TEEB, 2009:6).

A focus on ecosystem services enables the people to recognize the value and benefits these functioning ecosystems hold and can thus promote the conservation of the natural resources. This may be an effective way of creating and maintaining sustainable and healthy human settlements (Byrne & Sipe, 2010: 7). A balance between developmental and environmental objectives in human settlements can also be achieved through the help of a focus on ecosystem services (TEEB, 2009:6).

2.5   Resilience as new paradigm in the provision of ecosystem services

In order to gain a focus on ecosystem services and plan an area in such a way that enhances the ecosystem services unique to that specific area, one should have the correct mind-set and approach while considering factors with significant influence such as environmental change. The ways in which people think about change is in the process of shifting from a paradigm where urban areas (including the people) work and function separately from ecology to a paradigm where people and their urban area form part of ecosystems. This new paradigm of thinking forms the basis of the new concept of Resilience (Ahern, 2011: 341 – 342) and lays emphasis on the conviction that humans and nature should be seen as one ecological system (SRC, 2013: 3). Resilience can be defined as the capacity of a system such as a city, forest or an individual to deal with change and continue to develop and also to have the capacity to use shocks and disturbances to spur renewal and innovative thinking (SRC, 2013: 3). Ahern (2011: 341) defines resilience as the capacity of a system to respond to change or disturbances without changing its basic state.

Previous paradigms considered sustainability as a static condition which will stay and be kept over many generations once it is reached. These paradigms are not effective ways of thinking as events such as environmental changes are completely unpredictable. It is thus important that the dynamic nature of ecosystems is considered by planners when planning for any

environment as human settlements also form part of ecosystems as mentioned previously (Ahern, 2011: 342). In order to start thinking in the direction of resilience, planners need to firstly identify any disturbances in the specific area and then work together with other key role players as the paradigm of resilience is dependent on an integration of different fields (Ahern, 2011: 342).

According to ICLEI (2012: 3) green infrastructure plays an important role in creating resilient settlements. Green infrastructure planning is thus a fundamental approach in creating sustainable, resilient settlements and will thus be discussed in the following section.

2.6   Green infrastructure planning

Another paradigm shift taking place in recent times concerning green spaces such as parks, is that such places are no longer seen as open spaces that exist around planning, but rather as green infrastructure that forms part of the whole infrastructure of a settlement which is planned intentionally (Sandström, 2002: 375). Green infrastructure is an emerging planning concept that is principally structured by a hybrid drainage (hydrological) network, completing and linking relict green areas with built infrastructure that provides ecological functions (Ahern. 2007:1). It can also be seen as a community's natural life support system and the ecological framework needed for sustainability (American Planning Association. 2003: 1).

The American Planning Association (2007: 2-3) states that the following four key points are essential for green infrastructure planning: 1) creating an interconnected system of parks and open space is more beneficial than parks in isolation, 2) settlements can use parks to help preserve essential ecological functions and to protect biodiversity, 3) when planned as part of a system of green infrastructure, parks can help shape urban form and buffer incompatible uses, 4) settlements can use parks to reduce public costs for storm water management, flood control, transportation and other forms of built infrastructure.

According to Pauleit *et al* (2011: 273) a set of principles can be seen in green infrastructure planning. These principles are similar to the American Planning Association's four key points as mentioned above and are summarized in the following table:

Table 2.3: Principles of green infrastructure planning

Principles:	Discussion:	Role of planning for green infrastructure in terms of this principle:
Multi-functionality	Multi-functional green infrastructure explicitly defines and combines different social, ecological and economic functions where possible.	• To consider different groups of ecosystem services (abiotic, biotic and cultural). • To combine different functions or uses whenever possible such as integrated interconnected green spaces. • Prioritizing between different functions and setting up goals for each. • Monitoring the different functions. • To improve the awareness of multi-functions through communication and education.
Connectivity	Connecting green spaces and creating green space corridors are important for the ventilation of the human settlement, access to green areas and recreational use of green areas. Connectivity also enhances species dispersal.	• To consider the different scales and perspectives of physical and functional connections between green spaces, such as recreation, biodiversity and storm water management. • To base the green infrastructure planning of the specific area on thorough analysis of the green space resource and its function in the area.
Integration	This concerns the links and interactions between the green infrastructure and other urban infrastructures in the human settlement.	• To consider integrating and coordinating green infrastructure with other urban infrastructure in terms of functional and physical relations. • To create beneficial relationships between different professions and other actors.

Communicative and social-inclusive process	Green infrastructure includes a variety of green spaces (such as public, institutional and private) and interacts with a lot of other urban structures, therefore many stakeholders are involved.	• Attempt to meet all the stakeholders' needs and interests. • To involve stakeholders in decision-making through cooperation and coordination between different professions and levels. • To include public participation.
Long-term strategy	Green infrastructure planning should rather be based on a long-term vision instead of a static short-term plan. The long-term vision is aimed at achieving overall long-term goals while on-going learning is taking place between different actors in an adaptive planning mode.	• Adopting the sustainable concept of development which considers long-term benefits. • To consider interactive structures and multiple uses that will help to achieve a long-term goal. • To allow adaptation as on-going learning is taking place between different actors.

Source: Own creation from Pauleit et al (2011: 273 – 275)

International examples of green infrastructure planning include Emscher Landscape Park in Germany (LaBelle. 2001: 1-5) and the 'SEA Street Seattle, green infrastructure for storm water management and ecology', and the 'Greater Manchester, UK: synergies between climate change adaptation and ecological functions of green infrastructure' (Pauleit *et al.* 2011: 272). For South Africa, though it seems to be still a foreign concept with limited information and implementation examples.

2.7   Conclusion to ecosystem services and spatial planning approaches

An understanding and consideration of ecosystem services is necessary in order to create and maintain a well-planned environment, as a responsibility to the future generations and in line with the objectives of sustainable development. When a lack of understanding and planning regarding the role and impact of green spaces and environmental benefits exists, a great loss of essential and beneficial ecosystem services may follow.

It is evident that an integrated planning approach is needed, incorporating green spaces as part of the spatial planning process (green infrastructure planning) and creating settlements which can respond to change or disturbances and ensure sustainability for future generations (resilience).

When these benefits that green spaces provide are identified and their value understood, managers, educators and planners can then proceed in creating a sustainable human settlement and thus provide the most sustainable, cost-effective solutions. According to TEEB (2009:1) one can observe the direct effects of the ecosystem services approach most easily when it is used to address challenges faced by poor communities.

From the literature in this chapter, it is evident that certain theoretical principles regarding spatial planning and ecosystem services can be emphasized. The following table indicates these theoretical principles which are important to include when planning for green spaces in order to enhance environmental benefits:

Table 2.4: Important theoretical principles to consider when planning for the green spaces

Theoretical principles:	Reason of inclusion in planning process:
Status quo of the specific area's environment	Ensures that the planners and other stakeholders have an overview and background of the area's environmental strengths, weaknesses and opportunities.
Focus of the key stakeholders	The focus of the planning should include a focus on the provision of ecosystem services.
Interconnection of green spaces	Ensures that green spaces are not isolated from each other and the surrounding environment.
Consider green space as green infrastructure	The importance of regarding green space as part of a human settlement's infrastructure and not separate from the settlement itself.
Providing multifunctional green spaces	Creating spaces which provides a variety of functions and is not limited to one function.
Providing different ecosystem categories	Provision of ecosystem services from the different ecosystem categories (Ensures a variety of ecosystem services)

Source: Own creation (2014)

Chapter 3: Local reality of human settlements and the environment
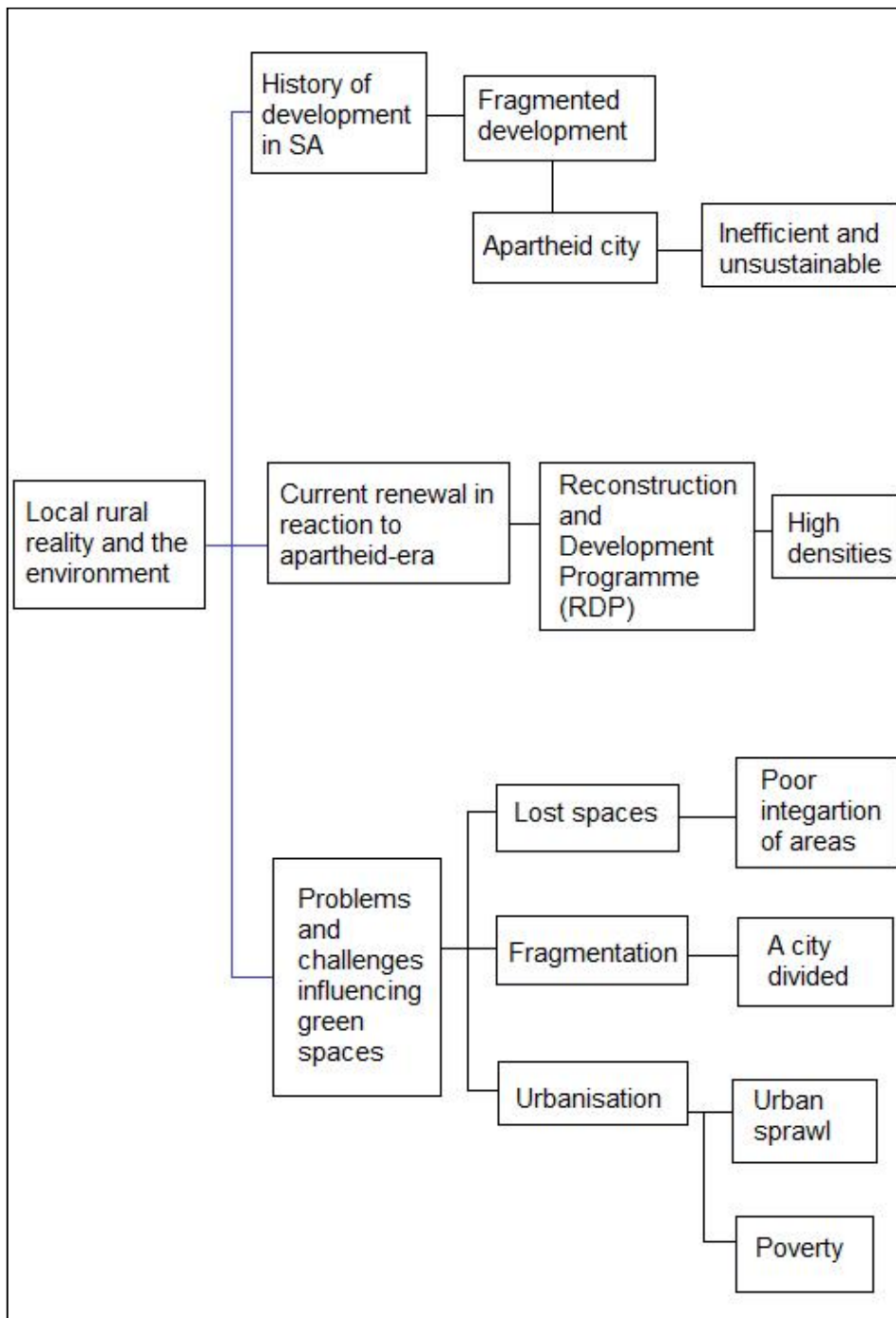
Figure 3.1: Structure of Chapter 3

Source: Own creation (2014)

Chapter 3 aims to clarify the understanding of the unique challenges of the current reality within human settlements in South Africa. In order to understand the current reality of the planning and development within human settlements in South Africa, the history of South Africa's planning and development will be discussed. Five interconnected problems and challenges concerning the development of cities, as well as rural areas and settlements, will then be discussed in this Chapter. This will also include the influence of these problems on natural green spaces in South African rural areas.

3.1 History of development in South African settlements

During the pre-1994 years, the national government which was led by the National Party (NP) provided the policies to implement apartheid (IIED, 2000: 19). Acts and policies supporting cultural classification in terms of race; social segregation; separate development; and the discouraging of contact between different races, were implemented which all supported a framework within which apartheid planning took place. This led to a fragmented government system that consisted of 30 central departments, four provincial administrations, three 'own-affairs' administrations and six self-governing territories (IIED, 2000: 19).

A fragmented pattern in the layout of South African settlements thus emerged from the fragmented government. Spatial planning had been the main planning instrument to ensure separate development and thus ensured that different groups were segregated into different residential and business areas. These different areas were often separated by an industrial area, railway, road or large unused open spaces (IIED, 2000: 20).

The following figure illustrates the typical form of the South African city which came into being during the apartheid years and is known as the segregated city or apartheid city.
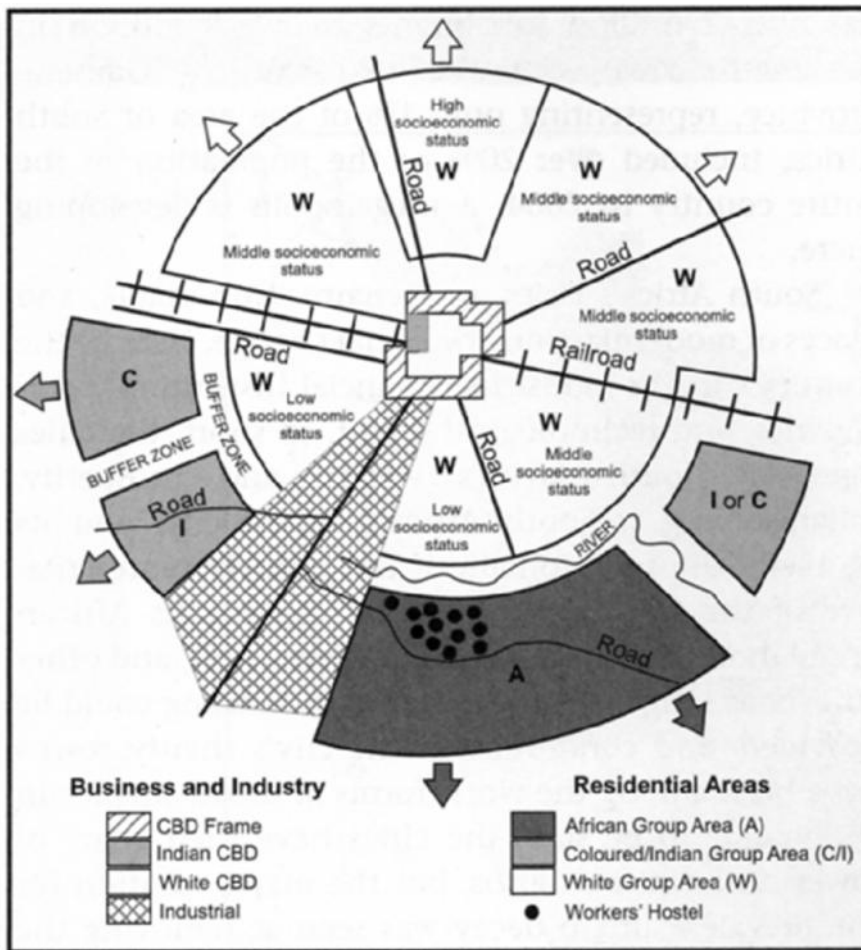
Figure 3.2: The Apartheid city

Source: Davies (1981)

After the apartheid-era, urbanisation has increased in South Africa. According to IIED (2000: 22) South Africa's urbanisation rate stood at 66% in the year 2000.

The reason for the massive increase of urbanisation is related to the Influx Control Act used to control the movement of different racial groups to other racial groups especially controlling the movement into urban areas, but after the apartheid-era, this Act was abolished and vast numbers of people moved from the rural areas to urban areas (IIED, 2000: 22). However, the apartheid-era shaped the spatial reality that is still visible today and according to Schoonraad (2000: 1) South African urbanized settlements can be seen as some of the most inefficient and unsustainable settlements in the world due to the policies of separate development of the apartheid government. As apartheid cities were developed based on segregation and inequality, the current reality still suggests of a city form that supports segregation which is inefficient and has enhanced problems such as fragmentation, poor living conditions, existence of unused

spaces, high urbanisation and in effect urban sprawl, despite new policies and legislation that have been enforced since the apartheid-era (IIED, 2000: 22).

These problems and impacts that originated from historic planning approaches are still visible in, especially, current rural settlements and have an influence on current green space planning and provision, as will be discussed accordingly.

3.2 Problems and challenges influencing the planning of green spaces

According to McConnachie and Shackleton (2012: 2) the rural settlements that developed from the apartheid-era are poorer in comparison to the urban areas and consist of less planned public green spaces. Green spaces in such rural settlements are mostly dominated by alien invasive plant species while planned green spaces in urban areas are dominated by plant species indigenous to South Africa (McConnachie and Shackleton, 2012: 2).

The current government of South Africa has a dynamic housing programme with an emphasis on delivering large numbers of houses to the poor in rural settlements at as low a cost as possible (Gilbert, 2004). This programme started as a result to redevelop and renew the rural settlements created during the apartheid-era and is called the post-apartheid Reconstruction and Development Programme or RDP (Department of Housing, 2007). According to the Department of Housing (2007), approximately two million RDP houses have been constructed from the year 1997 to 2007. This programme has thus ensured a great number of houses to people living in poor conditions in rural areas, however given that the RDP suburbs have higher densities, the area and quality of public green space is much lower and not planned for (McConnachie and Shackleton, 2012: 6).

The following figure illustrates a rural settlement with RDP housing in South Africa.
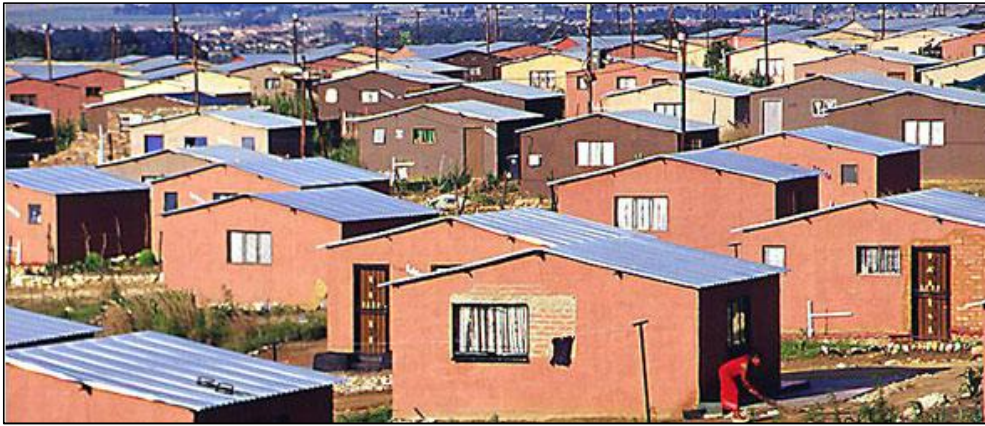
Figure 3.3: RDP housing in South Africa

Source: globalbuzz-sa.com (2014)

It is evident that green spaces in South African rural areas have rather become more of a luxury and not as an important aspect as development (Maas, 2006). It is evident that rural settlements are in need of planning, provision and protection of green spaces in order to improve the residents' living standards. The protection of the natural environment will follow when environmental benefits of green spaces are adequately used in a sustainable way (cross reference to Chapter 2).

A number of problems and challenges concerning rural settlements and the planning, provision and protection of green spaces can be identified as part of the current reality. The following problems and challenges were identified by the researcher from various planning and environmental literature (Trancik, 1986; Barnett, 1995; IIED, 2000; DEAT, 2006; McMahan *et al*, 2002):

- Existence of lost spaces
- Fragmentation of settlements
- Urbanisation
- Urban sprawl
- Poverty

These problems and challenges connected with each other as will be discussed. These interconnected problems and challenges have an influence on the planning and provision of quality green spaces which in effect influences the provisioning of sufficient environmental benefits, as will be discussed accordingly.

3.2.1 Existence of lost spaces

According to Trancik (1986: 1) this challenge begins with the creation of outdoor environments as collective, unifying frameworks for development. The built environment in human settlements is usually treated as isolated from the landscape and surrounding environment. This causes poor integration and brings forth lost spaces.

Lost spaces are defined by Trancik (1986: 3) as no-man's lands along the edges of freeways that nobody cares about maintaining. He also defines it as deteriorated parks which serve no purpose, or a more generally accepted definition of lost spaces is that they are the undesirable urban areas that are in need of redesign because they make no positive contribution to the surroundings and users (Trancik. 1986: 4). According to Jalaladdini & Oktay (2011: 666) these lost spaces contribute to the reduction of the vitality (or liveliness) in urban public spaces. There are five main causes of lost spaces and the disintegration between built areas and green spaces. The five causes identified by Trancik (1986: 4) are as follows:

 ➢ Increasing dependence on automobiles:
   The increasing need of the modern people to use automobiles (private or public) more than pedestrian footpaths or bicycles resulted in human settlements with highways and parking lots as the predominant types of open space. The streets and parking areas caused a separation between buildings or activities which created vast open spaces with no social purposes and thus a decline in social activity (Trancik. 1986: 5-7).

 ➢ Architects' attitude of the Modern movement towards open spaces:
   This movement developed on abstract ideals for the design of freestanding buildings, denying the importance of the street space, urban squares and other important outdoor surroundings. The focus is greatly on the design of the buildings while the spaces between the buildings are rarely designed. Buildings therefore became more just 'objects' separated from their context (Trancik. 1986: 8-10)

 ➢ Zoning and land-use policies that divided the settlements:
   Urban renewal projects was implemented and rarely corresponded in spatial structure to the evolved community pattern which they had replaced, they also did not respond to the social relationships that gave meaning to community existence. The RDP is an example of such a renewal project for rural areas where the focus was only on residential land uses because of the need and thus did not correspond in spatial structure to the rest of the settlements (McConnachie and Shackleton, 2012: 6). Zoning legislation had the

effect of separating functions that previously had often been integrated. This encouraged the disintegration between functions in human settlements (Trancik. 1986: 12).

➤ Privatization of public space:

Public spaces are often used by private enterprises for the appropriation of public space for private expression. Urban areas with collective spaces have thus been transformed into areas with private icons (buildings and spaces that don't fit together or into context because of the different private expression these buildings are seeking). Lost spaces thus occur between these buildings and activities (Trancik. 1986: 15-17).

➤ Abandonment of industrial, military or transportation sites:

The relocation of industry, obsolete transportation facilities, abandoned military properties and vacated commercial or residential buildings have created vast areas of wasted or underused spaces in urban and rural areas. These spaces offer enormous potential, but are just left with no purpose (Trancik. 1986: 17).

In South Africa, the concept of lost spaces already manifested during the apartheid years where there was a great deal of unoccupied land in most townships with no civic, social or cultural role (The Design Observer Group, 2014). These green spaces that stretched between the rural settlements (townships) and which was also located inside of the rural settlements, could be regarded as 'no-man's land' with no owner, no rules and no maintenance (The Design Observer Group, 2014). The following figure illustrates a rural settlement (township) situated near Cape Town, South Africa where the lost spaces which have no function (indicated in red) are clearly visible.

Figure 3.4: Indication of lost spaces in and around a rural settlement in South Africa

Source: capetownpartnership.co.za (2014)

The current reality suggests that these lost spaces still exist in the local South African context and need to be planned for and revitalised, as it holds great potential in providing environmental benefits (cross reference to Chapter 2.3 and 2.4.) to the residents of rural areas.

3.2.2   Fragmentation of human settlements

The fragmentation of settlements has increased over the years as the settlements split apart in two or more fragments creating what is known as the 'old city' and 'new city' (Barnett, 1995: 1). The following figure is an illustration of typical fragmented settlements.
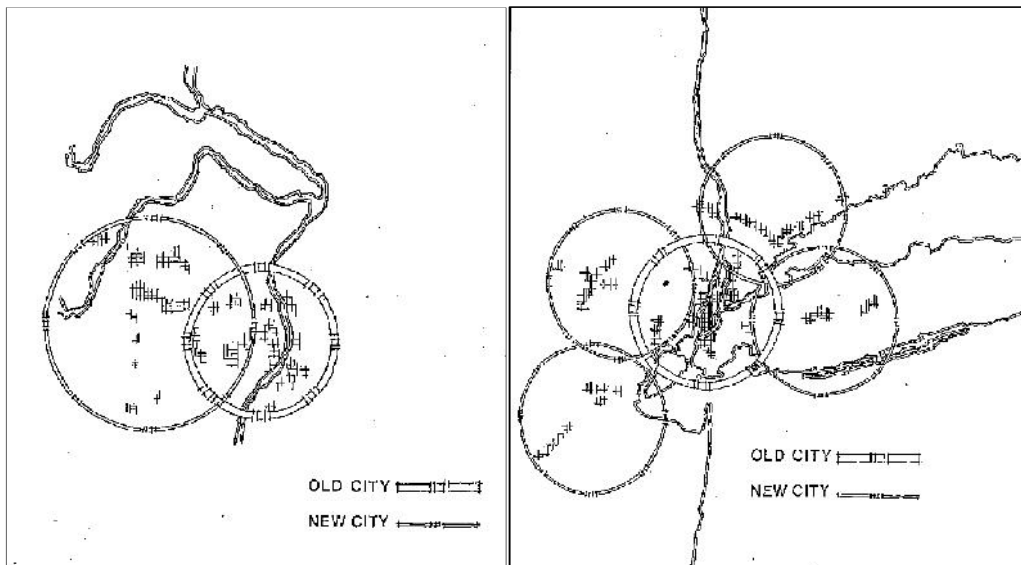
Figure 3.5: The fragmented settlement

Source: Barnett (1995: 1, 3)

The old part of the settlement contains the deteriorated housing which turns into high crime areas while the public green spaces in this old settlement are not used anymore as most residents move to the new part of the settlement which also includes a new lifestyle without public spaces. These unused green spaces thus turn into lost spaces with no specific function (Barnett, 1995: 1). The areas separating the old and new settlement also become unused open spaces with no function, thus fragmenting the overall human settlement. The fragmentation of settlements can be caused by rapid population growth which increases the demand for housing and living space thus causing new settlements to form (DEAT, 2006: 18 - 19).

The new settlement contains the newly built office space, clean and organised shops and industries, while the residential areas are mostly middle to high income (Barnett, 1995: 1). The form of the new settlement however did not develop as it was initially planned, as each component in the new settlement was proposed separately by competing developers, thus forming no integration of facilities. The shape developed thus as a more fragmented, inefficient settlement (Barnett, 1995: 5). Barnett (1995: 6) also states that most houses are built on isolated clusters or large lots where schools and parks are completely out of walking distance, thus forcing a lifestyle dependent on the usage of privately owned vehicles. In effect, people live an isolated life which offers an escape from community social responsibilities (Barnett, 1995: 7).

It is thus evident that the fragmented human settlement has developed a form that does not contribute or benefit the usage of green spaces but on the contrary lead to the formation of lost spaces.

38

In South African context the fragmented settlement is in essence the apartheid city (refer to Chapter 3.1) whereas the apartheid-era lead to the development of fragmented human settlements (IIED, 2000: 20). The following two figures indicate examples of South African fragmented settlements, illustrating a low income human settlement (indicated in red) separated (fragmented) from the urban area (indicated in yellow).

Figure 3.6: A part of Johannesburg indicating a divided city in South Africa

Source: citydivided.com (2014)

Figure 3.7: A fragmented city in South Africa

Source: a1kynaston.co.za (2014)

3.2.3   Urbanisation

Urbanisation describes the movement of great numbers of the population from rural areas to urban areas (Business Dictionary, 2014). According to the Department of Environmental Affairs and Tourism, or DEAT (2006: 18), rapid population growth can be seen as the most important threat to the environment. The migration of people to urban areas may help reduce pressure on the rural environment, but brings new pressure on the urban environment and especially on the green spaces in urban areas (DEAT, 2006: 242). Urbanisation and particularly unplanned informal settlements have a negative impact on the runoff from storm water, as the flows are concentrated because of the high population density. The green spaces are not planned and used effectively to facilitate the concentrated flow and causes land degradation and erosion (DEAT, 2006: 263).

In South Africa, the demand on the earth's natural resources is intensified with the increasing number of population. The United Cities and Local Governments (2010: 16) add that this increasing demand on the natural resources is in effect a pursuit for planned green spaces

which will provide environmental benefits. The increasing demand on natural resources causes massive consumption and inefficient consumption patterns on the resources thus impacting the natural environment (DEAT, 2006: 18 - 19). It is thus important to plan for the natural environment in order to control and maintain the usage and consumption patterns in the most sustainable way possible. It is especially in and around human settlements in South Africa that the planning of natural green spaces is needed as the populations in settlements keep increasing due to urbanisation (DEAT, 2006: 19).

More housing and supporting facilities are needed to accommodate the rising number of citizens. The lost spaces that weren't planned for, now turn into potential development areas for said facilities, thus placing additional pressure on the provision and protection of green spaces. As mentioned in Section 3.1, urbanisation is increasing at a high rate in South Africa since the apartheid-era (IIED, 2000: 22). People living in rural settlements with little or no services, facilities and work opportunities move to nearby urban areas (IIED, 2000: 22). According to the DEAT (2006: 318) urban areas in South Africa provide a varying range of services and thus act as distributing centres for a scattered rural population.

Rapid population growth that caused the phenomenon of urbanisation to take place in effect causes urban sprawl to happen (DEAT, 2006: 19).

3.2.4   Urban sprawl

Urban sprawl can be defined as the spread of urban development into areas that used to be countryside (Longmon Dictionary, 2014). The concept of urban sprawl came to being in the United States of America and was led by legislation as urban areas became denser because of urbanisation (Barnett, 1995: 48). The impacts that urban sprawl have on the environment include, but are not limited to the following:

- The land is levelled and the natural landscape with its environmental benefits stripped away (Barnett, 1995: 48).
- Decreased watershed permeability which results in an increased risk of floods and groundwater contamination (McMahan *et al*, 2002: 30).
- Fragmentation of natural green spaces as urban sprawl follows no specific growth pattern (McMahan *et al*, 2002: 30).
- Air and noise pollution (McMahan *et al*, 2002: 30).
- The loss of arable land to development (McMahan *et al*, 2002: 30).

- Introduction of invasive plants and animals into natural areas which disturbs the indigenous plants and animals in the ecosystem and their eligibility to provide the ecosystem services (Mashour & McDonell, 2005: 1).

In the South African context the phenomenon of urban sprawl began during the apartheid-era as new informal housing was built on the periphery of the urban areas, resulting in uncontrolled settlement development. According to the DEAT (2006: 265) the low income classes are usually forced into uncontrolled settlements as it is mostly the poor people living in rural areas (outside of urban borders).This uncontrolled development resulted from rapid population growth, and in effect the uncontrolled urbanisation which occurred as a result of the rural population's needs for services and activities provided by urban areas (UCLG, 2010: 16). This uncontrolled development placed severe stress on the provision of services (DEAT, 2006: 236).

The following figure illustrates typical urban sprawl in South African context as the growing population causes the urban areas to expand horizontally as informal settlements keep developing on the periphery of urban areas. Figure 3.8 illustrates the city of Johannesburg where it is evident that uncontrolled settlements are developing outwards from the urban area's central business district in a southern and northern direction on the figure.

Figure 3.8: Urban sprawl in a South African urbanized area

Source: Timeslive.co.za (2014)

3.2.5 Poverty

The current reality suggests that life in South African rural areas is much more affordable, but unsustainable, inefficient and dangerous (DEAT, 2006: 265). People living in rural areas are dependent on the natural environment and thus understand that the environment provides benefits for them to use (refer to Chapter 2). The rural populations however need guidance on how the environment, specifically green spaces, can be used in a sustainable way and thus improve their quality of life.

The rural areas where most of South Africa's poor live have a lack in resources, technology and access to infrastructure providing economic opportunities and health (DEAT, 2006: 265). The basic needs of the poor in South Africa leads them to cultivating erosion-prone hillsides, clear natural trees and vegetation in order to make space for houses, exploiting the soil without replacing nutrients (DEAT, 2006: 265). The direct impact of poverty in rural areas on the environment includes the depletion of water resources, the cultivation of marginal lands and the over exploitation of trees and other plants for resources such as firewood, food and medicine (DEAT, 2006: 265). The following figure indicates a rural settlement in South Africa which illustrates how the natural environment is not considered in the development (not supportive of green spaces) and how the poor living conditions negatively affect the environment.
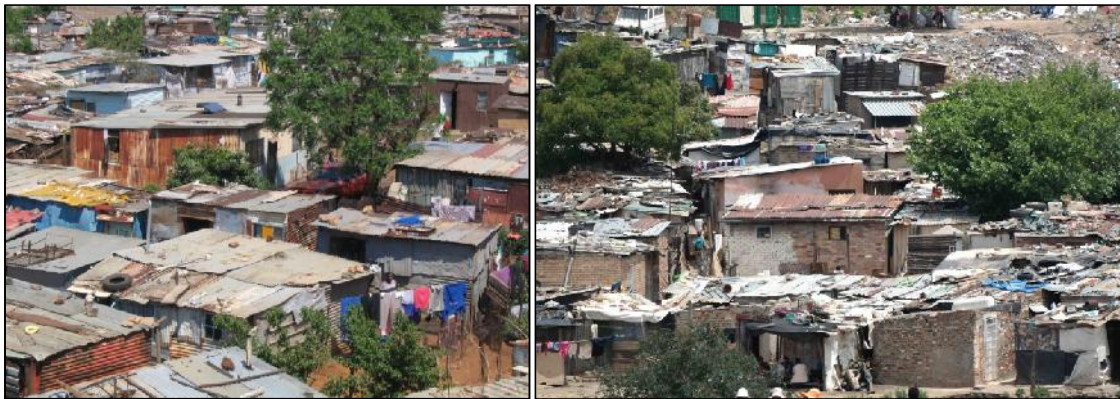
Figure 3.9: Rural settlement in South Africa

Source: documama.org (2014)

3.3   Conclusion

It is evident that the current reality of South African rural areas faces a number of environmental challenges. These challenges originate mostly from historic spatial patterns and occurrences in South Africa. The following table summarises such challenges, indicating the main cause as well as the most significant influence it has on the environment (specifically green space).

Table 3.1: Problems and challenges of green spaces in South African settlements

Problems and challenges:	Cause of this problem:	Influence on green spaces:
Existence of lost spaces	Poor integration between the built environment in human settlements and the landscape or surrounding environment (Trancik, 1986: 1).	Leads to the existence of deteriorated parks which serve no purpose and are in need of redesign because they make no positive contribution to the surroundings and users (Trancik. 1986: 4).
Fragmentation of human settlements	An increase in the population growth which increases the demand for housing and living space thus causing new settlements to form (Barnett, 1995: 7).	Encourages people to live isolated lives thus discouraging the use of public green spaces (Barnett, 1995: 7).
Urbanisation	Rapid migration of people living in rural settlements with little or no services, facilities and work opportunities to nearby urban areas to address their needs (IIED, 2000: 22).	Pressurises the planning and maintenance of the urban environment and especially the green spaces in urban areas (DEAT, 2006: 242).
Urban sprawl	Uncontrolled population growth and thus uncontrolled urbanisation taking place (UCLG, 2010: 16).	Fragmentation of natural green spaces as urban sprawl follows no specific growth pattern (McMahan *et al*, 2002: 30).
Poverty	People move to rural areas where it is much more affordable to live, but it is unsustainable, inefficient and dangerous which contributes to even more poor living conditions (DEAT, 2006: 265).	The need of the poor communities on natural resources causes them to use the natural environment and green spaces in unsustainable ways thus causing degraded areas (DEAT, 2006: 265).

Source: Own creation from Trancik (1986), Barnett (1995), IIED (2000), DEAT (2006), McMahan et al (2002) and UCLG (2010)

It is important to take these challenges into consideration when planning for future development and the environment, as it can influence the quantity as well as quality of environmental services which green spaces can provide. Taking the history and challenges of the local areas into consideration provide an overview of the areas' demography, economy and environment, which contributes to the planners' and developers' understanding of the needs of the area. The following chapter will discuss and evaluate the policies and legislation which guide the approach to green space planning in South Africa.

Chapter 4: Policies and legislation
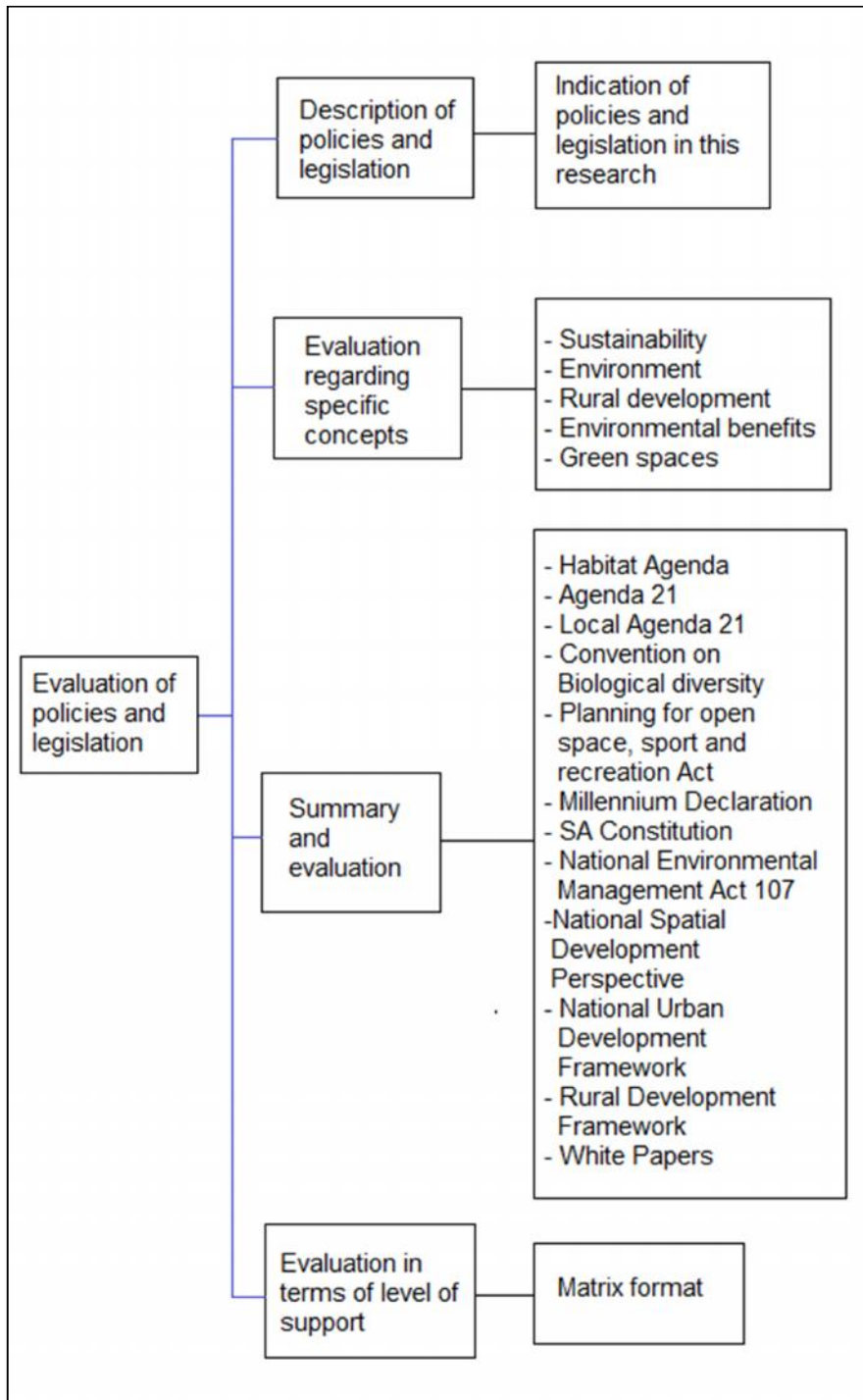
Figure 4.1: Structure of Chapter 4

Source: Own creation (2014)

Chapter 4 will identify and discuss a number of international, as well as national policies and legislation, in order to evaluate the current approach to planning for the environment, as supported by local legislation. The different policies and legislation will be summarised to illustrate its importance in terms of this research and will be evaluated in terms of addressing relevant concepts in green planning as explained in Chapter 2 (including sustainable development, the environment, rural development, environmental benefits for people, and the intentional focus on green spaces). This will be done in table format for each policy and legislation. This chapter will conclude with a matrix table comparing the different policies and legislation, indicating the state in which legislation in broad addresses the planning and provision of green spaces that provide environmental benefits, specifically in rural areas.

4.1   Introduction

Planning for urban areas and the environment is greatly dependent on policies and legislation which guides and supports the planning process (Kleyn & Viljoen, 1998:12). Environmental considerations should be included in a variety of policies and legislations, as well as different geographical levels (provincial, national and international) in order to be comprehensive.

The difference between legislation and policy is that legislation suggests a system of rules and regulations which gives order to society by means of enforcement through various government institutions (Kleyn & Viljoen, 1998:12), while policy is a set of guidelines which are developed in accordance with legislation in order to assist the various role players in legislation implementation (Torjman, 2005:2).

Figure 4.2 below indicates the different policies and legislation as well as other guidelines which will be discussed in this chapter.
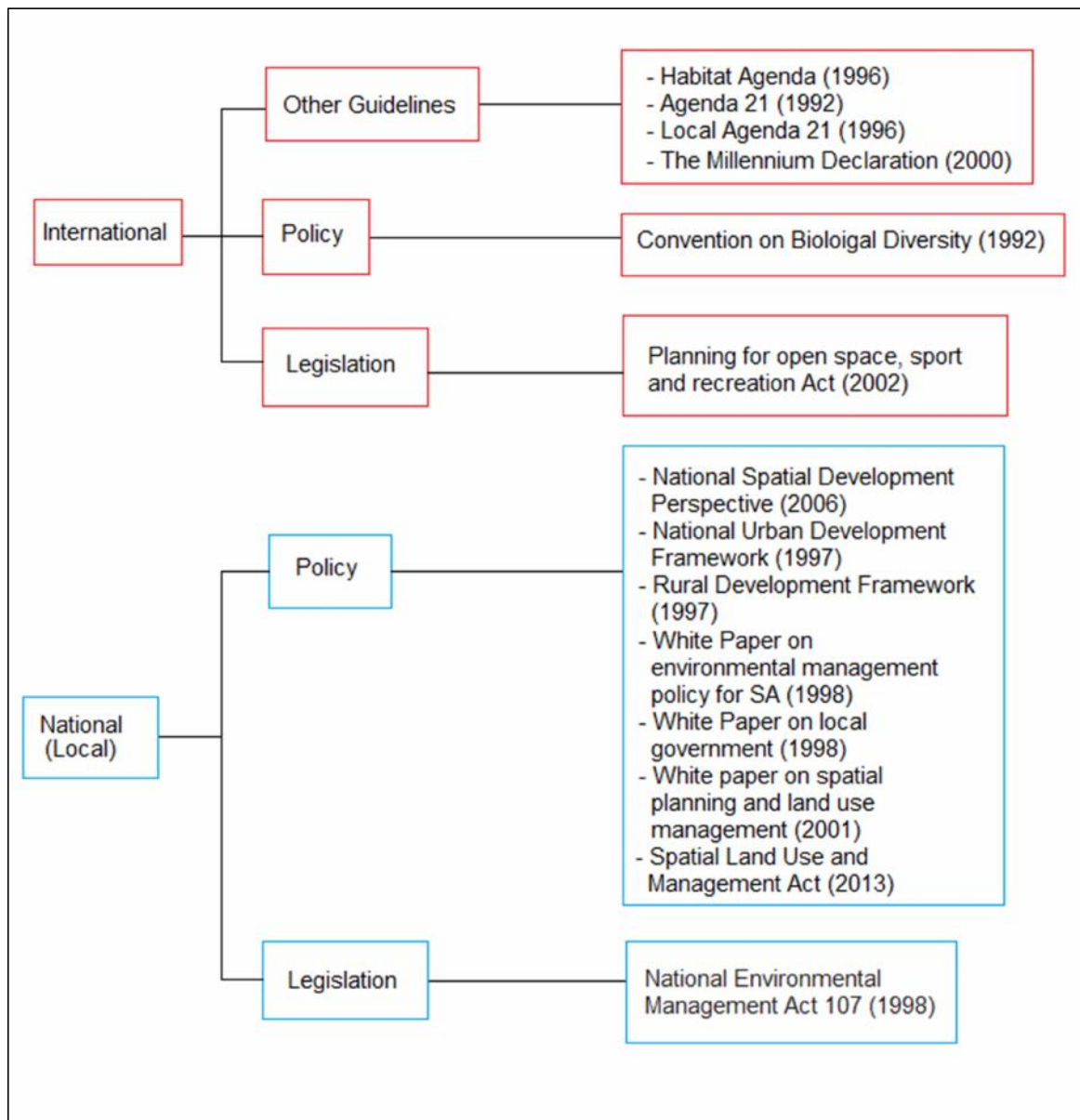
Figure 4.2: Policies and legislation in this research

Source: Own creation (2014)

The policies and legislation captured in the above figure will be discussed and evaluated in terms of five important aspects that are most relevant to green space planning and therefore to this study as explained in Chapter 2. These five aspects include:

- Sustainable development
- Environmental focus
- Rural development
- Environmental benefits for people
- An intentional focus on green spaces

4.2 International policy and legislation

4.2.1 Habitat Agenda (1996)

The Habitat Agenda is the main political document on the provision of quality human settlements, born from the Habitat II conference in Istanbul, Turkey from the 3rd to the 14th of June 1996 (Habitat Agenda, 1996: 1). The Habitat Agenda was adopted by 171 countries and was called the City Summit. It contains over 100 commitments and 600 recommendations on human settlements issues. This policy focuses on the imperative need to improve the quality of human settlements, which profoundly affects the well-being of people all over the world (Habitat Agenda, 1996: 1).

The purpose of this second United Nations Conference on Human Settlements (Habitat II) was to address the two globally important themes of "Adequate shelter for all" and "Sustainable human settlements development in an urbanizing world" (Habitat Agenda, 1996: 1). The international community decided that a combined global approach can enhance the progress towards achieving the goals for the two above mentioned themes. Relieving environmental degradation forms part of the goals which indicates that the environment is always an important factor to consider as it is even included in providing adequate shelter for all (Habitat Agenda, 1996: 2). The Habitat Agenda (1996: 4) states that when innovative strategies for shelter and human settlements are created, the outlook for solutions to global social and environmental problems will improve.

The Habitat Agenda in document is comprised of certain goals and principles; commitments regarding different aspects; and a global plan of action on achieving these commitments namely (1) Adequate shelter for all, (2) Sustainable human settlements development in an urbanizing world, (3) Capacity-building and institutional development and (4)International cooperation and coordination (Habitat Agenda, 1996: 11 – 20). The document concludes with a section regarding the implementation of the Habitat Agenda.

The following table evaluates the Habitat Agenda (1996) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.1: Evaluating the Habitat Agenda (1996)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✗	✓
Quote from the document indicating support (Only if supportive)	"Sustainable development is essential for human settlements development, and gives full consideration to the needs and necessities of achieving economic growth, social development and environmental protection"	"..also addressed important social, economic and environmental issues, including components of the sustainable Development agenda"	"Promote comprehensive rural development through such measures as equal access to land, land improvement, economic diversification, etc."		"..it is necessary to promote land use patterns that minimize transport demands, save energy and protect open and green spaces"

Source: Own creation from Habitat Agenda (1996: 1 – 109)

It is evident from the table above that the Habitat Agenda has a focus on planning for the environment in order to promote sustainability in urban areas and even in rural areas. There is however no consideration or in fact no knowledge about the benefits or services which the environment has to offer to the communities.

4.2.2   Agenda 21 (1992)

The Agenda 21 is documented from the United Nations conference on environment & development held at Rio de Janeiro, Brazil on 3 to 14 June 1992. Agenda 21 addresses the most intensive problems of today while also aiming at preparing the world for the challenges of tomorrow (Agenda 21, 1992: 3). Agenda 21 is a global political commitment on development and the environment. The implementation of this policy is first and foremost the Governments' responsibility and makes use of national policies, plans, strategies and processes in achieving this (Agenda 21, 1992: 3).

Cooperation between different countries, other international or regional organizations and non-governmental organizations is crucial for the success of this effort. The Agenda 21 (1992: 5) states that the focus is on integrating environment and development concerns which aims at leading to the fulfilment of better protected and managed ecosystems, provision of basic needs, improved living standards for all, and a safer, more prosperous future. This policy thus addresses poverty, ill health, hunger, illiteracy, and the deterioration of the ecosystems on which people depend for their well-being. Agenda 21 in document is comprised of four sections which includes the following: (1) Social and economic dimensions; (2) Conservation and management of resources for development; (3) Strengthening the role of the major groups; and (4) the implementation of Agenda 21 (Agenda 21, 1992: 1). The following table evaluates the Agenda 21 (1992) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.2: Evaluating Agenda 21 (1992)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✓	✗
Quote from the document indicating support (Only if supportive)	"Ensure that environment and trade policies are mutually supportive, with a view to achieving sustainable development"	"All countries should assess the environmental suitability of infrastructure in human settlements, develop national goals for sustainable management of waste, and implement environmentally sound technology to ensure that the environment, human health and quality of life are protected"	"To improve production systems in order to achieve greater productivity within approved programmes for conservation of national resources and in the framework of an integrated approach to rural development"	"Undertake long-term research into the importance of biodiversity for the functioning of ecosystems and the role of ecosystems in producing goods, environmental services and other values supporting sustainable development"	

Source: Own creation from Agenda 21 (1992: 1 – 351)

The Agenda 21 has a great focus on environmental planning, achieving sustainability, rural development and creating opportunities which brings forth environmental benefits. These concepts are all looked at in a broader manner while there's a lack of achieving this through the use of practical ways such as green spaces.

4.2.3 Local Agenda 21 (1996)

Agenda 21 called upon local authorities to undertake a process of consultation and review with their populations to achieve a consensus on 'Local Agenda 21' for their communities (Local Agenda, 1996: 3). The main focus for the Local Agenda 21 is to achieve transformation towards sustainable development and aims at answering questions such as: (1) How can sustainable development at the local level be made more significant? (2) How can systems be developed to involve the stakeholders in creating solutions to local environment and development issues? (3) How can we improve and integrate the quality of municipal services to address the environmental, economic, and social prospects of the communities? (Local Agenda 21, 1996: 4) The Local Agenda 21 can thus be seen as a planning framework for sustainable development at local level and focuses on guiding the three distinct development processes (Economic development, Community development and Ecological development) which are significant at local level and together creates successful sustainable development. The Local Agenda 21 (1996: 10) describes sustainable development as the fundamental first step of local authorities to provide their residents with basic human rights, needs, and economic opportunities while it also ensures a healthy natural environment.

The Local Agenda 21 (1996: 1 – 180) in document is comprised of an introduction to sustainable development which defines and discusses sustainable development and its different important aspects. Chapters on partnerships and issues analysis then follow which support the local authorities in identifying the partners and key stakeholders necessary for the process, as well as identifying main local issues needed to be addressed with this framework. An action plan, implementation process and monitoring process is discussed and laid out in the last chapters of the document. A few case studies of sustainable developed areas are also included in this document in order to contribute to guiding the process.

The following table evaluates the Local Agenda 21 (1996) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.3: Evaluating the Local Agenda 21 (1996)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✓	✓
Quote from the document indicating support (Only if supportive)	"The Local Agenda 21 Planning Guide has been prepared to assist local governments and their local partners to learn and undertake the challenging task of sustainable development planning"	"Several initiatives aimed at promoting sustainable agriculture and urban settlements and improving environmental and health conditions are already being implemented"	"The development planning issues faced by the municipality of Cajamarca illustrate the inter-dependency between urban and rural development and the need for coordinated planning"	"..provided a forum for citizens to discuss the environmental benefits sought by the community and to design projects to reduce existing environmental problems and promote environmentally sound economic development"	"..managing open spaces, recreational areas, hazard lands, green belts, and urban agricultural potential"

Source: Own creation from Local Agenda 21 (1996: 1 – 180)

The Local Agenda 21 directs a great focus on environmental planning in order to achieve sustainable development and create better quality of life through better planned environments, but unlike the Agenda 21, the Local Agenda 21 gives specific focus on practical smaller scale methods of achieving this through managing green spaces and recreational areas.

4.2.4 Convention on Biological diversity (1992)

The convention on biological diversity focuses on the value and benefits of biological diversity and thus on creating, conserving and maintaining biological diversity (United Nations, 1992: 3). The objectives of this convention are thus as follows: (1) the conservation of biological diversity; (2) the sustainable use of the biodiversity's components and (3) the fair and equitable sharing of the benefits that arises out of the use of genetic resources (United Nations, 1992: 3).

The convention is established in order to serve as a guideline for different contracting parties to enhancing and maintaining biological diversity in all areas (natural and developed). The following table evaluates the Convention on Biological Diversity (1992) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.4: Evaluating the Convention on biological diversity (1992)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✗	✗	✗
Quote from the document indicating support (Only if supportive)	"Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas.."	"Consideration shall also be given to the special situation of developing countries, including those that are most environmentally vulnerable"			

Source: Own creation from the United Nations' Convention on Biological Diversity (1992: 1 – 130)

The Convention on Biological diversity addresses environmental problems and promotes sustainable development and biodiversity, but there is no focus on how this improves or benefits the lives of the people or how this can be integrated or implemented in environments where people live.

4.2.5 Planning for open space, sport and recreation Act (2006).

This Act is part of national policies on different aspects of planning set out by the government. This act focuses on the fact that sport, open space and recreation underpins people's quality of life (Department for Communities and Local Government, 2006: 2). The objectives of this Act

include the following: (1) Supporting an urban renaissance; (2) Supporting a rural renewal; (3) Promoting social inclusion and community cohesion; (4) Enhancing health and well-being; and (5) the promotion of sustainable development (Department for Communities and Local Government, 2006: 2).

The Act comprises of a section that looks mainly at the maintenance of an adequate supply of green spaces and recreational as well as sport facilities. In this section the focus of the Act is on playing fields, development within green spaces and the enhancement of existing green spaces and recreational facilities. The Act also places a focus on the planning of brand new green space, sports and recreational facilities whereas rural areas deserve special attention as well (Department for Communities and Local Government, 2006: 1). The following table evaluates the Planning for open space, sport and recreation Act (2006) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.5: Evaluating the Planning for open space, sport and recreation Act (2006)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✓	✓
Quote from the document indicating support (Only if supportive)	"..promoting more sustainable development - by ensuring that open space, sports and recreational facilities (particularly in urban areas) are easily accessible.."	"..areas for nature conservation and biodiversity and by acting as 'green lungs' can assist in meeting objectives to improve air quality.."	"Open spaces within rural settlements and accessibility to local sports and recreational facilities contribute to the quality of life and well-being of people who live in rural areas"	"..providing opportunities to people of all ages for informal recreation, or to walk, cycle or ride within parks and open spaces or along paths, bridleways and canal banks. Allotments may provide physical exercise and other health benefits"	"Local networks of high quality and well managed and maintained open spaces, sports and recreational facilities help create urban environments that are attractive, clean and safe"

Source: Own creation from the Department for Communities and Local Government's Planning for open space, sport and recreation act (2006: 1 – 10)

This Act ensures that sustainability, environmental problems, rural development and environmental benefits are addressed and improved by focussing on the provision of green spaces and recreational facilities.

4.2.6   The Millennium Declaration (2000)

The United Nations Millennium Declaration has been compiled by the heads of State and Government at the United Nations headquarters in New York from 6 to 8 September 2000 (United Nations, 2000: 1). The declaration focuses on certain fundamental values which are essential to the international relations in the 21st century. These values include freedom, equality, solidarity, tolerance, respect for nature and shared responsibility (United Nations, 2000: 1).

The declaration identifies key points that deserves special attention and which are aimed at addressing specific challenges in order to enhance the quality of life. The key points are firstly to maintain peace and security amongst the people, to develop and eradicate poverty, to protect the environment, to ensure good governance and human rights, to protect the vulnerable and to address the special needs of Africa (United Nations, 2000: 2). The declaration supports the principles of sustainable development as set out by the Agenda 21 in 1992 and states that the conservation of the environment plays an important role in achieving a better quality of life for the people. The Millennium Declaration thus doesn't focus on only one aspect of importance for the planning and development of urban areas and the surrounding environment, but tries to include as many different aspects as possible.

The following table evaluates the Millennium Declaration (2000) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.6: Evaluating the Millennium Declaration (2000)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✗	✗	✗
Quote from the document indicating support (Only if supportive)	"We reaffirm our support for the principles of sustainable development, including those set out in Agenda 21, agreed upon at the United Nations Conference on Environment and Development"	"We resolve therefore to adopt in all our environmental actions a new ethic of conservation and stewardship and, as first steps"			

Source: Own creation from the United Nation's Millennium Declaration (2000: 1 – 9)

The Millennium Declaration mentions that better planning for sustainability and the environment is needed, but the declaration does not go any deeper or provide any more detailed information on these concepts.

4.3 National policy and legislation

4.3.1 The Constitution of South Africa (1996)

The Constitution of South Africa is the highest law of South Africa which provides the legal foundation, sets out the citizens' duties and rights, and defines the government structure. South Africa is currently using its fifth constitution that was drawn up by the elected Parliament in 1994 and was promulgated by the late President Nelson Mandela in 1996 (South Africa, 1996: 3).
The Constitution's focus is thus on achieving the following: (1) Heal the separations of the past and create a society based on democratic values, justice and fundamental rights; (2) Lay the foundations for a democratic open society with a government based on the people's will and

ensure law that protects every citizen equally; and (3) Improve the citizen's quality of life and support the citizens in improving their own potential (South Africa, 1996: 3).

The following table evaluates the Constitution of South Africa (1996) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.7: Evaluating the Constitution of South Africa (1996)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✗	✗	✗
Quote from the document indicating support (Only if supportive)	"..secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"	"..to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measure"			

Source: Own creation from the Constitution of South Africa (1996: 1 – 107)

The Constitution provides a small section on the environment, but no further focus or details are given.

4.3.2 National Spatial Development Perspective - NSDP (2006)

The National Spatial Development Perspective (NSDP) is used in the continued effort by the State to eradicate the damage shaped by decades of apartheid and colonial manipulation of the patterns of settlements and economic activity in South Africa (South Africa, 2006: i). The NSDP is an intergovernmental collaboration created from engagements between national government and provincial and municipal structures (South Africa, 2006: i). The NSDP is thus an important instrument for policy coordination in national, provincial and local governments, with regard to the spatial implications of infrastructure programmes in these different governmental spheres.

The NSDP provides a set of mechanisms and principles which guides the investment in infrastructure and other development decisions. It also provides a description of the spatial appearances of the key economic, social and environmental trends which are supposed to form the basis for a shared understanding of the national space economy (South Africa, 2006: ii).
In document the NSDP (2006: 1 – 2) is divided into the following three sections: (1) 'Framing' which discusses the mechanisms and principles of the NSDP; (2) 'Description and analysis' which summarises the current reality in terms of spatial development; and (3) 'Interpreting the space economy' by using the spatial realities and key dynamics as found in the NSDP's section 2, as well as the economic and social objectives of the government.

The following table evaluates the NSDP (2006) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.8: Evaluating the National Spatial Development Perspective (2006)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✓	✗
Quote from the document indicating support (Only if supportive)	"In opting for sustainable development, spatial interventions and impacts have to be designed and monitored for the broader economy and human settlements, for specific sectors in the economy"	"Operating within a sustainable development paradigm entails ensuring that economic growth and social development are in balance with environmental priorities"	"In addition to this, important interventions that are livelihood-enhancing and supporting will have to be considered, including sound rural-development planning policies and programmes.."	"The health of terrestrial ecosystems status determines their ability to provide ecosystem services such as water purification, prevention of erosion, carbon storage, supply of medicinal plants and pollination of commercial crops"	

Source: Own creation from the NSDP of South Africa (2006: 1 – 215)

It is evident from the table above that the NSDP directs a definite focus on planning for the environment and achieving sustainability with the inclusion of providing environmental benefits (ecosystem services) to the community, but it has no focus on detailed practical plans such as green spaces to provide this environmental planning.

4.3.3 National Environmental Management Act 107 – NEMA (1998)

The National Environmental Management Act's (NEMA) focus is on the right that states that everyone has the right to an environment that is not harmful to their health or well-being (South Africa, 1998: 2). The objectives of the NEMA are to provide for environmental governance that is co-operative; to establish principles for decision-making on matters which affects the environment; and to provide for aspects of the enforcement and administration of other environmental management laws (South Africa, 1998: 3).

According to the NEMA (1998: 9), the environment can be seen as the surroundings within which humans live and function and are made up of the following: (1) land, water and the atmosphere (2) plants and animals, including the micro-organisms; (3) the interrelationships between the earth and the life on earth; and the (4) physical, chemical, and cultural properties that influence the health and well-being of humans.

The NEMA is thus a law that exists for the intentional planning of the environment in order to address common social, economic and environmental problems that occur (South Africa, 1998: 15). The following table evaluates the NEMA (1998) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.9: Evaluating the National Environmental Management Act 107 (1998)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✗	✓	✗
Quote from the document indicating support (Only if supportive)	"..prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"	"..that the law develops a framework for integrating good environmental management into all development activities"		"Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued"	

Source: Own creation from the NEMA of South Africa (1998: 1 – 108)

The NEMA as environmental law addresses all environmental aspects including the importance of the benefits which the environment provides, however there exist no intentional focus on green spaces as well as no information on the planning of the environment in rural areas specifically.

4.3.4 National Urban Development Framework – NUDF (1997)

The purpose of the National Urban Development Framework (NUDF) is to provide a common view on strengthening the capacity of South Africa's cities, towns and city-regions. This is done with the focus on realising the cities', towns' and city-regions' potential of supporting national shared growth, social equity and environmental sustainability (South Africa, 1997: 2).

This framework aims at addressing the challenges and opportunities facing the cities, towns and city-regions of South Africa. In order to address these challenges and opportunities this framework focuses on inter-governmental cooperation (South Africa, 1997: 2).

The NUDF of South Africa (1997: 7) states that this framework doesn't only focus on urban areas but include rural areas as no divide between these areas are made in this framework. Guiding principles for the effective management of the cities, towns and city-regions of South Africa include the following: (1) An intentional focus on urban challenges; (2) Proactive management of urbanization; (3) An integrated approach to rural and urban areas; (4) Inter-governmental co-operation between regions; and (4) Differentiated support (South Africa, 1997: 4).

In document the NUDF is comprised of sections discussing cities, towns and city-regions in national policy context as well as global context; the national urban context; national urban development principles; urban outcomes and indicators; and the mechanisms for coordination (South Africa, 1997: 1 – 47).

The following table evaluates the NUDF (1997) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.10: Evaluating the National Urban Development Framework (1997)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✗	✗
Quote from the document indicating support (Only if supportive)	"..finding ways of addressing the housing challenge and substantially improving the environmental sustainability of urban South Africa given the unsustainable nature of current resource use trajectories"	"The urban areas are vital in efforts to curb the use of non-renewable resources, to reduce pollution and other forms of environmental degradation, and to promote climate mitigation and adaptation because most were poorly designed from an ecological perspective and have large environmental impacts"	"The discrete consideration of rural development as completely distinct from urban development is therefore no longer valid. A balanced approach to development addresses both ends of the continuum, rather than rural areas in isolation of urban"		

Source: Own creation from the NUDF of South Africa (1997: 1 – 47)

It is evident that the NUDF addresses the improvement of development in South Africa which includes sustainable as well as rural development. There is however not much attention given to the development of green spaces in urbanized areas.

4.3.5   Rural Development Framework – RDF (1997)

The Rural Development Framework (RDF) describes how the government aims at achieving a rapid and sustained decrease in rural poverty through working directly with the people in rural areas. According to the RDF of SA (1997: 5) rural development requires (1) institutional development, (2) Infrastructure investment, (3) Improved employment and income opportunities, (4) Conservation of resources and (5) justice, security and equity.

The RDF addresses aspects such as how to involve rural people in decisions on development; how to increase economic growth and thus employment in rural areas; how to improve the quality of services in rural areas as well as affordable infrastructure; and how to ensure that there is social sustainability in rural areas (South Africa, 1997: 6).

The government is responsible for supporting rural people in their efforts of development. The RDF thus sets out to define this role of the government, not through prescribing a specific strategy but by showing where integrated planning and coordination is needed for resources to be used productively in rural areas (South Africa, 1997: 5 – 6).

The RDF in document is comprised of sections which discusses the building of the following: (1) local democracy and development, (2) local economic development and rural livelihoods, (3) rural infrastructure, (4) social sustainability, and (5) local capacity (South Africa, 1997: 1 – 90). The following table evaluates the RDF (1997) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.11: Evaluating the Rural Development Framework (1997)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✗	✗
Quote from the document indicating support (Only if supportive)	"..secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"	"A wide range of possible environmental impacts must be taken into account. Environmental management should not be restricted to conservation of natural resources, the preservation of ecosystems, the maintenance of biological diversity"	"This document is written from the perspective that rural development is the business of everyone in rural areas. It is the business of rural people, and they must set the agenda. It is government's role to support rural people in their development efforts"		

Source: Own creation from the RDF of South Africa (1997: 1 – 90)

The RDF's main focus is on rural development while it is evident from the table above that it definitely includes the planning and conservation of the natural environment and achieving sustainability. There is however no awareness of the environmental benefits as well as no inclusion of the planning and development of green spaces.

4.3.6   White Paper on environmental management policy for South Africa (1998)

This White Paper is the government's national policy on environmental management which sets out the government's vision, principles and strategic goals which will be used for environmental management in South Africa (South Africa, 1998: 9).

The purpose of the policy is to inform the public what the government's objectives are and how it is intended to be achieved. The policy thus also aims at informing and guiding government agencies with their objectives and strategies of achieving these objectives. This policy strives to create a South Africa where everyone has sufficient food, clean water and air, homes and green spaces in their neighbourhoods which enables them to live in cultural, spiritual and physical harmony with their natural surroundings (South Africa, 1998: 9 - 10).

The people's environmental health and well-being are thus being promoted by addressing the following: (1) the quality of life and living environments; (2) access to land and natural resources; (3) integration of economic, social and environmental development; (4) efficient energy source usage; (5) interaction between sustainable development and the population; (6) sustainable use of social, cultural and natural resources; and (7) public participation in environmental governance (South Africa, 1998: 13).

The following table evaluates the White Paper on environmental management policy for SA (1998) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.12: Evaluating the White Paper on environmental management policy for SA

(1998)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✓	✓
Quote from the document indicating support (Only if supportive)	"The vision projects an integrated and holistic management system for the environment aimed at achieving sustainable development now and in the future"	"This is the government's national policy on environmental management"	"..regional planning and development, soil conservation, tourism, trade and urban and rural development. The implications of these powers are addressed later in this section"	"There should be equitable access to environmental resources, benefits and services to meet basic needs and ensure human well-being"	"..decent homes and green spaces in their neighbourhoods enabling them to live in spiritual, cultural and physical harmony with their natural surroundings"

Source: Own creation from the White Paper on environmental management policy for SA

(1998: 1 – 88)

It is evident from the table above, this policy is environmental centred and focusses on achieving sustainability. Although this policy is aware of and mentions rural development, ecosystem services and green spaces, it doesn't discuss it in more depth and detail; in fact these three concepts are just mentioned once.

4.3.7   White Paper on local government (1998)

According to this policy, local government plays a critical role in rebuilding local communities and environments which serve as the basis for an integrated, democratic, prosperous and non-racial society (South Africa, 1998: 6). Local government can be seen as the government-sphere that interacts closely with communities and takes responsibility for the services and infrastructure which are so essential to the people's well-being and ensures the development and growth of communities (South Africa, 1998: 7).

The aim of this White Paper is thus to establish the basis for a new developmental local government system committed to working with citizens and communities in creating sustainable human settlements which will provide a good quality of life while meeting the economic, social and material needs of communities (South Africa, 1998: 8).

The following table evaluates the White Paper on local government (1998) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.13: Evaluating the White Paper on local government (1998)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✗	✗
Quote from the document indicating support (Only if supportive)	"They assist municipalities to focus on the environmental sustainability of their delivery and development strategies. Sustainable development is development that delivers basic social and economic services to all"	"Building an awareness of environmental issues and how the behaviour of residents impacts on the local environment, and encouraging citizens to utilise scarce natural resources in a prudent, careful manner"	"One option to ensure dedicated attention to rural development matters is to establish a rural committee of Council, which would operate as a rural chamber for the municipality"		

Source: Own creation from the White Paper on local government of SA (1998: 1 – 120)

It is evident from the table that this White Paper with its focus on local government addresses some aspects in planning for the environment while it also strive for sustainable development. There is however no intense focus on rural development in this policy, but it is mentioned once while there is no mentioning of ecosystem services or green spaces.

4.3.8 White Paper on spatial planning and land use management (2001)

According to this White Paper the economic, social and environmental future of South Africa depends on the wise use of the land resources. This policy's principles and norms are to achieve sustainability, efficiency, equality, justice and good governance in spatial planning and land use management (South Africa, 2001: 1).

The needs that this policy aims at satisfying are the following: (1) Policies that result in the best usage and sustainable management of land; (2) Improved and strengthened planning-, management- and evaluation-processes; (3) Strengthened institutions and coordinated instruments; and (4) to create mechanisms that will facilitate satisfaction of the needs of communities and people at local level (Ministry of Agriculture and Land Affairs, 2001: 2).

This policy in document is comprised of the following sections: Points of Departure and background; Principles and norms for land use and management; Local spatial planning, land use management and land development; and the integration and alignment of the roles and responsibilities of the different spheres of government (South Africa, 2001: 1 - 25).

The following table evaluates the White Paper on spatial planning and land use management (2001) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.14: Evaluating the White Paper on spatial planning and land use management (2001)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✗	✗
Quote from the document indicating support (Only if supportive)	"The inclusion of the spatial development framework, with a direct legal link to the land use management scheme, is an essential step towards integrated and coordinated planning for sustainable and equitable growth and development"	"..that development and developmental programmes are holistic and comprehensive so that all factors in relation to land resources and environmental conservation are addressed and included"	"In a rural context it will be necessary also to deal specifically with natural resource management issues, land rights and tenure arrangements, land capability, subdivision and consolidation of farms and the protection of prime agricultural land"		

Source: Own creation from the White Paper on spatial planning and land use management of SA (2001: 1 – 25)

This White Paper's main focus is on the management of land uses which thus includes taking environmental aspects and sustainable development into consideration. This is however not done in detail to include environmental benefits and planning of green spaces.

4.3.9   Spatial Land Use and Management Act (2013)

The Spatial Land Use and Management Act (SPLUMA) was created to provide a framework for land use management and spatial planning in South Africa, thus specifying the relationship between the land use management system and spatial planning (South Africa, 2013: 2).

The SPLUMA provides a framework to achieve efficient and equitable spatial planning at the different governmental spheres as well as the coordination and review thereof (South Africa, 2013: 2). Addressing past regulatory and spatial imbalances is also taken into consideration by the SPLUMA. The SPLUMA has a focus on achieving the following aims: (1) A uniform, comprehensive and effective system of land use management and spatial planning; (2) Promotion of social and economic inclusion in the land use management and spatial planning system; (3) Provision of development principles, norms and standards; (4) Sustainable use of land; and (5) Cooperative intergovernmental relations amongst the different governmental spheres (South Africa, 2013: 14).

This act in document is comprised of the following sections: Development principles; norms and standards; Intergovernmental support; Spatial Development Frameworks; Land use management; Land development management; and General provisions (South Africa, 2013: 1-74).

The following table evaluates the SPLUMA (2013) which regard to core concepts applicable to green space planning, as derived from the theoretical investigation, in order to determine whether this policy is supportive of these specific planning concepts.

Table 4.15: Evaluating the Spatial Land Use and Management Act (2013)

	Sustainable development	Environmental centred	Rural Development	Environmental benefits for people	Focus on green spaces intentionally
Supportive of the specific concept?	✓	✓	✓	✗	✓
Quote from the document indicating support (Only if supportive)	"..to have the right of access to adequate housing which includes an equitable spatial pattern and sustainable human settlements"	"..to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures"	"Include previously disadvantaged areas, areas under traditional leadership, rural areas, informal settlements, slums and land holdings of state-owned enterprises and government agencies and address their inclusion and integration into the spatial, economic, social and environmental objectives of the relevant sphere"		"The land required for parks or open space must be provided within the land area to which the development application refers or may be provided elsewhere within the municipal area, at the discretion of the municipality"

Source: Own creation from Spatial Land Use and Management Act of SA (2013: 1 – 74)

The SPLUMA does include a focus on the environment and thus environmental land uses to enhance sustainability. The planning for green spaces is also included as an important aspect in this act, however, this act fails to address the last concept in detail and thus taking no note of the importance which the planning of green spaces provide in terms of environmental benefits.

4.4   Conclusion

It is evident from the previous two sections (Section 4.2 and 4.3) that the inclusion of certain concepts (in this case the inclusion of concepts directed to environmental planning) is dependent on the specific policy or legislation's focus, function and objectives. The following table includes all the policies and legislation discussed in this chapter and an evaluation of their support for the planning, provision and protection of green spaces that provide environmental benefits specifically in rural areas.

Table 4.16: Policy and legislation matrix

Evaluation colour:	Level of support for green spaces that provide environmental benefits specifically in rural areas:					
1	Weak					
2	Medium					
3	Strong					

Policy/ Legislation	Sustainable development	Environ centred	Rural Development	Environ benefits for people	Focus on green spaces	Evaluation
International policy and legislation						
Habitat Agenda (1996)	✓	✓	✓	✗	✓	2
Agenda 21 (1992)	✓	✓	✓	✓	✗	2
Local Agenda 21 (1996)	✓	✓	✓	✓	✓	3
Convention on Biological diversity (1992)	✓	✓	✗	✗	✗	1
Planning for open space, sport and recreation Act (2006)	✓	✓	✓	✓	✓	3
The Millennium Declaration (2000)	✓	✓	✗	✗	✗	1

National policy and legislation						
The Constitution of South Africa (1996)	✓	✓	✗	✗	✗	1
National Spatial Development Perspective - NSDP (2006)	✓	✓	✓	✓	✗	2
National Environmental Management Act 107 – NEMA (1998)	✓	✓	✗	✓	✗	2
National Urban Development Framework – NUDF (1997)	✓	✓	✓	✗	✗	1
Rural Development Framework – RDF (1997)	✓	✓	✓	✗	✗	2
White Paper on environmental management policy for South Africa (1998)	✓	✓	✓	✓	✓	3
White Paper on local government (1998)	✓	✓	✓	✗	✗	2
White Paper on spatial planning and land use management (2001)	✓	✓	✓	✗	✗	2
Spatial Land Use and Management Act – SPLUMA (2013)	✓	✓	✓	✗	✓	2

Source: Own creation (2014)

It is evident from Table 4.15 that all the policies and legislation include a section or paragraph on environmental planning and achieving or improving sustainability. Most of the policies and legislation address these concepts in terms of urban and rural areas. It is however clear that a gap exists in terms of the reason for the inclusion of environmental planning and sustainable development. Most policies include these concepts with a knowledge that conservation of the natural environment is important and that it is beneficial for nature to conserve it, but there is not much awareness of the fact that conserving the natural environment is beneficial to the local communities as well. Although environmental planning and green spaces are acknowledged in most of these policies and legislation, the successful implementation thereof remains questioned.

Legislation in broad supports the integration of the environment through the use of green spaces with urban and rural areas.

SECTION B: EMPIRICAL INVESTIGATION

Chapter 5: International green planning approaches
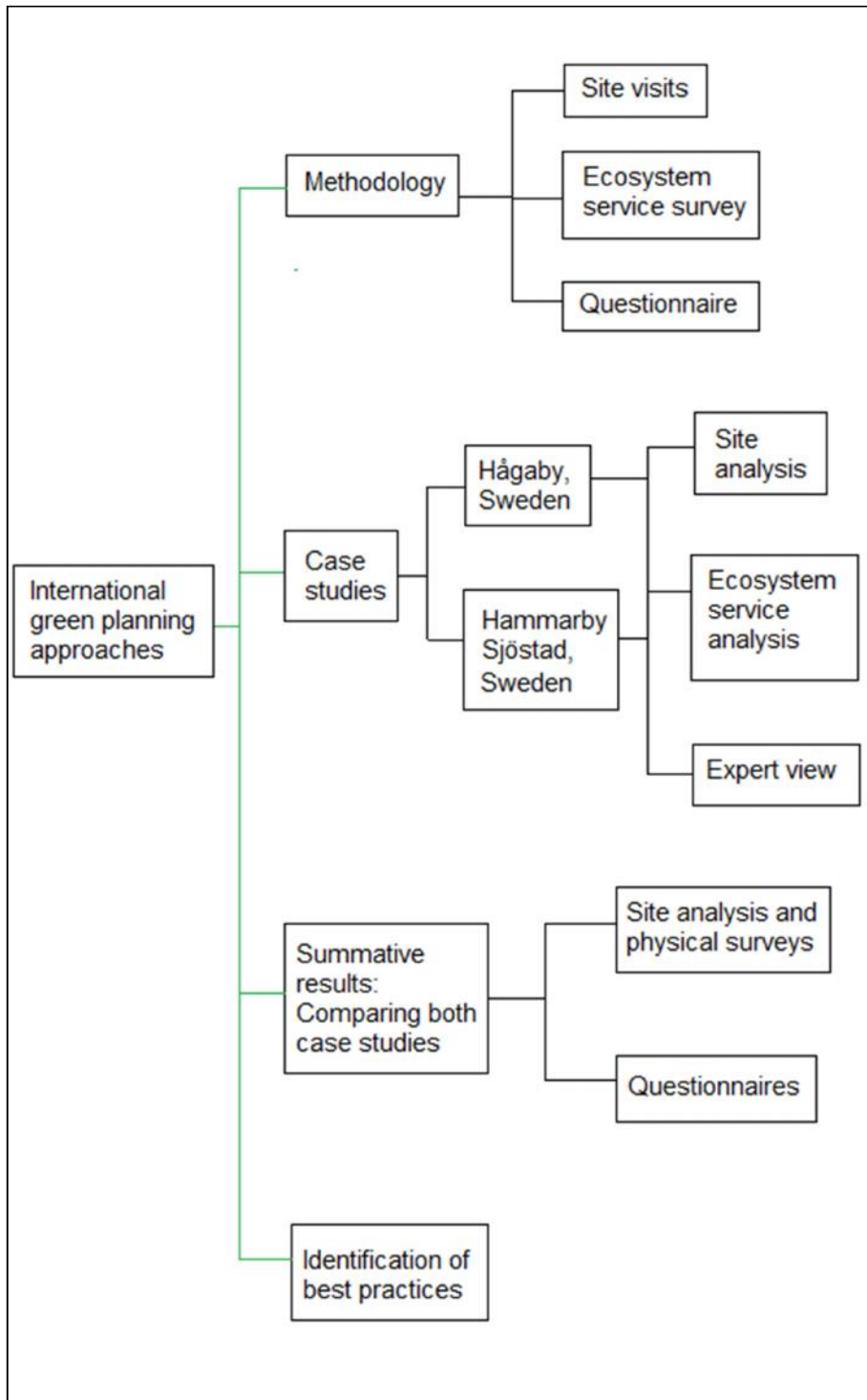
Figure 5.1: Structure of Chapter 5

Source: Own creation (2014)

The previous section captured the literature study of the research conducted and Chapter 5 starts with the empirical investigation of the research. This Chapter introduces Sweden as the international case study and discusses the methods used to analyse the international case study. A discussion of the results found during the site visits, ecosystem service survey and structured questionnaires follows. After comparing different case studies in Sweden, best practices were identified which may play a significant role if applied to the local context in South Africa.

5.1 Introduction

As mentioned in Chapter 1.2. (Problem statement) South Africa does not appear to be as evolved in integrating urban and rural areas and ecology as is the case internationally (Schäffler & Swilling, 2013: 1). It is thus important for South African Planners to consider the countries which are indeed more evolved and successful in this regard. Following a best practices approach will enable local planners to consider strengths and opportunities of an integrated planning approach, while seeking ways to adopt international approaches to fit the local context and challenges.

The international approaches evaluated in this research were based on identified case studies in Sweden which will be provided and discussed in section 5.2. The aim was to identify, review and evaluate the spatial planning and green planning approaches which Sweden uses in order to evaluate the spatial and environmental benefits thereof and possibilities for inclusion in local context.

According to Nelson (2006: 4) planning in Sweden is done from a framework that respects the need to preserve the natural environment. Nelson (2006: 1) also states that the city of Stockholm, which is the capital city of Sweden, is creating policies and using planning in such a way to develop a more sustainable society. He also describes planning in the context of Stockholm as the act of formulating strategies to improve the people's quality of life and the quality of the natural environment.

Due to Stockholm's planning success it became the first urban area to be selected for the European Green Capital 2010 award for leading the way towards environmentally friendly urban living which was awarded by the EU Commission (Stockholms Stad, 2013). It is thus clear that the areas in and around Stockholm are suitable areas to serve as international case studies to review, evaluate and compare in order to contribute to identifying applicable approaches to use in South Africa.

5.2   Methodology and research design

Two areas in Stockholm were chosen as case studies for the international case study research. The selected studies consisted of the following:

- Eco-village named Hågaby situated approximately 70 kilometres from Uppsala
- Eco-city named Hammarby Sjöstad situated on the outskirts of Stockholm

The following map indicates the geographical position of the broader area in Sweden in which the two different case studies are situated.
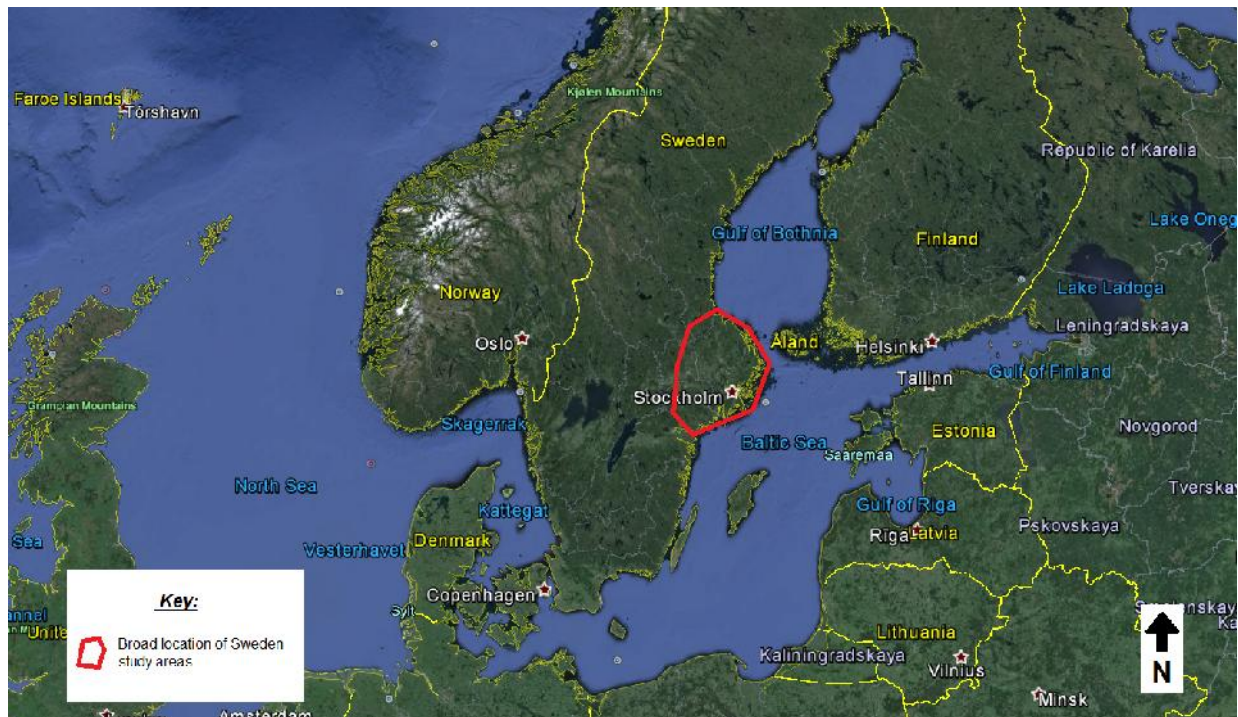
Figure 5.2: Map of Sweden indicating the broad location of the four case studies

Source: Own creation (2014)

The following map is a closer view of the area in which the two case studies are situated displaying the geographical position of each case study.
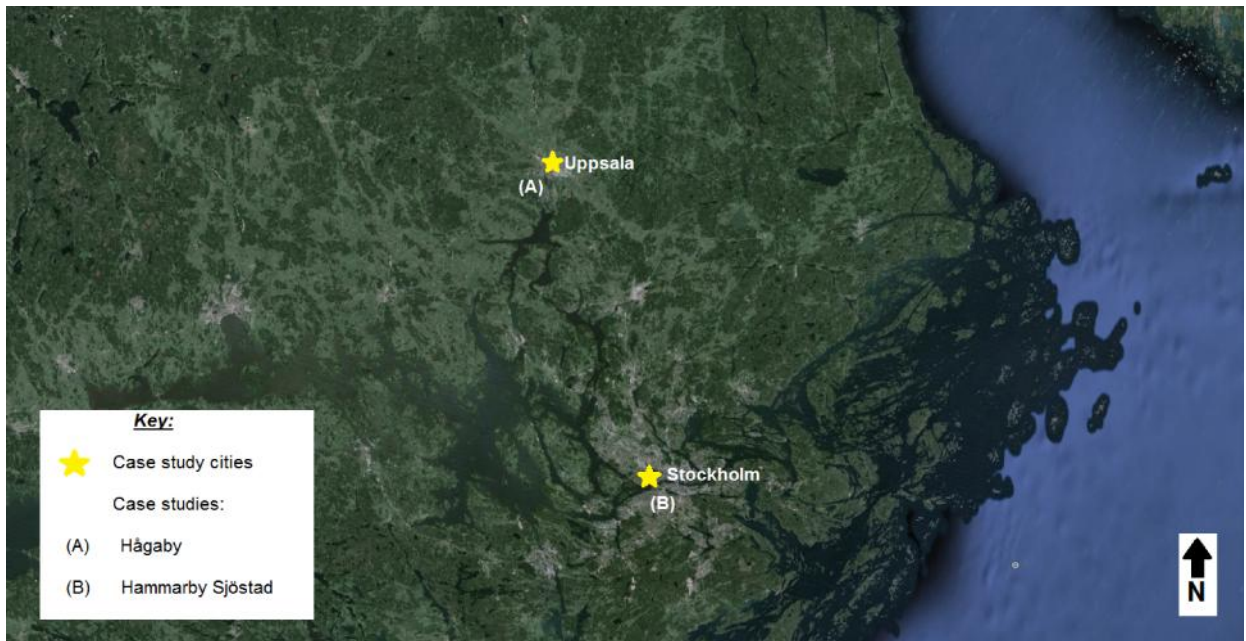
Figure 5.3: Map of Sweden indicating the geographical position of the case studies

Source: Own creation (2014)

Each of the above mentioned areas was firstly studied by means of physical surveys and site analysis and secondly through structured questionnaires provided to key informants and professionals, as explained accordingly.

5.2.1 Methodology and research design of the site visits and physical surveys

A variety of literature was reviewed and included in this section to contribute to the information provided. The two international case studies focussed on in this section, are Hågaby and Hammarby Sjöstad because both these case studies are macro scale case studies where the whole human settlement forms the case study and not only certain areas in the settlement. Another reason why these two case studies were chosen, is because one is an "eco-village" (rural area) while the other is an "eco-city" (urbanized area) and evaluating these two different types of areas separately provide diverse results, as well as planning approaches.

A site visit to each of the selected study areas in Sweden was undertaken by the researcher in order to experience the different areas and gain information on each of the area's approaches to planning. In each area a site analysis was conducted to determine the area's status quo. According to Lynch & Hack (1998) every area is to some degree a unique connected web of

activities which imposes limitations and offers a variety of possibilities. A site analysis thus gives planners the opportunity to experience these aspects of an area to its fullest potential.

The site analysis conducted on each of the two study areas was conducted by the researcher by means of a check-list approach, while observing the area. The check-list included the following main points (Refer to Annexure A for an example of the blank check-list document):

1) Macro environment
1.1)   Location
1.2)   Direct environment (Land uses around area)
1.3)   Movement networks in and around area
1.4)   Land uses in the area
2) Physical area
2.1)   Topography
2.2)   Plants
2.3)   Animals
2.4)   Flood lines
2.5)   Focus points in the area
3) Users of the area
3.1)   Target market
3.2)   Needs of the target market

Included with the site analysis, was an ecosystem service analysis as will be described in Section 5.2.2. The researcher visited Sweden from the 1st of June until the 15th of June during which the specific site visits (which included the ecosystem service analysis) and meetings with the key informants were conducted. The site visits, ecosystem service surveys and key informant meetings were done on the following dates as indicated in Table 5.1.

Table 5.1: Names of international case studies and researcher's dates of visit

Name of area:	Type of area:	Date of visit:	Visited by:
Hågaby	Eco-village (Rural area)	5 June 2014	L Cilliers (Researcher) Prof. SS Cilliers (Urban Ecologist) Prof. M. Ignatieva (Landscape Architect and coordinator of the visit)
Hammarby Sjöstad	Eco-city (Urban area)	9 & 11 June 2014	L Cilliers (Researcher) Prof. S Cilliers (Urban Ecologist)

Source: Own creation (2014)

5.2.2 Methodology and research design of ecosystem service survey

In order to determine the area's capability of providing ecosystem services (environmental benefits) to its residents, a further survey was conducted on the ecosystem services. This survey entailed the identification of ecosystem services present in the specific case study area in table format, indicating the category (refer to Chapter 2.3) of the ecosystem service and the provision thereof in the specific area.

The ecosystem service survey was conducted by the researcher and an Urban Ecologist from the North-West University. Accordingly the different ecosystem services identified in each case study were captured in terms of the four different categories as mentioned in Chapter 2.3, including:

- Provisioning services
- Regulating services
- Habitat or supporting services
- Cultural services

This revealed the area's status in terms of ecological aspects and indicated successful planning methods in providing ecosystem services.

5.2.3 Methodology and research design of questionnaires

In order to determine the international viewpoints and approaches to planning, it was important to identify a number of key informants to answer structured questions about each case study area. The term 'key informant' refers to a person that is used primarily as a source of information on a variety of topics (Tremblay. 1957: 688). According to Tremblay (1957: 691 – 692) key informants are important to contribute to the following: (1) Develop a definition of the dimensions involved, (2) discover the boundaries of the communities, (3) determine the most extreme, (4) increase knowledge of the problem.

It was important to identify key informants who have expert knowledge on the study areas and were in some way directly or indirectly involved in the planning and implementation of the study areas. The list of key informants is as follows:

Table 5.2: List of key informants for international case studies

Name of participant:	Designation:	Location of key informant:	Role played in green planning:
Prof. Per Berg	Main Planner	Hågaby (Eco-village)	Planner and Project leader in Hågaby as well as the communicator of this project.
Mr. Björn Cederquist	Architect	Hammarby Sjöstad (Eco-city)	Planner and Project leader from the City of Stockholm Municipality.

Source: Own creation (2014)

The method that was chosen to direct the questions to the key informant was through the use of structured questionnaires, considering the time and location constrains. The questionnaires were distributed personally or via email, depending on the location and availability of the key informants.

The questions asked in the questionnaire consisted mainly of closed questions followed by a few open questions. The reason for the closed questions was to be able to structure the key informants' answers to the questions in a comparative table. The reason for the comparison between the case studies is to create a general conclusion of Sweden's approach to green planning formulated from the different areas in Sweden with significant green planning. The few open questions focussed on ecosystem services and were asked in order to gain an

understanding of the key informants' perception of the study area in terms of the ecological aspects.

(Refer to Annexure B for an example of the questionnaire document)

The results derived from the site analysis and structured questionnaires are displayed in the following sections (sections 5.3 – 5.5) discussing each of the international case studies.

5.3   International case study 1: Hågaby

5.3.1   Site analysis Hågaby

A guided tour of Hågaby was arranged by Prof. Per Berg, the Main Planner, Communicator and also a current resident of this eco-village.

Hågaby is built according to the UN Habitat Agenda (1996) focussing on finding solutions for the seven main resource categories. As described by Berg & Ignatieva (2011: 1) the seven resources for resilient citylands such as Hågaby are (1) Physical resources; (2) Economic resources; (3) Biological resources; (4) Organizational resources; (5) Social resources; (6) Cultural resources and (7) Aesthetic resources. Hågaby is thus built with a specific focus on finding solutions or reactions to meeting these resources in the best possible way.

Hågaby is a small rural village situated on the outskirts of Uppsala City, Sweden. According to Berg & Ignatieva (2011: 12) Hågaby can be regarded as a resilient cityland which can be defined as a resistant, flexible human settlement integrated with green structures in a range of scales and can prevail over foreseeable generations. The direct environment around Hågaby consists mainly of natural green areas which includes a nature reserve. Agricultural land-uses are situated around Hågaby and include many stand-alone farm houses and farm grounds (Refer to Figure 5.4).

Figure 5.4: The natural green areas surrounding Hågaby

Source: Own images (5 June 2014)

An access road (portrayed in yellow in Figure 5.5 below) from Uppsala to Hågaby exists on the north-eastern side of Hågaby which the residents use when going to Uppsala City as there are residents in Hågaby who work in Uppsala. A bus network system is also situated on this access road which makes travelling between the urban area and this eco-village very accessible as a bus leaves from Hågaby every 20 minutes in the week.

Figure 5.5 below indicates the location of Hågaby in terms of its surroundings. Accessibility from Uppsala City situated approximately 5 kilometres from this eco-village is visible from the Figure.
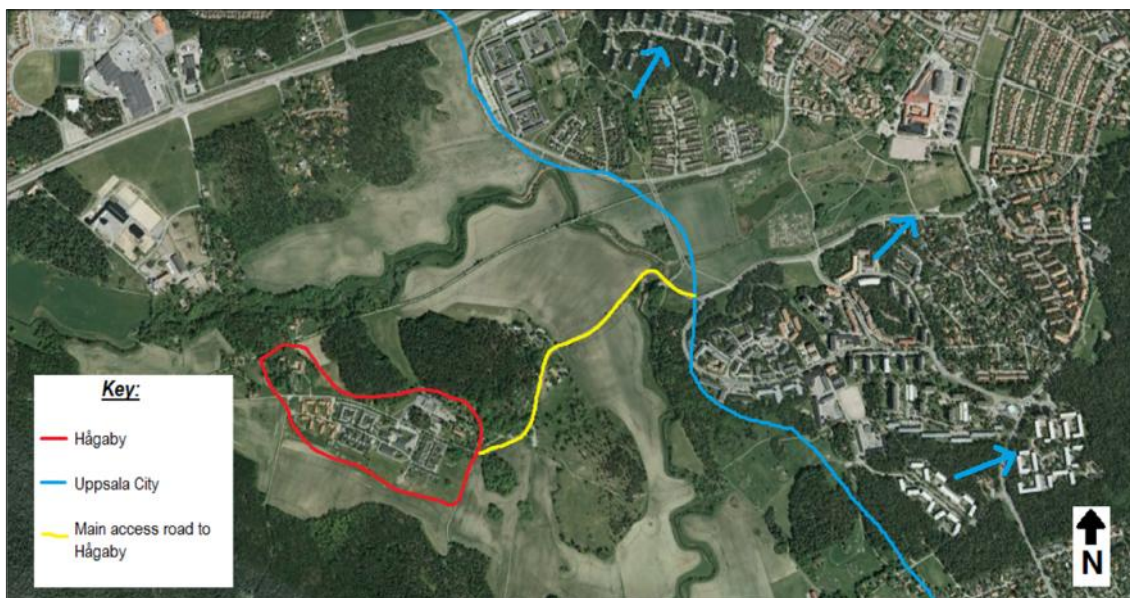
Figure 5.5: Location of Hågaby in terms of its surroundings

Source: Own creation (2014)

85

The internal roads of this eco-village developed with a focus on pedestrians and cyclists as illustrated in Figure 5.6 (Berg, 2014). Bicycles are the main means of transport in Hågaby with a total of 450 bicycles and 6 electric bicycles in the whole village (Berg & Ignatieva, 2011: 3).

Figure 5.6: Pedestrian and cyclist-friendly roads in Hågaby

Source: Own images (5 June 2014)

Figure 5.7 below is a detailed layout plan of Hågaby which indicates all the internal roads, housing and other land-uses.
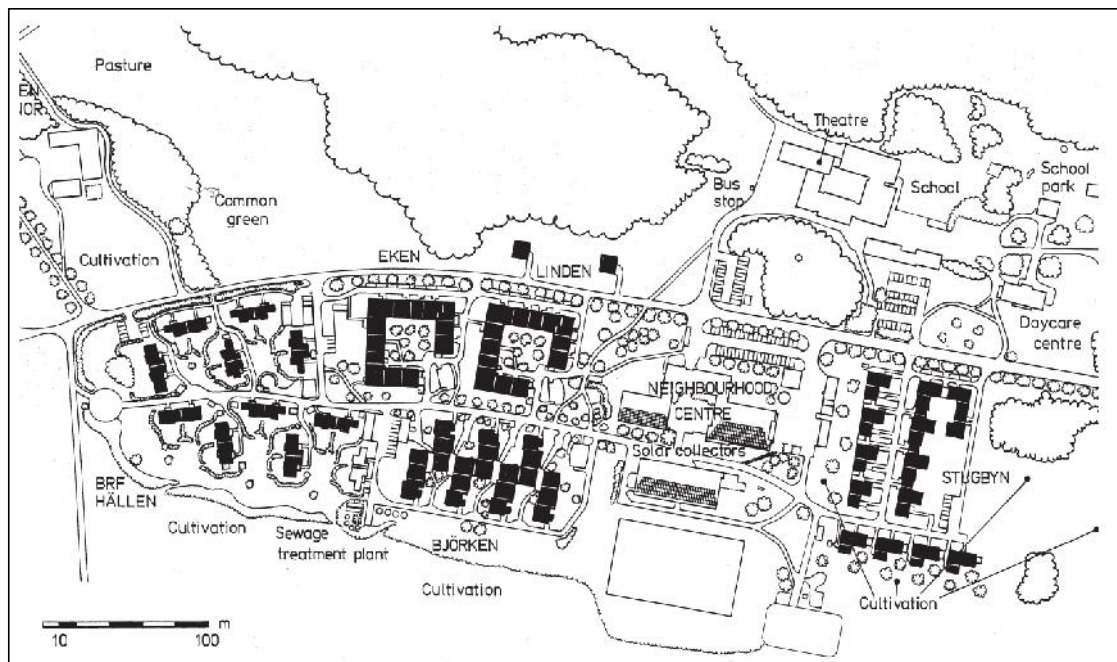
Figure 5.7: Detailed layout plan of Hågaby

Source: Berg (2004: 26)

The residential homes in Hågaby are mostly zoned as residential 2 houses as each built house is divided into two units for two families to live in (refer to Figure 5.8). Every unit has its own garden as well. Other land-uses in Hågaby include the following:

- Educational = Hågaby has its own pre-school (day care centre) and primary school which makes the village an attraction for families with young children.

Figure 5.8: Residential houses in Hågaby (left); playground at the day care centre indicating how young children play in the natural environment (right)

Source: Source: Own images (5 June 2014)

- Business = A community centre is situated in the middle of the village with the centre's main focus on the small village shop which provides food and other primary needs to the residents. The neighbourhood centre also gives the opportunity for other businesses to be established (refer to Figure 5.9).

Figure 5.9: Entrance to the community centre (left); One of the aisles in the community shop with vegetables produced from farms situated around Hågaby (right)

Source: Own images (5 June 2014)

- Social & Recreational = The community centre has a social hall where families can get together to socialize especially in the evenings. Other recreational areas in and around Hågaby consist of small parks for children, public community gardens available for a number of families to use, open sport-areas around the school and the historic Linnae hiking trail around Hågaby which was initiated many years ago by the famous historic botanist and taxonomist, Carl Linnae himself (refer to Figures 5.10 & 5.11).

Figure 5.10: The social hall in the community centre (left); A typical playground in Hågaby (right)

Source: Own images (5 June 2014)

Figure 5.11: Part of the community garden which serves a number of families (left); Starting point of the Linnae hiking trail with a map and information of the trail (right)

Source: Own images (5 June 2014)

The focus point in Hågaby is the community centre which forms the social hub of the village and has also attracted a number of tourists because of a small stage situated inside the community centre which has been used by a number of local and international music artists. In the middle

of the community centre is a statue of children holding hands which implies a 'strong community' as illustrated in Figure 5.12. This statue forms the focus point in the community centre. When considering the physical, natural area of Hågaby, it is evident that the topography is mostly level with a few small hills around the village and on the Linnae hiking trail.

Figure 5.12: The statue that serves as focus point in the middle of the community centre (left); Natural lawns between residential homes which serve as habitats for small wildlife (right)

Source: Own images (5 June 2014)

The vegetation type in this region consists mostly of natural woods, but the area bordering Hågaby on the southern side has turned into graze lands for livestock such as sheep. The vegetation inside of Hågaby are all left as natural lawns with mostly natural indigenous plants thriving in the village, except for the community gardens where a variety of vegetables and herbs are planted which are not necessarily indigenous (refer to Figure 5.12).

This eco-village is thriving with birdlife and this specific area is also a butterfly 'hotspot' where many butterfly experts and scientists visit to do research (Berg, 2014). The Linnae hiking trail is a popular location to experience Hågaby's butterflies. Small animals such as deer also make regular visits inside the village.

The biggest target market of this eco-village is young families with children but attracts any person from any background or class (Berg, 2014). A good distribution of different classes exists in Hågaby and this village is a good example of how an integration of different classes is possible. The main needs of the target market that gets addressed in Hågaby are the needs for sustainable living, being part of a strong community, peacefulness and non-expensive living in terms of resources. Hågaby developed mainly according to what the people's needs were and had no other specific reason for development which made it a huge success with the specific

current residents. The following table summarises the above mentioned information conducted during the site analysis of Hågaby.

Table 5.3: Summative site analysis of Hågaby

Key points in analysis:	Conducted information:
Macro environment	
Location	Outskirts of Uppsala City, Sweden
Direct environment (Land uses around area)	- Nature reserve - Stand-alone farmhouses - Farm grounds - Natural forests
Movement networks in and around area	External: Access roads from Uppsala Internal: Footpaths; bicycle paths; light motor vehicle roads
Land uses in the area	- Residential - Educational - Business - Social - Recreational
Physical area	
Topography	Level (with small hills around village)
Plants	Mostly natural indigenous plants Vegetation type: Woodlands
Animals	- Birds (high) - Insects (high) - Deer (low) - Small mammals – Squirrels etc. (medium)
Focus points in the area	- Community centre - Statue of children
Users of the area	
Target market	Mostly young families with children
Needs of the target market	- Sustainable living - Strong community - Peacefulness - Natural resources

Source: Own creation from physical survey (2014)

The solutions or reactions to the previously mentioned seven resources for resilient citylands can be called 'generators' (Berg, 2014). Hågaby was thus developed with a focus on including a variety of 'generators' (Berg, 2014), for example the community centre's social hall and the community gardens which serve as 'social generators', the shop in the community centre that serves as an 'organizational generator' and the hiking trail and natural lawns which serve as 'biological generators'. These are just a few examples of the many 'generators' that were developed in Hågaby in order to address the specific needs. The question that exists in one's mind is whether this approach is applicable in South Africa. Could this be the approach that South Africans have waited for all along in order address the society's needs in rural areas while making good use of the natural environment and conserving it in the process? This will be discussed in Chapter 7 of this research.

5.3.2 Ecosystem service analysis Hågaby

An ecosystem service survey conducted by identifying different types of ecosystem services in the specific case study can be a clear indication of the environment's status quo. The key findings that were reached during this survey are displayed in the table below. The following table indicates the different ecosystem services divided in the specific ecosystem categories (refer to Chapter 2.3) that were identified through observations by the researcher during the physical surveys in Hågaby.

Table 5.4: Ecosystem services in Hågaby

Provisioning services	Regulating services	Habitat or Supporting services	Cultural services
Provision of food from gardens. There exist four local scales of food production in this eco-village: 1) Kitchen gardens 2) Larger garden plots 3) Community gardens (one serves 10 families) 4) Local shop provides from local area (farms around Hågaby) There are 2% of local produce in Uppsala and 15% of local produce in Hågaby	Air quality regulation in Hågaby through the presence of a lot of trees as the area is mainly woodlands. There are also a few homes with green roofs which contribute to keeping the area's natural climate conditions by preventing to create a heat island around the village (refer to Figure 5.13).	The whole eco-village is conserved as a natural habitat for natural plant species throughout the village and thus attracts indigenous insects, birds and small animals to also live in Hågaby and not only the people.	Recreational activities can be done in Hågaby which contributes to the people's mental and physical health. Examples of these recreational activities are the parks, the hiking trail, community gardens and the people's individual gardens.

Provision of natural medicinal resources also from local gardens in Hågaby	Maintenance of soil fertility is kept through the presence of all the natural vegetation in the village itself.		The uniqueness of the village attracts a lot of tourists and a small museum explaining this eco-village and its history is created inside the community centre. Tourism is a big contribution to cultural services and advertises the idea of ecological friendly human settlements.
	Small hills were created around the village over many years as the ground was dug out and piled on heaps on the outskirts of the village when the homes were built. These hills now serve as a windshield that lifts the wind over the settlement (refer to Figure 5.13).		Aesthetic appreciation and inspiration as a cultural service is also promoted in Hågaby through the rich history that one notices in the design of the village as well as the museum and Linnae hiking trail.

Source: Own creation from physical survey (2014)

It is evident from the table that the natural environment is mostly maintained and conserved with as little disturbance from the humans as possible. The regulating services and cultural services are the two categories that appear the most in Hågaby, thus proving how dependent the residents are on the unchanged natural environment. The following figure indicates some of the ecosystem services mentioned in Table 5.4 above.

Figure 5.13: A house with a green roof in the village (left); The hill that was created around the village to guide wind over the settlement (right)

Source: Own images (5 June 2014)

5.3.3   Expert view Hågaby: Questionnaires

The results derived from the questionnaires as discussed in section 5.2.2 are presented in the following table. The results derived from the questionnaire are important as it presents the expert view and the opinions of the experts with regards to the area's structure and approaches to green planning and that the physical survey results of Hågaby (Section 5.3.1) should also be kept in mind while examining the questionnaire results. Table 5.5 captures the different questions from the questionnaire with Hågaby's key informant, Per Berg (refer to Table 5.1).

Refer to Annexure C1 for the actual structured questionnaire.

Table 5.5: Questionnaire results with regards to green planning in Hågaby

	Main points from questionnaire:	Information conducted from key informant:
1.	Area's success in terms of green infrastructure.	Good energy and waste water management
2.	Green planning supported by legislation.	Yes
3.	Key role players.	Urban Planners, Ecologists, Public community
4.	Motivation for existence.	Seeking sustainability and restoring the community
5.	Spatial relevance to location.	Interface between urban and rural – provides great location for eco-villages
6.	Factors ensuring success.	Recirculation of decisions between experts and public
7.	Financial investment in project.	Medium to High finances needed
8.	Familiar with the term, Ecosystem Services.	Yes
9.	Have a focus on Ecosystem Services.	Yes

Source: Own creation from structured questionnaires (2014)

5.4   International case study 2: Hammarby Sjöstad

5.4.1   Site analysis Hammarby Sjöstad

Hammarby Sjöstad which in English is translated as 'Hammarby Sea city' is an eco-city (Fränne, 2007: 1). Different from the eco-village concept like Hågaby, an eco-city is an urbanized environment where people can live healthier and economically productive lives while the environment is conserved and planned for (Virginia Tech, 2014). It is important that an urban area with such an ecological focus is reviewed in this study, in order to understand ecological planning approaches that have been followed in Sweden, regardless of what type of area (rural or urbanized).

Hammarby Sjöstad was built with a focus on integrating environmental goals (Fränne, 2007: 8). These environmental goals for Hammarby Sjöstad were developed by the City of Stockholm and are the following:

- Land usage: The reuse, redevelopment and transformation of the old brownfield sites into residential areas which are attractive and include beautiful parks and green public spaces.
- Transportation: Public transport which is attractive and fast and is combined with beautiful pedestrian-and cycle paths in order to reduce the usage of private cars.
- Building materials: The use of building materials that is environmentally friendly, healthy and dry.
- Energy: Provision of renewable fuels and biogas products as well as the reuse of waste heat coupled with the efficient consumption of energy in buildings.
- Water and sewage: The usage of a process that is as clean and efficient as possible through the aid of new technology for the saving of water and sewage treatment.
- Waste: The use of practical systems which thoroughly sorts the waste in order to maximise the recycling of material and energy as much as possible.
  (Fränne, 2007: 8)

Hammarby Sjöstad became one of the world's highest profile examples of Sustainable City Development and is visited by 10 000 decision makers every year. From the starting phases of the development of this eco-city, planning work has been integrated with environmental goals (Fränne, 2007: 1). This urban area was however not always known as an eco-city; in fact it was the exact opposite. The southern bank of Hammarby Sjö (Hammarby Sea) was an industrial brownfield which was then transformed into a shantytown because of the demand for new housing in the area. In 1998 however, the shantytown was demolished and the polluted soil of the whole area was decontaminated. The ecological development project started in Hammarby Sjöstad when it was envisaged to be the Olympic village for the 2004 Summer Olympics whereof Stockholm was a candidate host city for this event. Stockholm however was not selected as the host city of the 2004 Summer Olympics, but because the basis for an ecological development in Hammarby Sjöstad was then already established, the municipality of Stockholm decided to proceed with the project anyway (Fränne, 2007: 6-7).

Hammarby Sjöstad is situated on the banks of Hammarby Sjö (Hammarby Sea) on the outskirts of Söndermalm-district in Stockholm. The direct environment around Hammarby Sjöstad thus consists mainly of the Stockholm urban developments. The Sickla Canal, Hammarby Sea and Nacka Nature reserve are all direct environments of this eco-city which all play a significant role in this settlement and are also integrated with this eco-city as all these environments run through Hammarby Sjöstad. Major regional access roads give access to this eco-city from the greater Stockholm urban areas. Integrated in these access roads are light railway tracks and

bus routes in order to give easy access to visitors as this eco-city became a big tourist attraction over the years (refer to Figure 5.14).

Figure 5.14: Light rail and bus routes with a small station for the light rail train in Hammarby Sjöstad (left); A typical bus-stop in Hammarby Sjöstad (right)

Source: Own images (9 June 2014)

Figure 5.15 below indicates the location of Hammarby Sjöstad in terms of its surroundings. It is evident from the Figure that Hammarby Sjöstad is accessible from all the surrounding areas and forms part of Stockholm City.

Figure 5.15: Location of Hammarby Sjöstad in terms of its surroundings

Source: Google Earth (2014)

The internal movement networks of Hammarby Sjöstad were planned and developed with a focus on discouraging personal vehicle usage in order to reduce the gas emissions (Fränne, 2007: 11). The internal roads therefore consist of mainly pedestrian-, bicycle- and public transport routes as illustrated in Figure 5.16. A ferry commutes from Hammarby Sjöstad to other areas of Stockholm on a daily basis.

Figure 5.16: Pedestrian and cyclist friendly roads in Hammerby Sjöstad

Source: Own images (9 June 2014)

The residential homes in Hammarby Sjöstad are mainly residential 2, 3 and 4 as the focus was to develop a compact human settlement (refert to Figure 5.17). Other land-uses in Hammarby Sjöstad are the following:

- Business and Commercial = Two main streets attract small businesses to establish their offices in Hammarby Sjöstad as it is a peaceful, accessible area. A lot of shops and restaurants were also established especially next to the sea and lake.

Figure 5.17: Typical residential buildings in Hammarby Sjöstad

Source: Own images (9 June 2014)

- Industrial = On the southern edge of the settlement, a small industrial area with a few commercial land-uses amongst the industrial area are located.
- Educational = Hammarby Sjöstad has its own primary schools and a number of pre-schools and day care centres which makes it an attraction for young families with children.
- Recreational = A number of small playgrounds for children are distributed in this eco-city. A green-avenue exist between the residential buildings in the southern part of Hammarby Sjöstad which is mainly a connection of parks creating one long park along a small canal with a lot of trees, benches and footpaths (refer to Figure 5.18).

Figure 5.18: Different views of the green-avenue running between the residential buildings

Source: Own images (9 June 2014)

Hammarby Sjöstad has a central park which is integrated with the Nacka Nature reserve. This central park is a natural forest and includes hiking trails and small playgrounds for children as illustrated in Figure 5.19. Other recreational areas in Hammarby Sjöstad consist of community gardens in the courtyards of the residential buildings; walking trails along the sea and lake on boardwalks and hiking trails in the Nacka nature reserve.

Figure 5.19: The natural forest in the central park of this eco-city includes hiking trails (left); Playgrounds integrated with the forest (right)

Source: Source: Own images (9 June 2014)

A number of focus points could be identified in Hammarby Sjöstad which include the central park and the information centre made entirely of glass named GlasshusEtt (Glasshouse One) situated on the main road (refer to Figure 5.21). The rest of the settlement is built with the focus towards the Hammarby Sea and specifically the pedestrian jetty built in the sea accessible for pedestrians on the boardwalks (refer to Figure 5.20).

Figure 5.20: The boardwalks which create a hiking trail on the shoreline of the Hammarby Sea (left); The pedestrian jetty which serves as a focus point in this area (right)

Source: Own images (9 June 2014)

Figure 5.21: The information centre (GlasshusEtt) made entirely of glass which also serves as a focus point in the settlement

Source: Own image (11 June 2014)

When considering the physical, natural area of Hammarby Sjöstad, it is evident that the topography is mainly level with a slight decline towards the canals, lake and sea. This cares for effective storm water run-off towards the main water sources in the settlement. The natural forest in the central park consists of a few rocky hills which breaks the level topography of the settlement in the eastern area. The main vegetation type in this area as one can notice in the surrounding nature reserve is natural forests. The parks (such as the green-avenue) in Hammarby Sjöstad are left as natural lawns where some of the lawns are cut and some of the lawns are left to grow naturally. The central park in the settlement as mentioned before is a natural forest with a lot of tall trees, bushes and shrubs. Amongst the buildings a lot of man-made gardens exist with garden-flowers, vegetables and herbs which reduce the percentage of indigenous plants in the settlement. As mentioned before, the Nacka Nature reserve is situated directly next to the settlement and a part of the reserve is integrated into the settlement's central park (refer to Figure 5.22). This makes the settlement an area which also thrives with birdlife especially in the central park and next to the lake and sea. Small mammals such as squirrels and deer are also found in the central park.

Figure 5.22: An information board of the Nacka nature reserve which is situated in the central park informing visitors of the reserve (left); View of the nature reserve from the settlement (right)

Source: Own images (9 June 2014)

The only challenge that existed for the integration of the nature reserve and the central park however was the fact that a major regional road (highway) separates the settlement and the nature reserve (Fränne, 2007: 14). The plan which was made to address this problem was the development of two eco-ducts over the highway which connects the settlement's central park with the nature reserve. An eco-duct is an ecological bridge crossing a road with natural vegetation planted on the bridge and serves as a safe access for animals from one side of a busy road to the other side as illustrated in Figure 5.23 (Van Der Grift, 2014).

Figure 5.23: The eco-ducts over the highway which connect the Nacka nature reserve with the settlement's parks

Source: Own images (9 June 2014)

During the site analysis the observation could be made that this eco-city similar to the eco-village, Hågaby, attracts mostly young families with children as it is a small peaceful area with a lot of recreational space for small children to play, learn and grow.

Figure 5.24 below is the complete land-use map of Hammarby Sjöstad where it is evident how this eco-city was planned around the Hammarby Sea.

Figure 5.24: Land use map of Hammarby Sjöstad

Source: Fränne (2007: 33 – 34)

The following table summarises the above mentioned information conducted during the site analysis of Hammarby Sjöstad.

Table 5.6: Site analysis of Hammarby Sjöstad

Key points in analysis:	Conducted information:
Macro environment	
Location	Outskirts of Söndermalm-district in Stockholm City, Sweden
Direct environment (Land uses around area)	- Nature reserve - Natural water sources (Sea and canal) - Urban developments (built environment) - Natural forest
Movement networks in and around area	External: Regional access roads from the rest of Stockholm City Internal: Footpaths; bicycle paths; light motor vehicle roads; public transport (bus routes).
Land uses in the area	- Residential - Educational - Business - Commercial - Industrial - Recreational
Physical area	
Topography	Level (slight decline towards water bodies)
Plants	Mostly natural indigenous plants Vegetation type: Woodlands
Animals	- Birds (high) - Insects (high) - Deer (low) - Small mammals – Squirrels etc. (low)
Focus points in the area	- Information centre (GlasshusEtt) - Hammarby Sea with pedestrian jetty
Users of the area	
Target market	Mostly young families with children
Needs of the target market	- Sustainable living - Peacefulness - Natural resources - Recreational space

Source: Own creation from physical survey (2014)

5.4.2 Ecosystem service analysis Hammarby Sjöstad

An ecosystem service survey conducted by identifying different types of ecosystem services in the specific case study can be a clear indication of the environment's status quo. The key findings that were reached during this survey are displayed in the table below. The following table indicates the different ecosystem services divided in the specific ecosystem categories (refer to Chapter 2.3) that were identified through observations by the researcher during the physical surveys in Hammarby Sjöstad.

Table 5.7: Ecosystem services in Hammarby Sjöstad

Provisioning services	Regulating services	Habitat or Supporting services	Cultural services
Provision of food from gardens. There is a community garden situated in the centre of the eco-city which makes it within reach for all the residents of the settlements. There are also a number of Allotment gardens situated in the courtyards of the residential buildings (apartment blocks). Allotment gardens are gardens made available by the government for individuals like residents in residential 2, 3 or 4 apartments who are not able to have their own gardens in backyards (refer to Figure 5.25). These allotment gardens are mainly used for individual, non-commercial gardening and growing of vegetables, fruits and herbs for food.	Air quality regulation through the presence of a lot of green spaces (including the green-avenue, allotment gardens and natural forest central park) which includes a lot of trees to provide healthier air.	The natural forest in the central park serves as a great habitat for birds and small animals. The eco-ducts which connects the Nacka nature reserve with the settlement's central park contributes to the providing a safe habitat for nature.	Recreational activities can be done in Hammarby Sjöstad which contributes to the people's mental and physical health. Examples of these recreational activities are the parks, the hiking trails, community gardens and the boardwalk trails.
	Storm water in the settlement between the buildings is directed along small ditches towards the green spaces where it is then absorbed into the ground or runs into the small canal (refer to Figure 5.26). This small canal along the green-avenue in the settlement then directs the water into the Hammarby Sea and the lake (Fränne, 2007:24).	The canals running through the settlement serve as habitat for a variety of water birdlife which brings more of nature into the settlement itself (refer to Figure 5.27).	Hammarby Sjöstad attracts a lot of tourists as well as ecologists as it is known as a high profile sustainable urban development. Tourism is a big contribution to cultural services.
		Next to the shoreline of the Hammarby Sea is a protected reed park to serve as habitat for the birds. The boardwalks and pedestrian jetty along this reed park has a few educational boards informing the residents and tourists about the Swedish birds and different species existing in that area. This contributes to conserving their habitat (refer to Figure 5.27).	Aesthetic appreciation and inspiration as a cultural service is also promoted in Hammarby Sjöstad through the trails and benches in the parks. The parks in this eco-city are designed to promote the aesthetic appreciation of the nature and the surroundings.

Source: Own creation from physical survey (2014)

It is evident from the table above that unlike Hågaby, this case study's focus is more on how the natural environment can be changed and adapted to the human settlements in order to provide ecosystem services such as provisioning services and cultural services. Considering the number of habitat services, this case study however still takes the conservation of the natural

environment into consideration as well. The following figures indicate the ecosystem services located in Hammarby Sjöstad (refer to Table 5.7).

Figure 5.25: Aerial view of the allotment gardens situated in the courtyard of residential buildings (left); View from an allotment garden to the surrounding buildings (right)

Source: Own images (9 June 2014)

Figure 5.26: Ditches running through the residential areas which lead the storm water away (left); End-point of a ditch that opens up at the small canal in the green-avenue (right)

Source: Own images (9 June 2014)

Figure 5.27: Information board on birdlife situated on the boardwalk next to the shoreline (left); Canal running along the green-avenue inside the settlement serving as a habitat for Mallard ducks (right)

Source: Own images (9 June 2014)

With a deep focus on creating a sustainable settlement, Hammarby Sjöstad was able to find solutions in providing parks and green spaces which are integrated with the urban area. The approach of planning for a sustainable area enabled the implementation of various ecosystem services.

5.4.3   Expert view Hammarby Sjöstad: Questionnaires

The results derived from the questionnaires as discussed in section 5.2.2 are presented in the following table and figure. It is important to bear in mind that these results are only the opinions of the experts and only give a general idea of each area's structure and approaches to green planning and that the physical survey results of Hammarby Sjöstad (Section 5.4.1) should also be kept in mind while examining the questionnaire results. Table 5.8 captures the different questions from the questionnaire with Hammarby Sjöstad's key informant , Björn Cederquist (refer to Table 5.1).

Refer to Annexure C2 for the actual structured questionnaire.

Table 5.8: Questionnaire results with regard to green planning in Hammarby Sjöstad

	Main points from questionnaire:	Information conducted from key informant:
1.	Area's success in terms of green infrastructure.	Green corridors running through the whole area
2.	Green planning supported by legislation.	Yes
3.	Key role players.	Urban Planners, Environmentalists, Local Authority, Politicians
4.	Motivation for existence.	Restoration and reuse of low quality land; Need of new housing
5.	Spatial relevance to location.	Close to the inner urban area and next to the shore which makes it attractive and accessible
6.	Factors ensuring success.	Good location, design variations, effective land use and good economy
7.	Financial investment in project.	High finances
8.	Familiar with the term, Ecosystem Services.	No
9.	Have a focus on Ecosystem Services.	No, more of an 'eco-friendly building' approach

Source: Own creation from structured questionnaires (2014)

5.5   Summative results of the international case studies

Comparing the results of the two international case studies provide a general conclusion of Sweden's approach to spatial planning and green planning. The following table indicates the summative results for the site analysis of the international case studies (refer to Chapters 5.3 and 5.4) as well as a discussion on how these case studies compare on each key point.

Table 5.9: Summative results of international site analysis

Key points:	Hågaby:	Hammarby Sjöstad:	Discussion:
Location	Outskirts of Uppsala City	Outskirts of Söndermalm-district in Stockholm City	The case studies are both situated separately from the inner urban activities however they are still dependent on urban areas which support the economic activities.
Direct environment	• Nature reserve • Stand-alone farmhouses • Farm grounds • Natural forests	• Nature reserve • Natural water sources • Built environment • Natural forest	The direct environments are mostly green spaces.
Movement networks in and around area	Access roads from Uppsala City; Internal roads such as footpaths; bicycle paths; light motor vehicle roads	Access roads from Stockholm City; Internal roads such as footpaths; bicycle paths; light motor vehicle roads; public transport	Emphasis on the declining use of privately owned vehicles.
Land uses	• Residential • Educational • Business • Social • Recreational	• Residential • Educational • Business • Commercial • Industrial • Recreational	Heterogenic areas in terms of land-uses
Topography	Level	Level	Level topography which simplifies planning
Plants	Mostly natural indigenous	Mostly natural indigenous	Takes the environment and conservation thereof into consideration
Animals	-Birds (high) -Insects (high) -Deer (low) -Small mammals(medium)	-Birds (high) -Insects (high) -Deer (low) -Small mammals(low)	Takes the environment and conservation thereof into consideration
Focus points	- Community centre - Statue of children	- Information centre - Hammarby Sea with pedestrian jetty	Focus points exist
Target market	Young families with children	Young families with children	Target markets are the same as both case studies have the same type of environment
Needs of the target market	• Sustainable living • Strong community • Peacefulness • Natural resources	• Sustainable living • Peacefulness • Natural resources • Recreational space	Needs are similar as both case studies has the same target market

Ecosystem service categories that are most dominant	Regulating services and Cultural services	Provisioning services; Habitat services; Cultural services	The dominant ecosystem categories are evidence of the case study's focus in green planning. Hågaby leaves the natural environment as it is, conserving it in such a way while Hammarby Sjöstad influence the environment more, changing it toward a specific direction.
Interconnection of green areas	Yes	Yes	Both case studies' green spaces are interconnected which discourages the formation of lost spaces and encourages integration.

Source: Own creation from site analysis results (2014)

The following table indicates the summative results for the questionnaires conducted with experts of the international case studies (refer to Chapters 5.3 and 5.4). The summative results are then discussed and analysed in Figure 5.28.

Table 5.10: Summative results of international questionnaires

Key points from questionnaire:	Hågaby:	Hammarby Sjöstad:	Discussion:
Area's success	Good energy and waste water management	Green corridors running through the whole area	Green spaces are intentionally planned for.
Green planning supported by legislation.	Yes	Yes	International case studies follow legislation in term of green planning.
Key role players.	• Urban Planners • Ecologists • Public community	• Urban Planners • Environmentalists • Local Authority • Politicians	Urban Planners and Environmentalist (or Ecologists) are significant role players.
Motivation for existence.	Seeking sustainability and restoring the community	Restoration and reuse of low quality land; Need of new housing	Sustainability is an evident aim in these case studies.
Spatial relevance to location.	Interface between urban and rural – provides great location for eco-villages	Close to the inner urban area and next to the shore which makes it attractive and accessible	Spatial relevance to broader area is important.
Factors ensuring success.	Recirculation of decisions between experts and public	Good location, design variations, effective land use and good economy	The role players as well as the physical location are determinative of an area's success.
Financial investment	Medium to High finances needed	High finances	Mostly an expensive process.
Familiar with the term, Ecosystem Services.	Yes	No	In some cases, there is awareness of ecosystem services, but it does not deserve the main focus.
Focus on Ecosystem Services.	Yes	No, more of an 'eco-friendly building' approach, but ecosystem services are visible.	

Source: Own creation from structured questionnaires (2014)

It is evident from Table 5.10, which illustrates the questionnaire results from both case studies, that a number of best practices and main factors exist, guiding the spatial planning and environmental approaches in Sweden in terms of planning for green areas in urbanized or rural

areas. Figure 5.28 indicates these best practices and main factors for the planning of green areas in Sweden as derived from the questionnaire results in Table 5.10.
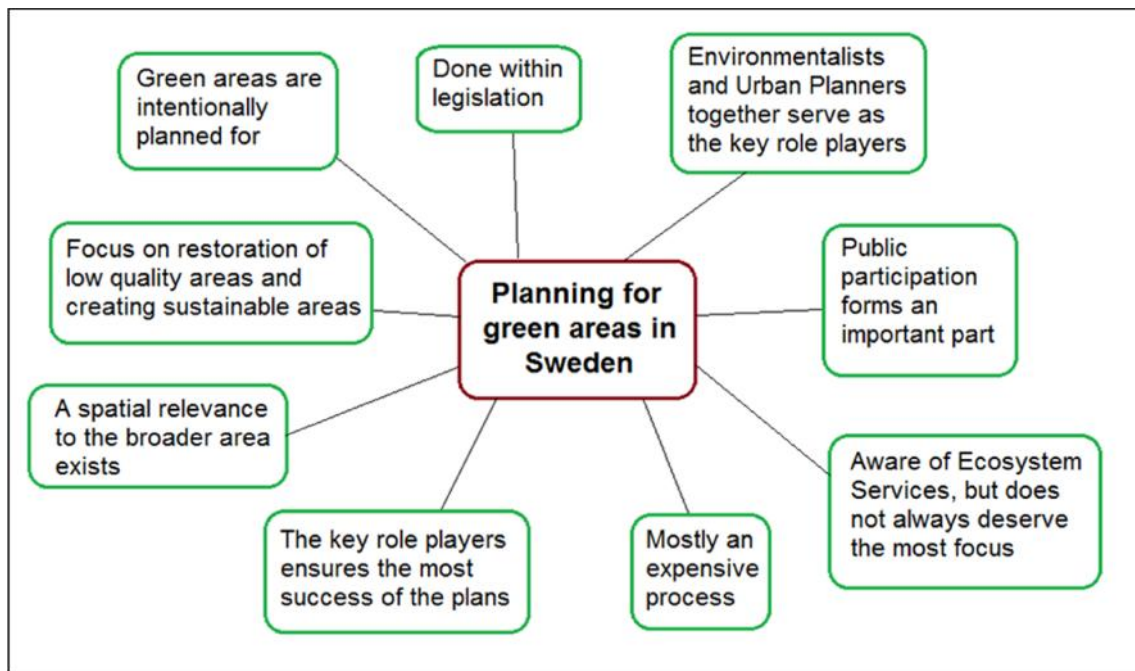
Figure 5.28: Main factors in planning for green areas in Sweden

Source: Own creation from questionnaire results (2014)

5.6 Conclusion with regards to international study

Firstly it can be concluded from the site analysis of the case studies (sections 5.3.1 and 5.4.1) that collaboration between stakeholders was a key issue as it was evident that municipalities and local communities and experts worked together to develop a unique approach to planning for the environment and green spaces. The two international case studies' approaches to green planning differs, however both case studies still address ecosystem services. This states Sweden's current spatial planning approach and integration of green planning practices. As seen in Section 5.3, the eco-village, Hågaby, followed the approach of the UN Habitat Agenda (UNCHS, 1996) focussing on finding solutions for the seven main resource categories, while the eco-city, Hammarby Sjöstad (Section 5.4), focussed on the City of Stockholm Municipality's six environmental goals, and still both areas succeed in addressing a number of ecosystem services.

The two different approaches of the two case studies consist of a number of practices which guided the planning and development of the areas. When considering the best practices from the two international case studies in terms of green planning, the following points for consideration could be identified from the summative results of the site analysis and questionnaires (Tables 5.9 and 5.10):

- Urban centres with commercial and other economic activities support green spaces as it contributes to green spaces that are lively, accessible and adequately used by residents.
- Settlements with a direct environment that consists of natural green spaces find it easier to integrate the surrounding green areas more with the settlements, thus creating more green spaces.
- The interconnection of green spaces in settlements is a very important factor in Sweden.
- The planning and design of other aspects such as housing and transport has an influence on the green spaces.
- It is important to take conservation of the natural indigenous vegetation and animals into consideration when planning for green spaces.
- Cooperation between Urban Planners, Urban Ecologists and the public is important.
- Variations in the design of elements in the areas contribute to creating interesting and attractive areas.

From the questionnaire results (sections 5.3.3 and 5.4.3) it is evident that the role of the key stakeholders has a big influence on the success of an area's green spaces. It is thus evident from the international case studies that (1) a unique green planning method created for the specific area and (2) a team of key role players working together with determination, can establish an integrated area (urbanised or rural) which provides environmental benefits to the community while conserving the natural environment. The question however is whether these conclusions drawn from the two international case studies, can be applicable in South African rural areas. This will be discussed in Chapter 7 of this research.

Chapter 6: Local green planning approaches
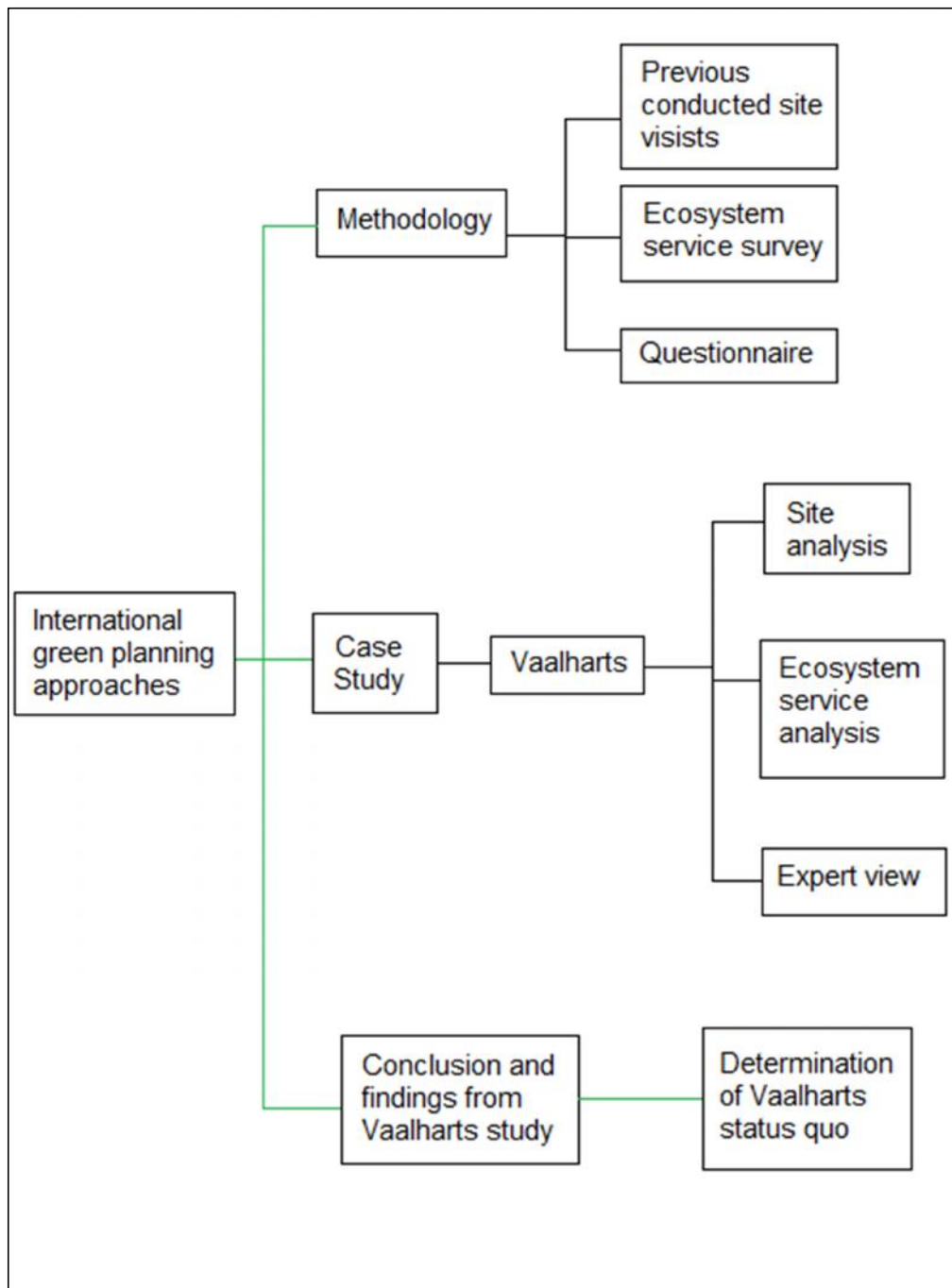
Figure 6.1: Structure of Chapter 6

Source: Own creation (2014)

This Chapter serves as the second part of the empirical investigation and introduces the Vaalharts area as the local case study, discussing the methods used to analyse this case study, along with a discussion of the results of the desktop analysis, ecosystem service survey and structured questionnaires. Key findings were determined with regards to the planning approaches and environmental status of the Vaalharts area, significant for the conclusions and recommendations section, following this chapter.

6.1 Introduction

As mentioned in Chapter 1, it is important to realise that the environment in urbanized areas is dependent on the people (in terms of planning and conservation) but also that the people (society) is dependent on the environment (in terms of certain benefits which are provided by the said green spaces and environment). The approach of enhancing the awareness of ecosystem services through the planning of green spaces as mentioned in Chapter 2, is especially relevant for rural poor communities in South Africa. According to TEEB (2009:1) one can observe the direct effects of the ecosystem services approach best when it is used to address challenges faced by poor communities.

In South Africa's overall population, 43% of people live in rural areas (Nationmaster, 2004). This emphasizes the need for the planning of sustainable green spaces as the environment plays a great role in the living standards of these vulnerable people (Brundtland, 1987:22). There are usually no environmental agenda in rural areas as survival serves as the rural population's main priority (Labuschagne *et al*, 2013: 2). The benefits which the environment provides are thus used in an unsustainable manner or sometimes not used at all as the people are unaware of the many services nature can provide.

The need for the planning of green spaces in order to enhance the ecosystem services of the area's natural environment is thus emphasised in rural South African areas.

6.2 Methodology and research design

The Vaalharts area serves as the South African rural case study for this research. The Vaalharts area is situated in the Northern Cape Province and directly borders the North West Province (Coetzee, 2011: 1). The following map indicates the geographical position of the Vaalharts area in South Africa.
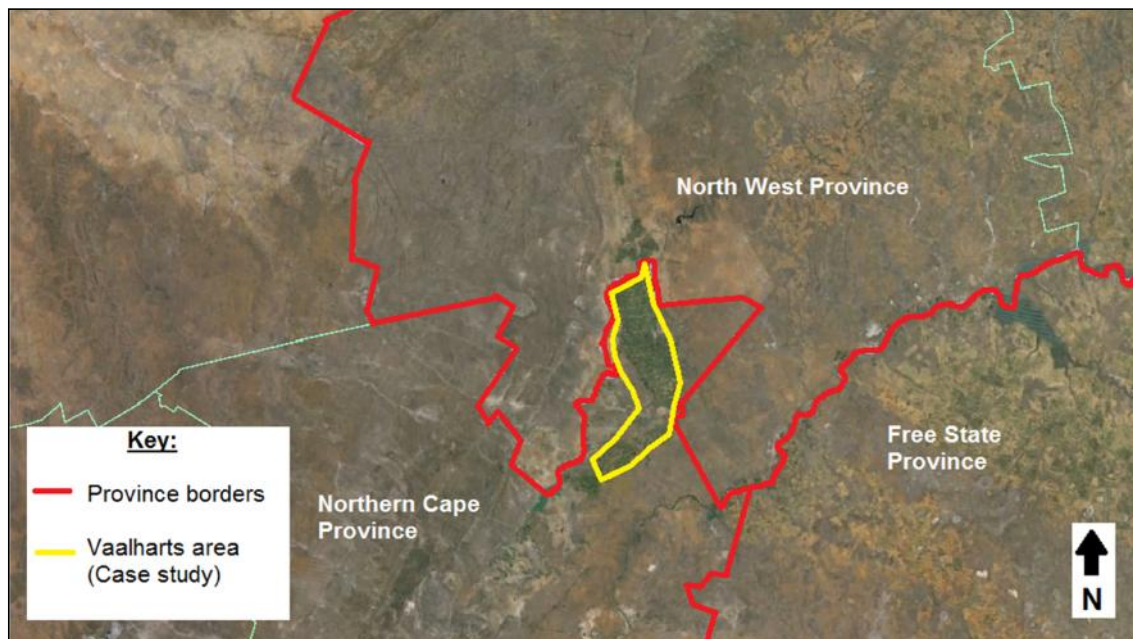
Figure 6.2: Location map of the Vaalharts area

Source: Own creation (2014)

The Vaalharts area consists of a beautiful rural landscape with scattered rural settlements and is best known for its water scheme (Labuschagne *et al*, 2013: 3). This is the largest irrigation scheme in South Africa and has approximately 32,000ha of land under irrigation (Labuschagne *et al*, 2013: 3). According to Barret (2013) the area is still characterized as unsustainable and the people still struggle economically as the whole economy is mainly dependent on the agriculture sector. Another challenge in the area is that urban sprawl has risen dramatically in the past 10 years (refer to Chapter 3.2.3.1). As a result of the urban sprawl the residents have thus settled in rural areas away from urban nodes, which hold little or no work opportunities, services and needs (Labuschagne *et al*, 2013: 3). There was no urban planning or environmental planning conducted in this area as the area developed spontaneously (Barret, 2014). The residents in these rural settlements are mainly dependant on the environment (mostly agriculture and water) which thus makes this area a good South African case study to evaluate the spatial and environmental benefits of green spaces in rural areas.

The Vaalharts-area consists of a number of rural settlements which include examples such as Taung, Valspan, Ganspan, Sekhing, Pampierstad, Hartswater and Jan Kempdorp (Coetzee, 2011: 12 – 14). A variety of literature were reviewed and included in this section to contribute to the information provided. Previous conducted site visits by researchers from the North West University South Africa, as well as a variety of literature was reviewed and analyzed in terms of

the green space planning approach in the Vaalharts area. The following map indicates the entire Vaalharts area including the location of the rural settlements.
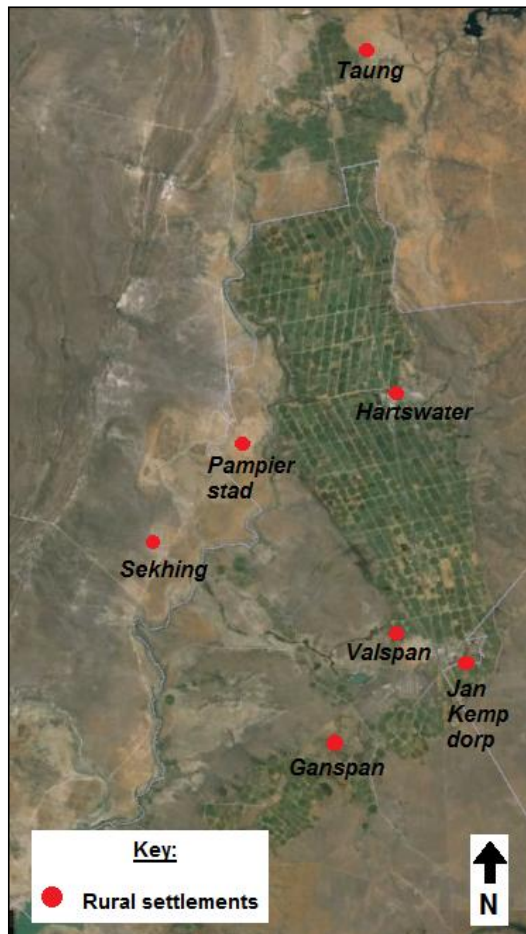
Figure 6.3: The Vaalharts area and its rural settlements

Source: Own creation (2014)

The main focus to establish a status quo in terms of the environmental situation in the Vaalharts area was limited to the key environmental phenomenon (water irrigation), the land cover, the green spaces and their interconnections in the broader area.

The Vaalharts area as the local case study was researched through a similar approach in which the two international case studies were conducted (refer to Chapter 5.2), enabling an accurate comparative study between the local and international case studies where similar factors were analysed. The Vaalharts case study comprised of (1) an analysis of previously conducted site visits conducted by selected researchers from the North West University South Africa and (2) structured questionnaires provided to key informants in order to determine the professional and

expert view with regards to local planning approaches in the Vaalharts area, as explained accordingly.

6.2.1 Methodology and research design of the Vaalharts site visits

A desktop analysis was conducted to evaluate planning documents, information and results from previous conducted site visits in order to gain insight on the Vaalharts case study's approaches to planning and green space provision.

The captured information was arranged in a similar format (check-list approach) to the international case studies in order to determine the area's status quo. The check-list approach included the following aspects:

1) Macro environment

1.1)   Location

1.2)   Direct environment (Land uses around area)

1.3)   Movement networks in and around area

1.4)   Land uses in the area

2) Physical area

2.1)   Topography

2.2)   Plants

2.3)   Animals

2.4)   Flood lines

2.5)   Focus points in the area

3) Users of the area

3.1)   Target market

3.2)   Needs of the target market

6.2.2 Methodology and research design of ecosystem service survey in the Vaalharts area

In order to determine the local case study's capability of providing ecosystem services (environmental benefits) to its residents, a further analysis was conducted on the ecosystem services. This consisted of the identification of ecosystem services, indicating the category (refer to Chapter 2.3) of the ecosystem service and the provision thereof in the specific area, based on previous conducted studies and planning documents compiled for the Vaalharts area.

Accordingly the different ecosystem services identified were divided into the four different categories as captured in Chapter 2.3, including:

- Provisioning services
- Regulating services
- Habitat or supporting services
- Cultural services

This analysis and findings revealed the Vaalharts area's status in terms of ecological aspects.

6.2.3   Methodology and research design of questionnaires

In order to determine the professional and expert viewpoints with regards to local approaches to planning, key informants were identified to answer specific questions about the Vaalharts area. Selected informants were chosen based on their expert knowledge (relating to the Vaalharts area) and their expert knowledge regarding Urban and Regional Planning, development in South Africa and green space planning and provision within the local rural context.

Selected key informants for the local case study included:

Table 6.1: List of key informants for the local case study

Name of participant:	Designation:	Location of key informant:	Role played in green planning:
Me. Liesbet Barrat (Expert knowledge on the specific study area)	Project Manager (NWU WIN Project – Vaalharts)	Jan Kempdorp (Vaalharts)	Role played in green planning only dependent on the need of the project. This informant's role is focussed more on coordinating and managing projects being done in the study area.
Mr. Nicolaas Johannes Blignaut (Expert knowledge on planning and development in SA)	Professional Town and Regional Planner	Potchefstroom	20 Years of experience in Town and Regional Planning as well as related services such as planning for the environment.

Source: Own creation (2014)

A quantitative research approach was followed as the opinions and views of the selected experts were obtained by means of structured questionnaires, similar to the method used in the international case studies (refer to Chapter 5.2.3).

(Refer to Annexure B for an example of the questionnaire document)

6.3   Local case study: Vaalharts

6.3.1   Site analysis Vaalharts

The Vaalharts area is best known for its abundance of water and thus its irrigation scheme as it is the largest irrigation scheme in South Africa and dates back 130 years (Van Vuuren, 2010: 20). The Vaalharts irrigation scheme which was first suggested by surveyor-general, Francis Orpen, is situated at the confluence of the Harts River and the Vaal River (Van Vuuren, 2010: 21). Orpen discovered that the bed of the Vaal River was much higher than the valley floor of the Harts River which makes it possible to irrigate through the use of gravity-fed canals (Van Vuuren, 2010: 21).

People started to inhabit Vaalharts which caused the development of small rural settlements as the abundance of water provided residents with agricultural work opportunities and water as a resource as well as other natural resources dependant on the abundance of water in the area (Phokwane Local Municipality, 2012: 25). From the rivers and dams in the area, a variety of canals were made to serve as the water contributors to the irrigation system for the farmers in the area. The management of the water usage and availability is very important in this area in order to conserve it as a sustainable resource (Phokwane Local Municipality, 2012: 51 – 52). According to the Department of Environmental affairs (2011: 60), South Africa is considered a water scarce country and it is thus important that residents understand water as an ecosystem service and the importance of it for the environment and conservation.

The abundance of water contributes to Vaalharts being a suitable study area in South Africa to evaluate and enhance the ecosystem services as most natural resources and services are instigated by water. The following figure indicates the different dams, rivers and canals situated in the Vaalharts area, illustrating the area's abundance of water.
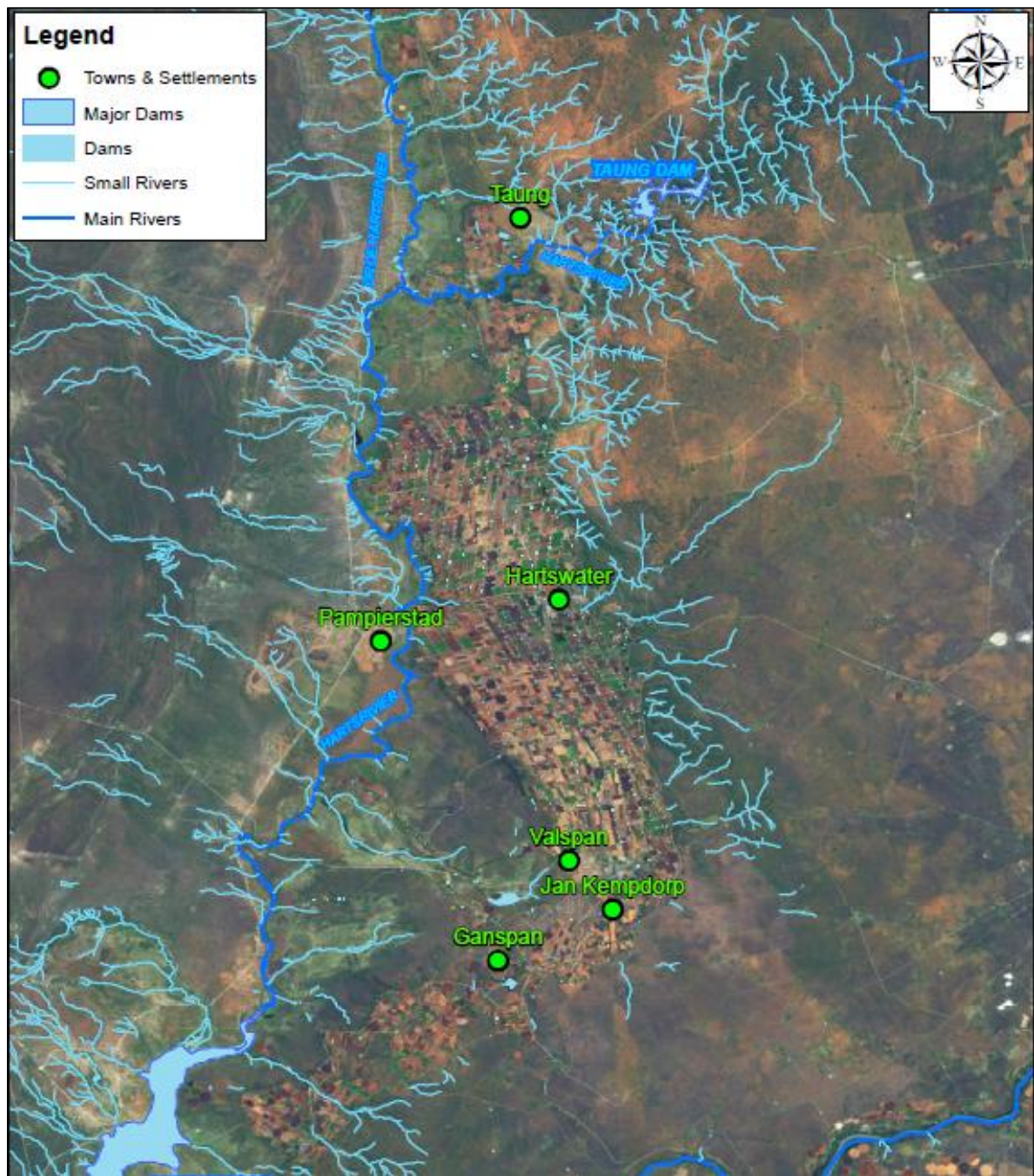
Figure 6.4: Water in the Vaalharts area

Source: Schlebusch (2013)

The direct environment around the Vaalharts area consists mainly of natural green areas as well as agricultural land uses as this is a highly agriculturally used area (Phokwane Local Municipality, 2012: 25). Other land uses around the area include scattered residential rural settlements, nature reserves which add to recreational land uses as well as larger urban areas

such as Kimberley which adds to commercial, industrial and business uses around Vaalharts. The environment directly bordering the Vaalharts area is however mainly vast open country used for agriculture, cattle and game farming (Phokwane Local Municipality, 2012: 55).

In terms of movement networks in and around the Vaalharts area, the area can be considered as accessible due to the national road (N18) running through the Vaalharts area and connecting the area with larger urban areas such as Kimberley. A number of regional roads connect the area with smaller settlements. The following figure illustrates the movement networks in and around the Vaalharts area:
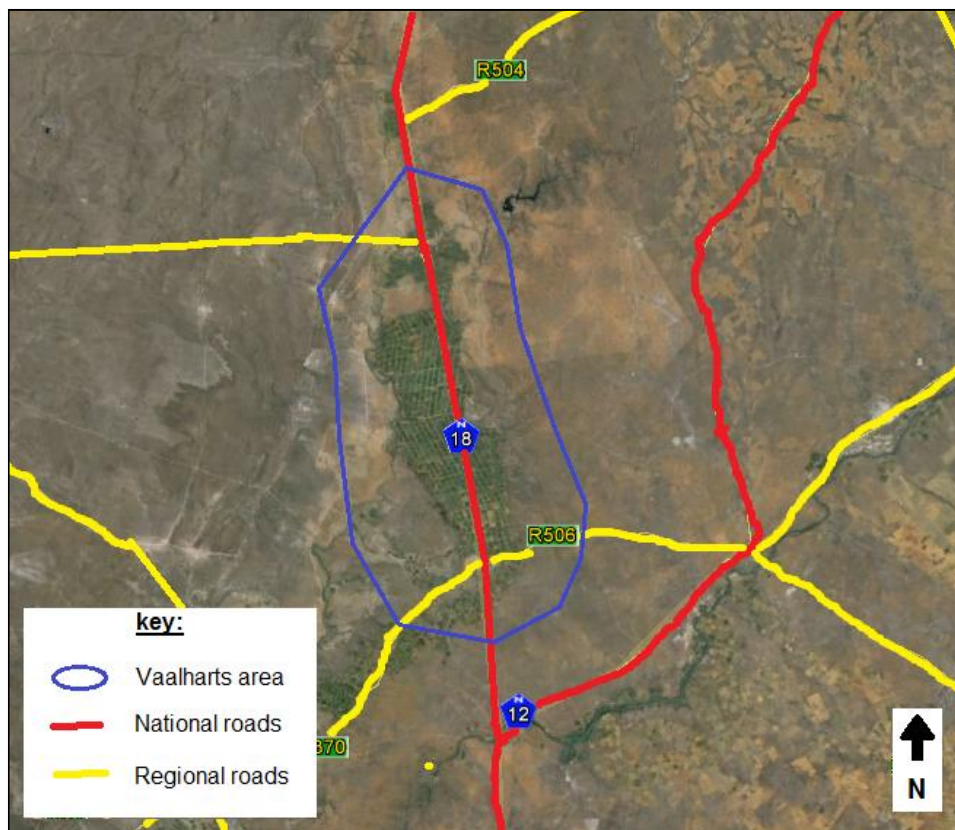
Figure 6.5: Movement networks in and around the Vaalharts area

Source: Own creation (2014)

The Vaalharts area can be regarded as a rural area used mainly for agricultural uses and livestock farming (Labuschagne *et al*, 2013: 3). A few distinct land uses visible in the Vaalharts area include the following:

- Residential housing = Informal rural settlements (such as Valspan – Figure 6.5) have developed in the area over the years as well as more formally planned rural settlements (such as Jan Kempdorp and Hartswater).

Figure 6.6: Informal rural settlement, Valspan, situated in the Vaalharts area

Source: Google Earth (2014)

- Agricultural land uses = Most of the rural areas surrounding the residential settlements are used for agricultural activities such as crop (refer to figure 6.6) and livestock farming as the irrigation scheme, climate and vegetation of the area suits these activities perfectly.

Figure 6.7: A rural area on the outskirts of a settlement used for crops.

Source: Google Earth (2014)

- Industrial = The formally planned settlements each have an industrial area where most of the primary products from the farming activities in the area are produced and manufactured into secondary products before they are transferred to the consumers. Harts water is one of the formally planned settlements with an industrial area (Figure 6.7).

Figure 6.8: Hartswater industrial area

Source: Google Earth (2014)

- Business/ Commercial = A variety of small shops are situated in the settlements in order to provide the residents of necessities such as clothing, food and other supplies.

- Recreational = A variety of game farms as illustrated in Figure 6.8 exist in the Vaalharts area as well as hiking trails along the two rivers flowing through the area (SA Places, 2014). Recreational activities such as golf courses and public swimming pools also exist inside the settlements.

Figure 6.9: Waterhole at a game farm near Jan Kempdorp

Source: Google Earth (2014)

According to the Spatial Development Framework of the Frances Baard District Municipality which is the District Municipality governing over most of the Vaalharts area, the biome in which the Vaalharts area is situated, is the Savanna biome (FBDM SDF, 2013).

According to the National Botanical Institute (2008: 2), the Savanna biome is characterized by a ground layer of different types of grass and a distinct upper layer of woody plants. The plant species thriving in the Savanna biome is highly adaptable thus proving that the Vaalharts area is situated in a strong natural environment (National Botanical Institute, 2008: 2). The savanna vegetation types are mostly used for cattle grazing or game farming which thus prove the Vaalharts area a suitable area for protected nature reserves or game reserves (Phokwane Local Municipality, 2012: 55). According to the Local Government: Municipal Systems Act, 2000 (Act No 32 of 2000) this area is suitable for "Critical Open Space" which is defined as a sensitive area where natural habitats and features occur that are of great importance to the ecology of the surrounding areas.

The following figure is an extract from the Frances Baard District Municipality's (FBDM's) Spatial Development Framework (2013) which only indicates the Vaalharts area's biome.
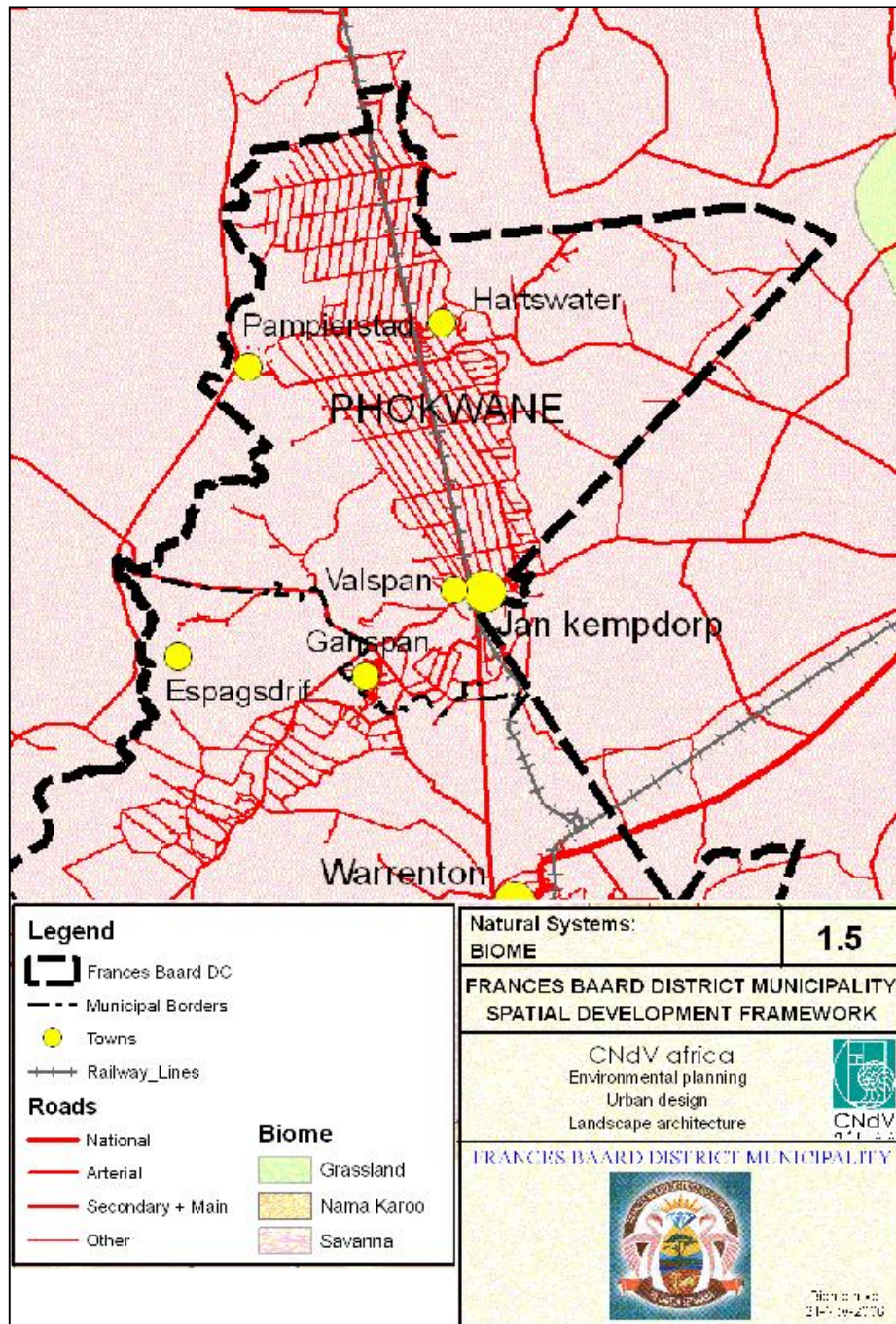
Figure 6.10: The biome of the Vaalharts area

Source: FBDM (2013)

The distribution of vegetation in the Vaalharts area provides a good suggestion on what the ecological status of the area is. The Land cover map of the Vaalharts area provides complete information on what physical material is located in this specific case study and it's usually determined by analysing satellite and aerial imagery (United States Department of Commerce, 2014).

Refer to Annexure D for the complete Vaalharts Land cover map of 2012.

The following figure is an extract from the complete Vaalharts Land cover map (2012) which indicates the vegetation in the Vaalharts area.
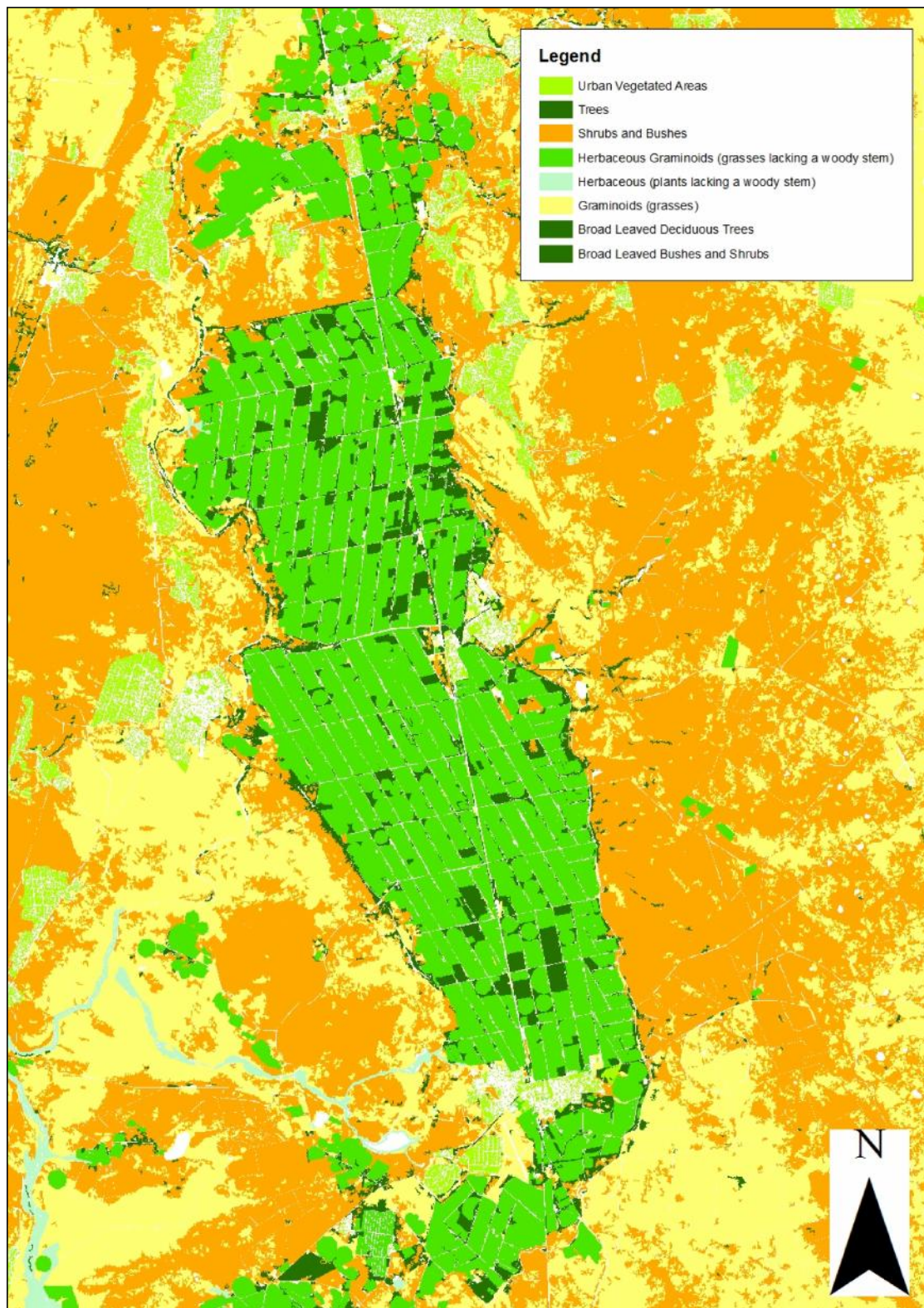
Figure 6.11: Land cover map indicating the vegetation in Vaalharts

Source: Department of Economic Development, Environment, Conservation and Tourism (2012)

According to Figure 6.10 the surrounding natural green areas are mainly shrubs and bushes as well as graminoids or commonly referred to as grasses (refer to Figure 6.11). These vegetation types are common in a Savanna biome and serve as perfect vegetation for the farming of Africa's game including the big 5 (Phokwane Local Municipality, 2012: 55).

Figure 6.12: The typical natural, indigenous vegetation which grows in the Vaalharts area

Source: Google Earth (2014)

The green areas closest to the settlements are mostly Herbaceous graminoids which are plants without a persistent stem or shoots above ground and thus lacking definite firm structure (Gregorio & Jansen, 2005: 28). These are the main characteristics of agricultural vegetation which thus indicates the broad area (indicated in light green on Land cover map) used for agricultural activities in the Vaalharts area.

The Vaalharts area is also popular for livestock farming and is mostly done in the areas with Herbaceous graminoids (refer to Figure 6.12). These areas consist of vegetation which is ideal for the feeding of livestock and these areas are, as seen in Figures 6.11 and 6.16, located closest to the settlements which ensure good accessibility for the farmers and workers.

Figure 6.13: Livestock farming near Pampierstad

Source: Google Earth (2014)

It is evident from Figure 6.10 that trees (indicated in dark green) are mostly in the areas where the people live and work (in settlements and among the agricultural areas). It is evident that large trees don't grow very densely in the natural areas in Vaalharts, but are planted by residents in and around their settlements for shade, as well as provisioning and aesthetic services (refer to Figures 6.13 and 6.14).

Figure 6.14: Trees in the informal rural settlement of Ganspan (left); trees densely planted in the formal rural settlement of Hartswater

Source: Google Earth (2014)

Figure 6.15: Trees next to the N18 national road through Vaalharts

Source: Google Earth (2014)

The following extract (Figure 6.15) from the Vaalharts Land cover map (2012) indicates the urbanized areas (settlements) in Vaalharts as well as the urban vegetation and trees. It is evident from this figure that this area has great potential in terms of the conservation and enhancement of current green spaces as they already exist around the settlements. These green spaces can be enhanced through planning for the green spaces which will thus enhance the provisioning of quality environmental benefits.
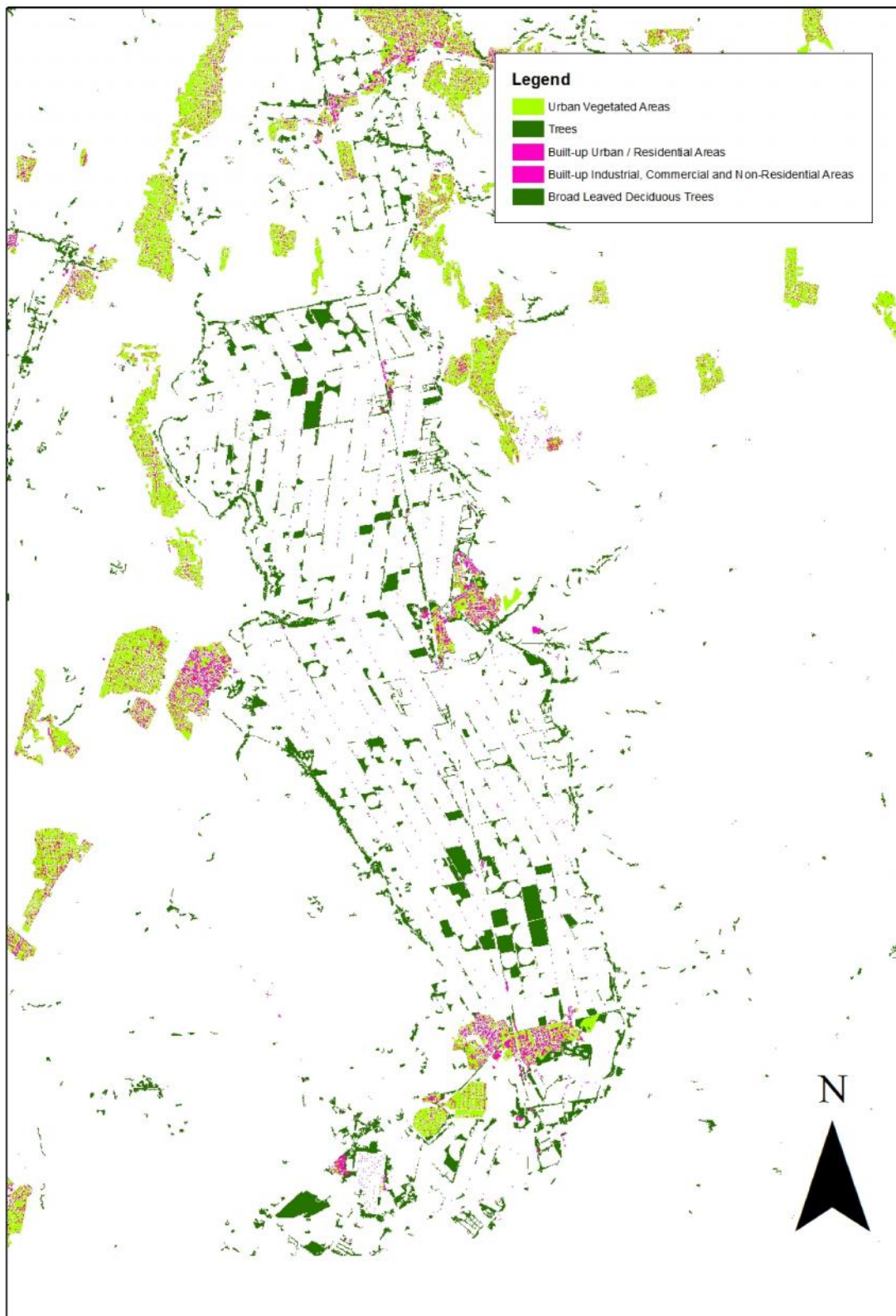
Figure 6.16: Land cover map indicating the settlements, urban green areas and trees

Source: Department of Economic Development, Environment, Conservation and Tourism (2012)

The following figures indicate green spaces in some of the informal rural settlements in the Vaalharts area which also proves the potential for green space planning in order to enhance quality of life of residents through the environmental benefits.

Figure 6.17: A green space in the rural settlement of Pampierstad

Source: Google Earth (2014)
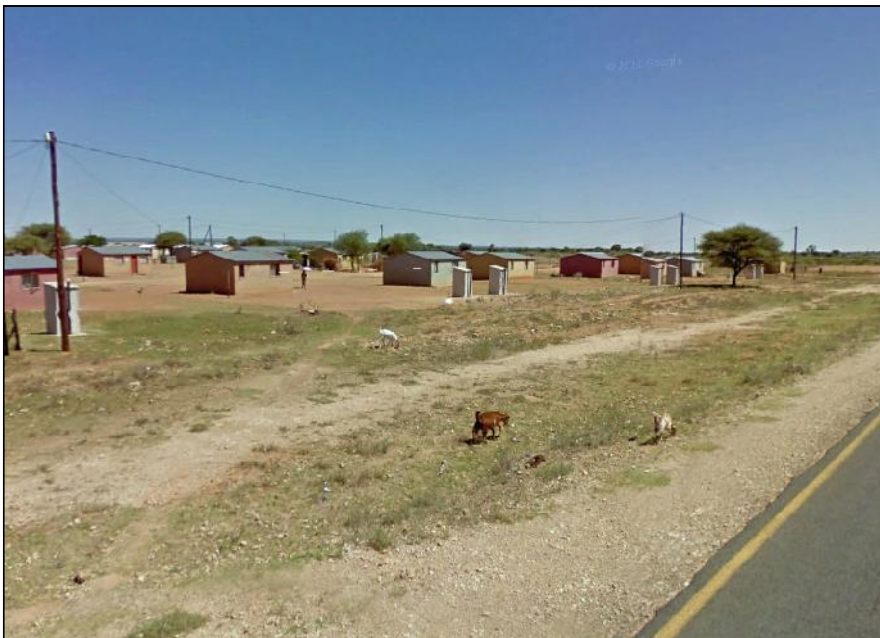
Figure 6.18: Livestock walking next to the regional road indicating a need for a protected green space in informal rural settlements

Source: Google Earth (2014)

Figure 6.19: A green space in the rural settlement of Ganspan

Source: Google Earth (2014)

Figure 6.20: Aerial view of Sekhing, indicating green spaces in this rural settlement

Source: Google Earth (2014)

The Vaalharts area's topography is as indicated in Figure 6.20 mostly irregular plains as the topography is not completely level but varies to be uneven, while the North eastern side of the area consists of hills. The following extract from the FBDM SDF indicates that the topography of the area is mostly uneven with a few hills.
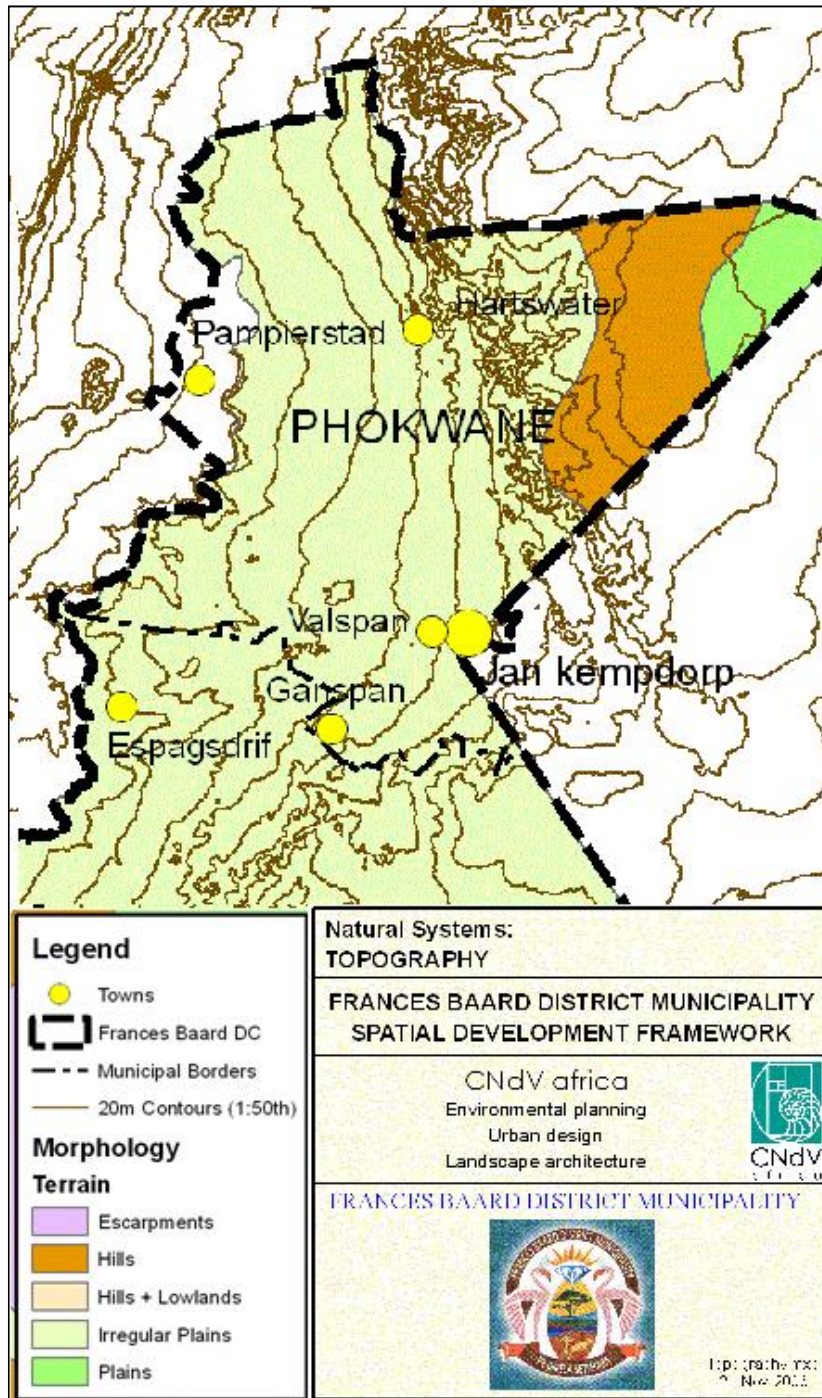
Figure 6.21: Topography of the Vaalharts area

Source: FBDM (2013)

During the desktop analysis, the observation could be made that the target market of the Vaalharts area in the informal settlements is mainly residents with a low income, relying on the irrigation scheme and agricultural activities to provide work opportunities. Crop and game farmers, with their families, are also attracted to the Vaalharts area as it is a peaceful area with great agricultural qualities and requires a lifestyle dependent on the environment (Phokwane Local Municipality, 2012: 25). The following table summarises the desktop study and findings conducted from the various site visits, site analysis and planning documents of the Vaalharts area.

Table 6.2: Analysis of the Vaalharts area

Key points in analysis:	Conducted information:
Macro environment	
Location	In the Northern Cape province directly bordering the North West province, South Africa (A rural area situated approximately 100km from an urban area with high economic activities).
Direct environment (Land uses around area)	• Natural green areas • Agricultural • Rural residential settlements • Nature reserves and game farms
Movement networks in and around area	A national road runs through the area which makes it accessible. Access from various access roads also exists.
Land uses in the area	• Residential • Agricultural • Business • Commercial • Industrial • Recreational
Physical area	
Topography	Uneven with a few hills

Plants	Mostly natural indigenous plants as well as agricultural vegetation. Biome: Savanna (mostly shrubs and bushes)
Animals	• Cattle and other farm animals for livestock farming • Wild African animals in game reserves
Focus points in the area	- Vaalharts irrigation scheme - Larger settlements (Jan Kempdorp and Hartswater)
Users of the area	
Target market	Farmers and farm workers with their families.
Needs of the target market	• Work opportunities • Peacefulness • Natural resources

Source: Own creation from physical survey (2014)

6.3.2 Ecosystem service analysis Vaalharts

A desktop analysis on ecosystem services in Vaalharts was conducted by identifying different types of ecosystem services in the specific case study. The amount and type of ecosystem services in this area provide an indication of the environment's status quo. The key findings are captured in the table below, indicating the different ecosystem services divided in the specific ecosystem categories (refer to Chapter 2.3) that were identified through previous conducted site visits and environmental documentation during the desktop analysis on the Vaalharts area.

Table 6.3: Ecosystem services in the Vaalharts area

Provisioning services	Regulating services	Habitat or Supporting services	Cultural services
The environment (taking the water scheme and climate into consideration) is used for the growing of vegetation for food. This is mainly done for farming purposes and not fully utilized by residents (especially in rural settlements) for their own use.	Air quality regulation in the settlements in the Vaalharts area through the presence of a lot of trees in the settlements.	The natural water sources in the Vaalharts area serve as great habitats for birds, insects and small animals.	Recreational areas such as sports grounds exist in the formal settlements of the Vaalharts area such as Hartswater and Jan Kempdorp.
Wood from natural trees, shrubs and bushes are used by rural residents as firewood for the cooking of food as well as for the making of furniture and other tools and appliances .	Some of the rivers and dams in the Vaalharts area flow through wetlands which acts as natural filters for the water thus regulating and in a way purifying the water.	The natural environment as mentioned before is a suitable environment for Africa's wildlife (including the big 5). The Vaalharts area thus serves as a great habitat for African wildlife (as there already are a few game reserves in the area).	Tourism as a cultural service is evident in this area as the natural environment attracts a lot of tourists to this area. Game reserves offer experience of the natural environment as well as wildlife to the tourists while the agricultural products (such as olives) also attract tourists to the area.
Natural water (from dams and rivers) is used by rural residents in informal settlements for drinking, cooking and washing.	Maintenance of soil fertility is kept through the presence of the natural vegetation especially near the rural settlements.		Trees are used in the settlements for shade and provide a peaceful atmosphere as well as aesthetic value to the settlements. Trees are also planted in rows next to some of the area's national and regional roads which also contribute to aesthetic value.

Source: Own creation from desktop analysis (2014)

It is evident from Table 6.3 that ecosystem services are definitely visible in the Vaalharts area as the natural environment is conserved and used in everyday activities of the residents. This area however holds more potential in providing ecosystem service,s especially with provisioning services (food provisioning to the low income residents) and regulating services (regulation of storm water through vegetated areas causing filtration of water). The following figure indicates that the regulation of storm water from the streets is not planned in an ecological or sustainable manner, but through the use of a concrete canal not contributing to the natural environment.

Figure 6.22: Water channelized from streets in Pamperstad

Source: Google Earth (2014)

Habitat services, as well as cultural services, tend to be the dominating types of services in the Vaalharts area. The following figure indicates an example of a recreational open space in the formal rural settlement, Hartswater.

Figure 6.23: Recreational open space (sports ground) in Hartswater

Source: Google Earth (2014)

6.3.3   Expert view Vaalharts: Questionnaires

The results derived from the questionnaires as discussed in section 6.2.3 are presented in the following table. It is important to bear in mind that these results are only the opinions of the experts and provide a general view of the area's structure and approaches to green planning. These findings should be considered along with the desktop analysis results of the Vaalharts area (Section 6.3.1 and 6.3.2). Tables 6.4 and 6.5 captured the structured questions along with the key informants' (refer to table 6.1) summative answers to each question.

Refer to Annexure C3 and C4 for the actual structured questionnaires.

Table 6.4: Questionnaire results with regards to green planning in Vaalharts

	Main points from questionnaire:	Information conducted from key informants:
1.	Area's success in terms of green infrastructure.	None, no prior planning or needs assessment done before implementing green spaces – green spaces inaccessible for communities
2.	Green planning supported by legislation.	No
3.	Key role players.	Municipalities, Public community, Town Planners, Sports and recreation students.
4.	Motivation for existence.	Recreational activities, leisure needs as well as education.
5.	Spatial relevance to location.	No specific relevance – Still catching up and transforming after apartheid-era
6.	Factors ensuring success.	Trans disciplinary partnerships
7.	Financial investment in project.	Yes
8.	Familiar with the term, Ecosystem Services.	Yes
9.	Have a focus on Ecosystem Services.	Not a direct focus on these services, but aware of these services.

Source: Own creation from structured questionnaires (2014)

Table 6.5: Questionnaire results with regards to green planning in the local rural context of South Africa

Main points from questionnaire:	Information conducted from key informants:
1.	SA's success in terms of green infrastructure.	It is conserved, but finances and maintenance are lacking.
2.	Green planning done within legislation.	Yes
3.	Key role players.	Town Planners specifically working on Land Use Management, Environmentalists, Engineers.
4.	Motivation for existence.	Completely dependent on the specific area. Unused green spaces usually developed to estates.
5.	Spatial relevance to location.	A green space is planned for according to the area it is situated in.
6.	Factors ensuring success.	Green spaces with maintenance are usually the most successful
7.	Financial investment in project.	Not much provision made in South Africa for planning of green spaces
8.	Familiar with the term, Ecosystem Services.	No
9.	Have a focus on Ecosystem Services.	No

Source: Own creation from structured questionnaires (2014)

It is evident from Table 6.4 that a lack in planning for green spaces exists in South Africa. In the Vaalharts area, this is worsened by the communities' lack of knowledge with regard to the benefits of green spaces and the surrounding environment, resulting in a lack of usage and maintenance linking to sustainable development objectives. In the structured questionnaire of Vaalharts (refer to Annexure C1) it is mentioned that some communities don't want green spaces and as a result destroy it after implementation - this is good proof of the communities' unawareness (lack of knowledge) of the benefits these spaces can offer them. A unique and noticeable strength in the planning of the Vaalharts area is the involvement of a variety of professions and fields of research which contribute to creating a more sustainable area addressing a variety of needs and challenges. An example of such involvement is the North West University's current project on the Vaalharts area which includes a variety of faculties namely health sciences, educational sciences, social sciences, natural sciences, agriculture and technology (Barret, 2014). This project's aim is to enhance rural health and well-being through inter-sectorial partnerships (Barret, 2014).

From Table 6.5 it is evident that green planning in South Africa is done mainly in order to abide to legislation and that it is not seen as a top priority as a massive lack in finances and maintenance exist. This proves that a lack of knowledge on the benefits of green spaces (ecosystem services) exists. Communities, as well as most experts, are not aware that ecosystem services can contribute to finding solutions for some of the most common problems in rural settlements, such as unhealthy water, a lack of food provision, air pollution, low quality of life and a degraded environment.

6.4   Conclusions with regards to local study

From the site analysis of the case study (section 6.3.1 and 6.3.2) an environmental perspective of the study area was determined, illustrating potential for planned green spaces to provide environmental benefits when considering the natural vegetation, climate, topography and water sources (refer to table 6.2). The current land uses of the area, as well as its surrounding environment, have developed from a dependence on the environment as most of the land uses are directly or indirectly connected with the agricultural activities and water irrigation. It is evident from Table 6.3 that the area is favourable for ecosystem services as plenty of ecosystem services are visible in the area without the municipalities or planners even placing a focus on ecosystem services or on the planning of green spaces.

Findings from the questionnaires illustrated the lack of knowledge and lack of effective sustainable planning from the authorities, as well as the communities, contribute to the

existence of unsustainable, unmaintained green spaces with ecosystem services going to waste, in turn effecting the environment negatively.

In summary, the following points for consideration could be identified from the results of the site analysis and questionnaires (refer to Tables 6.2, 6.4 and 6.5):

- The direct environment suggests of a natural environment rich in biodiversity, natural resources and thus potential for enhancing ecosystem services.
- It is a highly accessible area.
- Green spaces consist mostly of natural indigenous vegetation.
- The abundance of water ensures the provision of healthy green spaces as well as interconnection of green spaces along rivers.
- Green spaces are seen as unimportant by some of the communities.
- Green spaces situated in settlements are not integrated with the surroundings as the communities don't understand the importance of these spaces.
- Education and information regarding the benefits of the environment is needed in the area.
- A lack of focus, finances and thus maintenance of green spaces exist.
- Cooperation between different professions or fields is taking place in this area.

In order to find the best possible approaches to spatial planning and green planning for the Vaalharts area (including an approach which provides the best possible environmental benefits for the communities), a comparative study between the international and local studies will be conducted in the following chapter (Chapter 7). An evaluation of the literature study's applicability in the case study will also contribute to best practices approaches to be recommended.

SECTION C: CONCLUSIONS AND RECOMMENDATIONS

Chapter 7: Comparative Analysis and Conclusions

The following conclusions were drawn as a result of the theoretical and empirical research conducted. These conclusions serve as the basis for the recommendations to be made and evaluation of the approaches to planning of green spaces in South Africa in an attempt to recommend approaches which will enhance the provision of environmental benefits within local areas. Firstly a comparative analysis was conducted between the international and local case studies in order to identify best practice approaches. The conclusions drawn from the comparative analysis were then evaluated in terms of each of the theoretical chapters in order to illustrate the linkage between theory and practice. This chapter furthermore aimed to answer the research questions and objectives of the research as captured in Chapter 1.

7.1   Comparative analysis: International versus local case study

As planning in Sweden is driven by the need to preserve the natural environment and has won the European Green Capital award for leading the way towards environmentally friendly urban living in the City of Stockholm, the empirical investigation provided a valuable indication of the possible level of green planning as well as best practice approaches to guide local planning approaches. The study of both the international and local case study, as well as the comparison of these case studies, provided insight with regards to the provision of environmental benefits which complies with a number of research objectives stated in Section 1.2 of this research (refer to Chapter 1.2.1 – Nr's. 2 & 3; Section 1.2.2 – Nr's. 2, 3, 4 & 5).

Firstly, the site analysis results from the international case studies and the local case study were compared and are captured in the following table (cross reference to Tables 5.9 and 6.2 for case study details).

Table 7.1: Comparison of Swedish and South African case studies: Site analysis

Key points:	International case studies:	Local case study (Vaalharts):	Discussion:
Location	Outskirts of main urban areas that has high economic activities.	A rural area situated approximately 100km from an urban area with high economic activities.	The local case study is not situated close to an urban area with high economic activities such as the international studies.
Direct environment	• Nature reserve • Stand-alone farmhouses • Farm grounds • Natural forests • Natural water sources • Built environment	• Natural green areas • Agricultural • Rural residential settlements • Nature reserves and game farms	The direct environments of both international and local studies are mostly green spaces.
Movement networks in and around area	Access roads from urban area; Internal roads such as footpaths; bicycle paths; light motor vehicle roads; public transport.	Access roads to the area from most directions; internal roads are mostly vehicle orientated.	Both case studies are highly accessible areas.
Land uses	• Residential • Educational • Business • Commercial • Industrial • Social • Recreational	• Residential • Agricultural • Business • Commercial • Industrial • Recreational	Both international and local case studies are heterogenic areas in terms of land-uses
Topography	Level	Uneven with a few hills	Level topography simplifies planning while an uneven topography is more challenging.
Plants	Mostly natural indigenous	Mostly natural indigenous	In both cases a quality natural environment exists in terms of vegetation.
Animals	All animals living in the area is natural to this area.	Animals in the area are mostly used for farming purposes (game farming and livestock farming).	In both cases a quality natural environment exists in terms of animals.
Target market	Young families with children.	Farmers and farm workers with their families.	Both target markets are dependent on the environment: Young families for its

Needs of the target market	• Sustainable living • Strong community • Peacefulness • Natural resources • Recreational space	• Work opportunities • Peacefulness • Natural resources	peacefulness, recreational areas and resources; and farming families for its work opportunities and resources.
Ecosystem service categories that are most dominant	Regulating services, Cultural services, Provisioning services and Habitat services.	Regulating services and Cultural services	In the international case study, the dominant ecosystem categories are evidence of planning in accordance with conservation which enhances the ecosystem services. In Vaalharts the natural environment is left unplanned.
Interconnection of green areas	Yes, such as the green-avenue in Hammarby Sjöstad being a series of interconnected parks.	Not done intentionally	Interconnection of green spaces discourages the formation of lost spaces and encourages integration. In the settlements of Vaalharts the green spaces are isolated, but natural interconnection occurs along the rivers flowing through the area.

Source: Own creation (2014)

It is evident from Table 7.1 that the physical environment of the Vaalharts area is in many ways similar to the international case studies' physical environment, enabling opportunities for implementing similar planning approaches.

The following table indicates the comparison of the questionnaire results from the international case studies and the local case study (cross reference to Tables 5.10, 6.4 and 6.5 – Chapters 5 and 6).

Table 7.2: Comparison of Swedish and South African case studies: Questionnaires

Key points from questionnaire:	International case studies:	Local case study (Vaalharts):	Discussion:
Area's success in terms of green planning	Good management and sustainable green corridors running through the areas.	Conservation is done, but a lack of planning, finances and maintenance exist.	Planning and management of green spaces is determinative of its success, it is however lacking in the Vaalharts area.
Green planning supported by legislation.	Yes, according to key informants there is cooperation with ordinary legislation and goals of the legislation were followed in implementation.	Mainly yes, according to key informants the planning is done according to the ordinance and new legislation. The key informants add that it is however not visible in these areas.	Legislation should guide the planning of green spaces, not only to adhere to legislative requirements but to develop potential of providing benefits.
Key role players.	• Urban Planners • Ecologists and Environmentalists • Public community • Local Authority • Politicians	• Urban Planners • Environmentalists • Public community (to an extent) • Local Authority • Recreation experts	A variety of experts, as well as local residents, working together is crucial in the planning process.
Motivation for existence.	Seeking sustainability and restoring the area as well as the community from previous low quality lifestyles that existed in the specific areas.	In order to provide leisure needs and recreational activities.	A focus on restoring the area's quality influences the restoration of the community's quality of life. Approaches in the Vaalharts area do not completely consider this.
Spatial relevance to location.	Spatial relevance exists making the areas attractive, accessible and functioning.	No intentional spatial relevance.	Most green spaces in the Vaalharts area are not planned within the broader environmental context
Factors ensuring success.	Cooperation of professionals and the local community. Good locations, design variations and supportive economic activities.	Cooperation between different professionals and disciplines.	It is evident that trans-disciplinary partnerships ensure success.

Financial investment	Medium to high finances was available for the implementation of green spaces and environmental areas.	Limited financial provision made in South Africa for planning of green spaces	Evidence that a lack of finances is a gap refraining successful planning of green spaces in South Africa.
Familiar with the term, Ecosystem Services.	In some cases yes	Only some professionals	The amount of knowledge on the benefits that the environment can provide is determinative of how and why green spaces are planned for which will also determine the success thereof. In both cases there is still a lack of knowledge, however internationally some of the communities are aware of it as well.
Focus on Ecosystem Services.	In the areas where the residents are informed of ecosystem services (such as Hågaby), a focus on enhancing and using these services was created.	No, most residents are unaware of ecosystem services.	Hågaby's case study proved that it is important to inform the stakeholders (experts, as well as the community).

Source: Own creation (2014)

Based on the summative opinions of the key informants as indicated in Table 7.2, it can be concluded that certain gaps exist in the local South African approach to planning and provision of green spaces.

Accordingly the local South African approach to planning of green spaces was evaluated against the international best practices. The following table captures the key findings (conclusions) from the site analysis and questionnaires of the international case studies with the local case study (refer to Chapter 5.6; and Chapter 6.4 as well as Tables 7.1 and 7.2).

Table 7.3: Evaluation of the South African case study in terms of the international findings

Nr:	Findings and best practices identified in International case studies:	Evaluation of Local case study (Vaalharts) according to international findings:	Discussion and gap-analysis:
1.	Economic activity of urban centres supports the green spaces.	✖	Green spaces in the Vaalharts area are not situated near economic activities as few economic activities exist in the rural settlements.
2.	Direct environments consisting of natural green areas integrate easily with a settlement's green spaces thus creating more green spaces.	✔	The environments directly bordering the rural settlements are mostly natural green areas with indigenous vegetation.
3.	The interconnection of green spaces in settlements is an important factor in planning approaches.	✖	Most green spaces inside the rural settlements of the Vaalharts area are isolated from each other, but the rivers flowing through a few of the settlements cause some interconnection of green spaces to occur.
4.	The planning and design of other aspects such as housing and transport has an influence on the green spaces.	✖	Green spaces situated in the settlements of Vaalharts are not integrated with the surroundings and are planned isolated from the surroundings.
5.	The conservation of the natural indigenous vegetation and animals when planning for green spaces is crucial.	✔	The green spaces in the Vaalharts area consist mostly of natural indigenous vegetation as well as animals (in the game reserves).
6.	Cooperation between various professionals is important when planning for green spaces.	✔	A strength in Vaalharts is the cooperation of a variety of professionals in order to plan for a more sustainable area.
7.	Variations in the design of elements in the areas contribute to creating interesting and attractive areas.	✖	Green spaces in Vaalharts appear to be homogeneous, however they are used for different uses as well.

Source: Own creation (2014)

Based on the abovementioned comparative analysis and gap-analysis, the strengths and weaknesses of the Vaalharts area were identified, focussing on the planning for spatial and environmental benefits in green spaces (from Tables 7.1 – 7.3):

7.1.1 Strengths in the Vaalharts area regarding the planning for environmental benefits in green spaces:

I.   Vaalharts is situated in an area rich in natural green areas and indigenous vegetation as well as animals.
II.   The Vaalharts area is a highly accessible area.
III. A variety of land use types exist in the Vaalharts area.
IV.   Residents of the settlements in the Vaalharts area are dependent on the environment.
V.   Cooperation of different professionals within the planning process.
VI.   The abundance of water ensures the provision of sustainable green spaces
VII. The Vaalharts area has potential to support ecosystem services.

7.1.2 Weaknesses in the Vaalharts area regarding the planning for environmental benefits in green spaces:

I.   The Vaalharts area is located far from urban areas which creates a lack of economic activities in order to support planned green spaces.
II.   Green spaces in the Vaalharts area are mostly left unplanned with no vision, usage or maintenance plans.
III. Green spaces in the Vaalharts area are isolated from each other.
IV.   Most green spaces in Vaalharts are homogeneous (similar in appearance as well as function) – No unique qualities and functions.
V.   A lack of finances for the planning of green spaces exists.
VI.   The Vaalharts area needs a proactive plan addressing problems in the area.
VII. A lack of knowledge on environmental benefits exists in the Vaalharts area.

It can thus be concluded that the Vaalharts area has the potential to support ecosystem services and provide green spaces to local communities, but the weaknesses need to be taken into consideration and addressed accordingly in order to ensure successful planning and provision of green spaces within this area. The linkage between theory and practice should be strengthened to enhance successful planning and implementation of said planning approaches.

7.2 Linking theory and practice

7.2.1 Provision of ecosystem services in relation to spatial planning

The conclusions drawn in this section refer to Chapter 2 of the research.

Theoretical investigations suggested that parks and green spaces are the areas in human settlements that provide the opportunity to enhance sustainability and the appearance of environmental benefits.

As stated in Chapter 2.7 of this research it is important that knowledge and thus an understanding and consideration of ecosystem services is necessary in order to create and maintain a well-managed and sustainable environment.

The inclusion of green spaces as part of the area's infrastructure (green infrastructure planning – refer to Chapter 2.6) is important as can be seen in the international case studies where the planning of green spaces was considered a high priority and equally as important as other infrastructure in the settlements. In South Africa on the other hand, the lack of knowledge on the environmental benefits contributed to the misunderstanding that green spaces are a luxury for high income areas only (refer to Chapter 6.4) and not considered to be a necessity. The successful planning, implementation and maintenance of these green spaces will support communities to become more resilient, responding to change or disturbances without changing the basic state of the environment and enhance sustainable development for future generations.

International case studies illustrated the added benefit of identifying and understanding the value and benefits of green space provision, urging different key stakeholders to work together in creating a sustainable area which provide efficient environmental benefits. It is stated in Chapter 2.7 that the direct effects of the ecosystem services approach can best be observed when it is used to address challenges faced by poor communities. In the case of the rural settlements of the Vaalharts area, it is clear that these poor communities don't have an ecosystem services approach and thus need this new focus when planning for green spaces in order to achieve these direct effects.

When considering the theoretical principles regarding spatial planning and ecosystem services as summarized in Table 2.4 (in Chapter 2.7), the applicability of these principles in the international case studies and the need thereof in the South African case study is evident. The following table indicates the evaluation of the international and local case studies (refer to Chapter 7.1) in terms of the theoretical principles derived from Chapter 2.

Table 7.4: Evaluation of the case studies in terms of the theoretical principles derived from Chapter 2.

Theoretical principles (derived from Chapter 2):	International case studies:	Local case study (Vaalharts):
Key stakeholders have a focus on the environment and its benefits during planning and implementation.	✓	✗ (Refer to Table 7.2)
Green spaces planned to interconnect with each other.	✓	✗ (Refer to Table 7.3 – Nr.3)
Consider green space as green infrastructure and not separate from the settlements' other infrastructure.	✓	✗ (Refer to Table 7.3 – Nr. 4)
Providing multifunctional green spaces	✓	✗ (Refer to Table 7.3 – Nr. 7)
Providing different ecosystem categories (Ensuring a variety of ecosystem services)	✓	✓ (Current environment is beneficial for this principle and has great opportunity when planning is done - refer to Section 7.1.1. – Nr. VII)

Source: Own creation (2014)

It is evident from Table 7.4 that the planning of green spaces in the international case studies links with the theoretical approaches in terms of the provision of environmental benefits and that the local South African approach needs to be revised in order to be aligned with theoretical objectives. This section complies with the research's first primary objective (refer to Chapter 1.2.1) which states that existing literature on environmental benefits and ecosystem services will be examined.

7.2.2 Local reality of human settlements and the environment

The conclusions drawn in this section refer to Chapter 3 of the research and comply with the research's secondary objective nr. 1 in identifying possible problems relating to environmental planning in human settlements in South Africa (refer to Chapter 1.2.2).

When the Vaalharts area is considered, it aligns with Chapter 3.3 that stated that South African rural settlements face a number of environmental challenges which will be discussed in Table 7.5.

As stated in section 7.1.2 of this chapter, the Vaalharts area has no proactive plan in identifying current problems concerning planning for the environment and thus no approach to addressing these problems. The need for the identification and solving of specific problems in the Vaalharts area is evident from the literature in Chapter 3 as it states that it's important to take identified challenges into consideration when planning for future development and the environment, as it influences the quantity, as well as quality, of environmental services which green spaces provide. When the history and challenges of the local areas are taken into consideration, an overview of the area's demography, economy and environment is provided which contributes to the planners' and developers' understanding of the needs of the area (refer to Chapter 3.3).

The following table indicates the challenges in rural settlements as constructed in Chapter 3 (refer to Table 3.1), and the weaknesses of the Vaalharts area (refer to Chapter 7.1.2 and Table 7.3) in order to compare theoretical objectives and empirical reality.

Table 7.5: Evaluation of the Vaalharts area in terms of challenges identified in Chapter 3.

Challenges:	Influence on green spaces:	Influence visible in the Vaalharts area:
Existence of lost spaces	Deteriorated parks which serve no purpose and are in need of redesign.	✔ (Refer to section 7.1.1 – Nr. II, III, IV)
Fragmentation of human settlements	Encourages isolation, thus discouraging the use of green spaces.	✔ (Refer to section 7.1.1 – Nr. I, III)
Urbanisation	Pressurises the planning and maintenance of especially the green spaces in settlements.	✔ (Refer to section 7.1.1 – Nr. II)
Urban sprawl	Fragmentation of green spaces as urban sprawl follows no specific growth pattern.	✔ (Refer to section 7.1.1 – Nr. III and Table 7.4 – Nr. 4)
Poverty	The need of the poor communities on natural resources causes them to use the natural environment and green spaces in unsustainable ways thus causing degraded areas	✔ (Refer to section 7.1.1 – Nr. V, VII)

Source: Own creation (2014)

It is evident from Table 7.5 that the Vaalharts area aligns with the identified challenges of South African rural settlements captured in Chapter 3.

7.2.3   Policies and legislation

The conclusions drawn in this section refer to Chapter 4 of the research.

Policies and legislation are important for the inclusion and guidance of planning for the environment. It is evident from the questionnaire results (refer to Table 7.2) that the key informants of both international and local case studies are aware that the planning for green spaces is done within legislation. From the 14 policies and legislation evaluated in Chapter 4, only 4 of these policies and legislation indicated a weak level of support for the planning of green spaces that provide environmental benefits while the other 10 policies and legislation indicated a medium to high level of support.

The question however is whether these policies and legislation are comprehensive and sustainable to guide the planning and provision of green spaces in South African rural areas. The White Paper on environmental management policy for SA (1998) was concluded to be one of the policies with the strongest level of support for green spaces that provide environmental benefits specifically in rural areas (refer to Table 4.16 – Chapter 4).

Based on the level of support, the White Paper on environmental management policy for SA (1998), as indicated in Chapter 4.3.8, was therefore evaluated in accordance with the key findings on planning for the environment in the Vaalharts area (Section 7.1.1 & 7.1.2).

Table 7.6: Evaluation of Vaalharts according to the objectives of the 'White Paper on environmental management policy for SA'

Aims of the policy:	Does Vaalharts meet these aims?	Discussion:
Better quality of life and living environments.	✖	The Vaalharts area is located in a quality environment which is rich in natural resources, however the residents' lack of knowledge on maintaining these areas lead to a low quality of life (refer to Section 7.1.2 – Nr. IV, VII)
Access to land and natural resources	✓	Residents do have access to natural resources.
Integration of economic, social and environmental development	✖	Green spaces are isolated from surroundings and no economic activities are integrated with green spaces (refer to Section 7.1.2 – Nr. I, III).
Sustainable use of social, cultural and natural resources	✖	The residents don't have any maintenance or usage for their green spaces and has a lack of knowledge on sustainable living (refer to Section 7.1.2 – Nr. II, VII).
Public participation in environmental governance	✖	The problem of a lack of knowledge is sufficient proof.

Source: Own creation (2014)

It is evident from Table 7.6 that even though the policies and legislation consist of the right focus and aims, it is of great importance that the local communities are informed, educated and involved in order to be able to implement and maintain such approaches. It is thus evident that rural settlements in the Vaalharts area are in need of education and more public participation in terms of environmental planning policy and legislation.

7.3   Conclusion

7.3.1   Conclusions with regard to existing literature on ecosystem services

Refer to primary research objective 1 that states that existing literature on spatial and environmental benefits will be studied – Chapter 1.2.1, as well as the following secondary research objectives: (1) Identifying possible problems relating to environmental planning in human settlements in South Africa; (2) Identifying the different ecosystem services which are present in rural areas in South Africa.

The following conclusions on the green spaces of the Vaalharts area were drawn:

- The Vaalharts area does not comply with theoretical principles on environmental benefits.
- There is a lack of focus in terms of providing environmental benefits.
- No planning for the interconnection of green spaces exists.
- There is no integration of green spaces with the surroundings.
- No planning for the provision of multifunctional green spaces is done.
- The environmental problems originate from the challenges described in the literature such as the existence of lost spaces, fragmentation of settlements, urbanisation, urban sprawl and poverty.
- The quality of the natural environment has great potential to provide environmental benefits to the residents if these services are used and planned for.

7.3.2   Conclusions with regard to best practice approaches

Refer to primary research objective 2 that states that green national ande international green planning approaches in human settlements will be studied – Chapter 1.2.1. Refer also to the following secondary research objectives: (1) Reviewing urban planning methods to enhance environmental benefits in human settlements (especially in rural areas) internationally; (2) Reviewing urban planning methods to enhance environmental benefits in human settlements in

South Africa; (3) Evaluating the role of community participation in creating and maintaining green areas with ecosystem services in human settlements; and (4) Finding international best practices with regard to green planning that can possibly be applied locally.

The following conclusions on the empirical research were drawn:

- Accurate and detailed information on planning for green spaces was obtained because of the comparative analysis conducted.
- The international planning methods correspond mostly with the theoretical principles.
- South African rural areas has a great need in finding methods to enhance the provision of environmental benefits and correspond with the theoretical principles

The following best practice approaches were identified in the comparative analysis:

- Key stakeholders place a focus on planning for environmental benefits
- Green spaces are interconnected with each other
- Green spaces are seen as equally important as other infrastructure in the human settlements
- Green spaces are planned to be multifunctional thus providing different functions, needs and activities to the communities.
- Economic activity and green spaces are integrated which ensures support for the green spaces in terms of enhancing the usage of the green spaces.
- Green spaces are used to conserve the indigenous plants and animals.
- Key stakeholders consist of a great variety of professions.
- Green spaces are each designed uniquely in order to suit and enhance the visual quality of its specific area.
- Community participation plays an important role in maintaining the functions and benefits of the green spaces.

The final primary research objective stated in Chapter 1.2.1 will be addressed in the following chapter as recommendations will be made for the provision of new and innovative approaches to planning for the environment in rural areas in South Africa.

Chapter 8: Recommendations

The final chapter of this research aims at making recommendations in accordance with the conclusions drawn from the research conducted (refer to Chapter 7). This chapter also aims at addressing the final primary objective of this research, namely to provide new and innovative approaches to planning for the environment in rural areas in South Africa. These recommendations will thus focus on proposing approaches which (1) comply with suitable theoretical approaches, as well as best practice approaches found in international case studies; and (2) enhance and provide different ecosystem service types from the different ecosystem categories within local rural areas. This chapter will thus be divided into two sections containing recommendations according to the two above mentioned points.
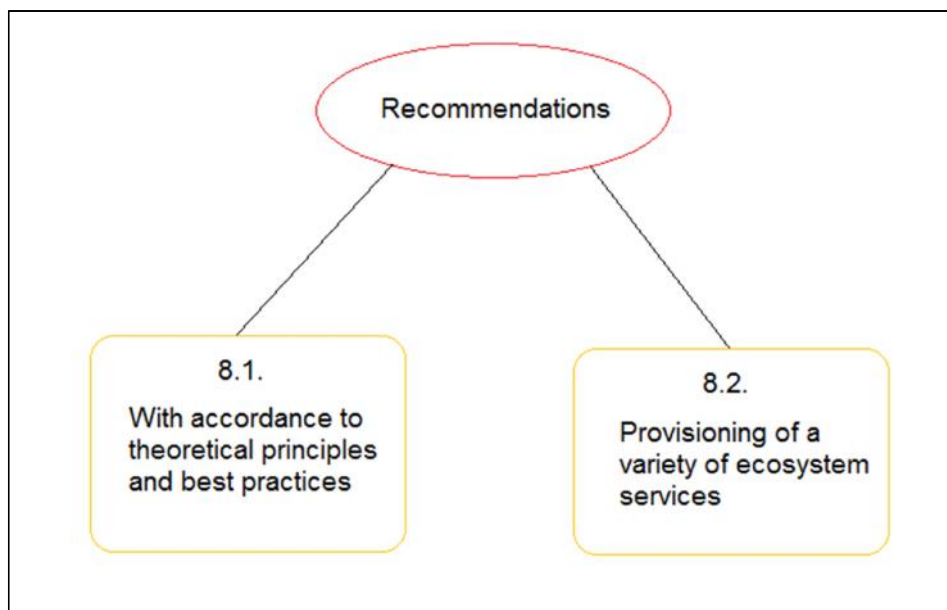
Figure 8.1: Structure of Chapter 8 (Recommendations)

Source: Own creation (2014)

8.1   Recommendations with accordance to theoretical principles and best practices

The recommendations in this section were made according to the theoretical principles in planning for the environment which was derived from the literature study (refer to Chapter 2). It was concluded in Chapter 7.3.1 that the Vaalharts area does not comply with a number of these theoretical principles (namely, a focus on providing environmental benefits; interconnection of green spaces; integration of green spaces with surroundings) thus causing a lack in the approach of planning for the environment. Recommendations on addressing each of the

theoretical principles are made accordingly and focus on best practice approaches (refer to Chapter 7.3.2).

8.1.1 A focus from key stakeholders to provide environmental benefits

It is firstly recommended that the key stakeholders included in the planning, development and maintenance of human settlements are informed about the importance of planning for the environment, as well as the benefits the environment can, in return provide, to local communities. These key stakeholders should thus be educated on the role and the importance of the environment, the different ecosystem services the environment can provide, and what approaches could be followed in enhancing and providing these green space benefits. Such education and academic programs should be included in higher education curricula, to ensure the training and delivering of professional experts that grasp the crucial role of green spaces and environmental benefits within the planning approaches.

The North West University (Potchefstroom campus) currently introduced a new module on Urban Ecology within the Urban and Regional Planning programme, educating students on the role and importance of the environment and thus green spaces within the planning process, and addressing how the environment can be better integrated within settlements in urban and rural areas. Similar modules and educational programmes should be developed and included in the curricula of disciplines linked to the planning and development profession.

Local authorities and municipalities should also be introduced to the benefits of green spaces and the role of the environment within urban planning approaches. As concluded in Chapter 7.2.3, a number of policies and legislation (such as the White Paper on environmental management policy for South Africa; Local Agenda 21; and National Spatial Development Perspective) support the planning of green spaces that provide environmental benefits (Cross reference to Table 4.16 – Chapter 4). It is recommended that a framework aiming to ensure the enforcement of such policies, be developed and implemented in the municipalities.

Once professionals and local authorities grasp the importance of the role of the environment within planning processes, the shift in focus can be communicated and transferred to the local communities. A method that was used in the international case study of Hammarby Sjöstad, is the education of residents by the use of placing educational information signs along the green spaces. These educational signs inform the residents on unique environmental qualities in the specific area (cross reference to Chapter 5.4.2). This was incorporated with hiking trails and other recreational activities in green spaces. The following figure illustrates an example of such

an educational information sign and approach that can be implemented within the local rural context of South Africa as well.

Figure 8.2: An educational information sign as recommended (left); An educational information sign in the international case study (right)

Source: Culture24 (2012); Own image (9 June 2014)

8.1.2   Interconnection of green spaces

The current reality in the Vaalharts area needs to be addressed, with regards to the isolated green spaces with no unique function. Isolated green spaces can be connected through various ways which will in effect create a lively, open and more accessible area for the community (cross reference to Table 2.3 – Chapter 2).

Green spaces which are separated by a road, railway track or river can be interconnected through the use of bridges. Bridges with a unique design suitable to the specific area can be designed in order to create and enhance a specific atmosphere or aesthetic feeling which can also be incorporated with a hiking trail to provide recreational activities in the green space. Eco-ducts (ecological bridges crossing a road with natural vegetation planted on the bridge) were used in the international case study (cross reference to Chapter 5.4.1) to connect green spaces with each other which was separated by a major regional road. The following figure illustrates examples of such bridges that connect green spaces, as possible solutions to address the local challenges.

Figure 8.3: A pedestrian bridge connecting two green spaces (left); An eco-duct in the international case study connecting green spaces (right)

Source: wikimedia.org (2014); Own image (9 June 2014)

The importance of connecting these green spaces, as mentioned in the literature study, is to provide a continuous green space which is accessible and convenient to use for pedestrians and fauna (cross reference to Table 2.3 – Chapter 2). This shifts the focus to safe and fast pedestrian orientated planning which is beneficial to poorer communities, such as local communities in the Vaalharts area.

The rivers and streams running through the Vaalharts area provide opportunity for interconnected green spaces as the rivers physically connect the green spaces. The interconnected green spaces along the rivers and streams should be planned in an integrated manner in order to enhance activities and services such as recreation, conservation of the natural environment and storm water management (cross reference to Table 2.3 – Chapter 2). The green-avenue that was planned along the canals in the international case study is a best practice example of transforming canals (which created lost spaces along the sides to canals) that provide benefits and activities to the surrounding areas (cross reference to Chapter 3.2.1). The planning of the green-avenue lead to the existence of sustainable interconnected green spaces. The following figure illustrates examples of planned green spaces along rivers or canals. This best practice can be adopted and implemented to address challenges and needs in the local rural context.

Figure 8.4: A planned green space along a river providing recreational activities (left); A part of the green-avenue planned along the canals in the international case study (right)

Source: Archpaper.com (2014); Own image (9 June 2014)

8.1.3   Integration of green spaces with surroundings

As concluded in Chapter 7.3.2, the international case studies consider green spaces equally as important as other infrastructure in the human settlements. This implies that key stakeholders consider green spaces rather as a necessity, and not a luxury as the current local reality often suggests. The integration of green spaces is therefore subject to the perception and focus of the key stakeholders (refer to Section 8.1.1). When the green spaces are regarded as part of a settlement's infrastructure, a link and interaction between the green infrastructure and other urban infrastructure can be pursued. According to the literature in Chapter 2, this can be achieved through functional and physical relations (cross reference to Table 2.3 – Chapter 2).

The green spaces in the Vaalharts area need to be planned according to specific functions which it can provide to the specific surrounding communities within the area. Green spaces located nearby schools and residential areas (accommodating large numbers of children), can be functionally integrated with the surrounding area by planning the green space with a focus which will attract children. The international case studies were found to be located mainly in areas with high numbers of young families and children. Green spaces were thus planned mostly as playgrounds and sport facilities in order to functionally integrate the green spaces to the surrounding communities (refer to Chapter 5.4.1 and 5.4.2). The following figure indicates the international studies' examples of green spaces that were planned as playgrounds to functionally integrate with the surrounding communities. Similar approaches can be implemented within the local context.

Figure 8.5: Green spaces planned as public playgrounds for the children in the international case studies of Hågaby and Hammarby Sjöstad

Source: Own images (9 June 2014)

The green spaces in the international case studies were situated near economic activities which ensured usage and support for the green spaces, as the economic activities attracted the residents to the specific area. In the international case study of Hågaby, a community centre with surrounding green spaces is situated in the centre of the settlement which attracts the residents to the area to buy food, and thus make use of the green spaces to eat and relax (refer to Chapter 5.3.1). The green spaces around the community centre are also used for markets on some occasions. It is thus recommended that economic activities such as local markets be planned in close proximity or even integrated with green spaces in the Vaalharts area. This will enhance the usage and functions of these green spaces, as well as the quality of life, in especially poor communities.

8.2   Providing a variety of ecosystem services in the Vaalharts area

As the quality of the natural environment in the Vaalharts area has great potential to provide environmental benefits (as concluded in Chapter 7.3.1), this section recommends some of the most important ecosystem services that can be enhanced in order to contribute to the enhancement of these environmental benefits. The recommended ecosystem services are also accompanied by recommended approaches to plan for these ecosystem services.

It is recommended, as stated in the literature, that provisioning is made for ecosystem services from all four the ecosystem categories (refer to Chapter 2.3). This ensures that a variety of ecosystem services are provided, addressing a great variety of the community's needs (cross reference to Table 2.3 – Chapter 2).

The recommendations for ecosystem services in the Vaalharts area from the different ecosystem categories are as follows (Section 8.2.1 – 8.2.4 cross references to Table 2.2 of Chapter 2):

8.2.1 Provisioning services

It is recommended that parts of the green spaces situated within the residential areas of the rural settlements are planned for the provisioning of food to the local communities. As the poor communities live in settlements of high density (refer to Chapter 3.2 and 3.2.5), every housing unit does not have of its own backyard and thus need space for their own food production.

It is thus recommended that community gardens be implemented in parts of the green spaces. A best practice approach derived from the international case studies is the provision of allotment gardens in green spaces located in walking-distance from the residential homes (cross reference to Table 5.7 – Chapter 5). The allotment gardens need to be made available by the government and will stay government's property. In order to plan and develop allotment gardens, parts of the green space need to be divided into little square plots whereas each plot is allocated to a specific family to grow their own fruit, vegetables and medicinal plants (cross reference to Table 5.7 – Chapter 5).

The following figure illustrates allotment gardens in the international case studies. Such approaches can be adopted and implemented in the local rural context of South Africa as well.

Figure 8.6: Allotment gardens in the international case study as recommended in the Vaalharts area

Source: Own image (9 June 2014)

Fresh water is another provisioning service which green spaces in the Vaalharts area can provide. As mentioned in Chapter 2.3, the local vegetation influences the quantity and quality of water availability in the specific area which in return influences the availability and usage of water for local communities in the settlements. The appointment of maintenance workers in the green spaces is recommended in order to ensure the conservation of the indigenous vegetation which is needed in order to naturally purify the water (cross reference to Table 5.7 – Chapter 5). The involvement of the local authorities and different professionals, together with the community, is a very important recommendation in this aspect, linking with the adequate training and education of the community members (refer to Section 8.1.1).

8.2.2   Regulating services

It is recommended that vegetation in green spaces are planted and maintained. As mentioned in Chapter 2.3, trees and plants in green spaces regulate the air quality by removing pollutants from the atmosphere thus improving the liveability and health in human settlements. The appointment of maintenance workers to ensure the conservation of the indigenous vegetation is thus also a crucial point of consideration for this ecosystem service category.

The regulation of storm water in the Vaalharts area can also be enhanced through the planning and provision of ecosystem services. It is important to understand as Chapter 2.3 states, that the natural vegetation, including the soil, act as filters of water, breaking down waste in water through biological activities as the water flows through vegetated areas. It is thus recommended

that built water drainage pipes along the roads be incorporated with the natural environment by removing parts of the built concrete pipes in order to ensure that the storm water flows through vegetated areas as well to filter the water. The water thus has to be directed towards the green spaces where it can be absorbed by trees and plants, or directed to water sources such as dams or streams in the green spaces, as in the cases of the international case studies (cross reference to Table 5.7 – Chapter 5). This will ensure a sustainable regulation of water in terms of storm water, ensuring that the water don't go to waste or become polluted. The following figure indicates the endpoint of a ditch directing the storm water toward the green-avenue and the canal flowing through the green-avenue in the international case study.

Figure 8.7: Storm water directed to green spaces in the international case study

Source: Own images (9 June 2014)

8.2.3 Habitat or supporting services

It is recommended that green spaces in the Vaalharts area are conserved as habitats for plants, animals and other wildlife. This area's natural environment is considered a great habitat for African wildlife as a few nature reserves exist (cross reference to Table 6.3 - Chapter 6). It is recommended that current protected nature reserves which are located close or adjacent to human settlements be integrated with these settlements' green spaces. This will create a continuous habitat spreading throughout the entire Vaalharts area (This recommendation only considers small mammals, insects and birds that cannot be kept in by fences like larger, dangerous mammals are protected). Integrating the nature reserves with the settlement's green spaces was proven to be successful in the international case studies, through the use of interconnection methods such as eco-ducts as explained in Section 8.1.2.

Educational signs and information boards should be incorporated within specific locations within the area, as in the international case study of Hammarby Sj stad where green spaces were integrated with the Nacka Nature reserve information and notices. This informs the community on the other natural residents in the settlements and creates awareness of conserving the habitats of these small mammals, insects and birds. The following figure illustrates an educational information sign of the Nacka nature reserve bordering the international case study. These information signs are placed throughout the green spaces of the settlement and could be adopted to fit the local context and rural reality.

Figure 8.8: An example of the international case study's information sign as recommended for the Vaalharts area

Source: Own images (9 June 2014)

8.2.4   Cultural services

As tourism is already an evident cultural service in the Vaalharts area (cross reference to Table 6.3 - Chapter 6), it is recommended that tourist activities be integrated with green spaces in settlements. This can be done by using the green spaces as special markets or festivals on occasional days in order to sell agricultural products unique to the Vaalharts area, such as olives. This will enhance the usage of the green spaces and ensure opportunities to inform tourists on the natural environment as well the history of the Vaalharts area. This also provides economic benefits which brings a vital source of income to the Vaalharts area through the usage of the natural environment. The international case study of Hågaby used this method, thus creating an awareness among the tourists about the importance of the environment as well as sustainable living (refer to Chapter 5.3.1).

The integration of nature reserves with the green spaces in settlements, as discussed in Section 8.2.3, not only enhances habitat services, but also enhances cultural services. It is recommended that throughout the continuous green spaces integrated with the nature reserves, recreational activities such as hiking trails along with the educational signs (as mentioned in Section 8.2.3) can be implemented. This contributes to the residents' mental as well as physical health, and creates an aesthetic appreciation in the area. The following figure illustrates unique hiking trails in the international case studies. Such approaches can be incorporated in the local rural reality as well.

Figure 8.9: The start of the Linnae hiking trail in Hågaby (left); The educational boardwalk hiking trail along a water source in Hammarby sj stad

Source: Own images (9 June 2014)

Another recommendation to enhance cultural activities in the Vaalharts area is to conserve the plants and trees in the green spaces as mentioned in Section 8.2.1. Trees are used in the settlements for shade and provide a peaceful atmosphere as well as aesthetic value to the settlements.

8.3   Final conclusion and recommendations

The primary objective of identifying innovative approaches to planning for the environment in South African rural areas has been addressed in this chapter. It is however evident that the sustainability of these recommended approaches is greatly dependent on the cooperation of the local communities, local authorities and professionals involved in the planning process.

The following table captures the summative conclusions based on best practices identified, and the evaluation of the spatial and environmental benefits of green space provision.

Table 8.1: Summative conclusions based on spatial and environmental benefits

Best practices identified in this research	Spatial benefits	Environmental benefits
Educating and informing professionals on the importance of providing environmental benefits.	- Expands the knowledge and insight regarding sustainability included in the spatial planning process. *(Refer to Section 8.1.1)*	- Enhancement of residents' quality of life *(Refer to Section 8.1.1)*
Interconnection of green spaces.	- Creates lively, open and accessible areas for the community. *(Refer to Section 8.1.2)*	- Recreational activities - Conservation of the natural environment - Storm water management *(Refer to Section 8.1.2)*
Green spaces regarded as part of a settlement's infrastructure.	- A spatially integrated area - Quality planned areas - Accessible *(Refer to Section 8.1.3)*	- Regulation of storm water from urban infrastructure to green spaces (Filtered water) - Healthier air quality *(Refer to Sections 8.1.3 and 8.2.2)*
Multifunctional spaces.	- Mixed land uses - Good accessibility amongst different uses *(Refer to Section 8.1.3)*	- Gardens for food provisioning - Recreational activities (hiking) - Educational activities (school tours) - Economic activities (shops and restaurants) - Social activities (relaxation and community markets) *(Refer to Sections 8.1.3 and 8.2)*
Integration of green spaces with surroundings.	- A spatially integrated area - Open and accessible areas *(Refer to Sections 8.1.2 and 8.1.3)*	- Enhances the usage and functions of green spaces, - Enhances the quality of life, in especially poor communities *(Refer to Sections 8.1.2 and 8.1.3)*
Conservation of indigenous plants and animals in settlements.	- Attractive areas - Influences types of functions in area and thus physical structure of the settlement. *(Refer to Section 8.1.3 and 8.2)*	- Provide source of income for the area (tourism – Nature reserves) - Purifies flowing water - Healthier air quality - Habitats for animals *(Refer to Section 8.2)*

Source: Own creation (2014)

Finally, it can be concluded that, as was also the case in the international case studies, the following two issues are of great importance in the planning of green spaces to provide environmental benefits, also in the local South African context: (1) a unique green planning approach created for the specific area and (2) a team of key role players understanding the importance and role of green spaces within the spatial planning reality, creating an integrated area (urbanised or rural) which provides environmental benefits to the community, while simultaneously conserving the natural environment.

ANNEXURES

Annexure A: Site Analysis Format

Site Analysis

Area: _____   **Date: _____**

1) Macro environment:
1.1)   Location:

1.2)   Direct enviroment (land uses around area):

1.3)   Movement networks in an around area:

1.4)   Land uses in the area:

2) Physical area:
2.1)   Topography:

2.2)   Plants:

2.3)   Animals:

2.4)   Floodlines:

2.5)   Focus points in the area:

3)   Users of the area:

3.1) Who is the target market:

3.2) Needs of the target market that gets addressed:

Annexure B: Questionnaire Format

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To whom it may concern:

Urban and Regional Planning
Tel: 018-299 2400
Fax: 086 515 7118
E-mail: juanee.cilliers@nwu.ac.za

28 May 2014

Re: Masters Study Urban Planning

I, Dr Juaneé Cilliers, is the Study leader of Luan Cilliers (Student number 22242856), registered for the degree M.Art et Scien (Masters in Planning) at the North-West University, South Africa.

Mr Cilliers is currently conducting the empirical investigation of his research entitled "Evaluating the spatial and environmental benefits of green space: An international and local comparison on rural areas".

It would be greatly appreciated if you could assist by completing the attached questionnaire. Information and data obtained will be used for research purposes only.

Please contact me if you need any further information.

Kind regards,

Dr. Juaneé Cilliers
Senior Lecturer
Urban & Regional Planning
North West University
Potchefstroom

Evaluating the spatial and environmental benefits of green space: An international and local comparison on rural areas

Date: _____ Location: _____

Name of participant: _____

Designation: _____

Experience with green space planning: _____

_____

Questionnaire:

1) Would you say that green spaces in South Africa can be seen as successful in terms of the planning done here? Please motivate your answer.

   _____
   _____

2) Would you say that the 'green planning' in South Africa is done within legislation? Please motivate your answer.

   _____
   _____

3) Who are all the key role players who are involved in the planning process for green spaces in South Africa? Different professions?

   _____
   _____
   _____

4) What would you say is the motivation for the existence of green spaces?

   _____
   _____

5) What is the spatial relevance of green spaces in SA?

   _____
   _____

6) What would you say are the key factors ensuring the success of green spaces in SA?

   _____
   _____

7) Do you know of any financial investment for the planning and implementation of green spaces in SA? _____

8) a) Are you familiar with the term 'Ecosystem services'? _____

b) Would you say that there is a focus on Ecosystem services in the planning of green spaces in SA? Please elaborate by using examples you are familiar with in SA.

_____
_____
_____
_____
_____
_____
_____
_____
_____

9) Please fill in the following table by providing what you think is the strengths, weaknesses, opportunities and threats of the planning process for green spaces in SA:

Strengths:	Weaknesses:
Opportunities:	Threats:

Thank you for your time!

Annexure C: Structured Questionnaires with Key Informants

Annexure C1

Evaluating the spatial and environmental benefits of green space: An international and local comparison on rural areas

Date: 5/5/2014   Location: Hågaby

Name of participant: Per Berg

Designation: Main Planner

Role played in this specific area: Planner and Project leader in Hågaby as well as the communicator as my biggest role.

Questionnaire:

1) Would you say that this area can be seen as successful in terms of the 'green infrastructure' done here? Please motivate your answer.

Yes, the energy and waste water management is an indicator. Advanced water management however is still an expensive system.

2) Is the 'green planning' done within legislation? Please motivate your answer.

Yes, Cooperating with ordinary legislation - So there's no special rules & financing.

3) Who are all the key role players who were involved in the planning process of this area? Different professions?

We follow an integration of Top down & Bottom-up where the communication between specialists & the community is very important. Key role players: Planners, ecologists and /the public.

4) What was the motivation for the existence of this area?

＊For the people to find free solutions for sustainability.
＊To restore the community (Create a strong community)

5) What is the spatial relevance in terms of its location?

Interface between urban & rural → This is the best location for such a village

6) What are the key factors ensuring the success of this area?

The recirculation of decisions

7) What was the estimate financial investment for the planning and implementation?

Low at the start, but as the village grew in popularity → more expensive

8) a) Are you familiar with the term 'Ecosystem services'? Yes

b) Would you say that there is a focus on Ecosystem services in this area? Please elaborate by using examples from this specific area.

A lot of trees which provide clean soil & air as regulation regulation services. Canopies of trees are seen as very important.
We have a windshield wall that l-is the wind over the settlement. We are familiar with social & cultural services thus the focus on the community centre. We found a golden way to give access to people to "see the value of the green structure.

9) Please fill in the following table by providing what you think is the area's strengths, weaknesses, opportunities and threats:

Strengths:	Weaknesses:
- Quantitately use very much less ending resources - Strong community - Interested from whole community - Good environment for entrepreneurs	- Recycling sewage sistem is not organisational - One entreprenuer left and affected whole community.
Opportunities:	Threats:
- Opportunity for new factory & educational centre & residential houses - Electric vehicles being planned - Activities close to each other brings more opportunities. - Opportunity for Psychological activities because of the peacefulness (stress management)	- If a key player goes down, they take others with. - If the centre is sold out it will lose the whole social generator. - The world's ignorance + every decision being made effects Hagahy

Thank you for your time!

183

Annexure C2

<u>Evaluating the spatial and environmental benefits of green space: An international and local comparison on rural areas</u>

Date: _2014 - 06 - 13_   Location: _HAMMARBY SJÖSTAD_

Name of participant: _BJÖRN SEVELKVIST_

Designation: _ARCHITECT_

Role played in this specific area: _PLANNER IN THE PROJECT LEAD_
FROM THE CITY OF STOCKHOLM

Questionnaire:

1) Would you say that this area can be seen as successful in terms of the 'green infrastructure' done here? Please motivate your answer.
RATHER GOOD CONSIDERING IT IS A DENSE INNERCITY AREA.
GREEN CORRIDORS THROUGH THE WHOLE PLAN

2) Is the 'green planning' done within legislation? Please motivate your answer.
WE HAVE FOLLOWED THE GOALS PUT UP BY THE CITY. "THE
WALKABLE CITY" IS THE LEAD WORD FOR THE LONG TERM PLAN

3) Who are all the key role players who were involved in the planning process of this area? Different professions?
POLITICIANS, PROJECT LEAD FROM THE CITY — URBAN PLANNING AND
REAL ESTATE OFFICE, ENVIRONMENTAL ADMINISTRATION, LOCAL AUTHORITY,
DEVELOPERS (35), WATER/ENERGY/WASTE MANAGEMENT, TRAFFIC PLANNERS
FROM THE REGIONAL ADMINISTRATION

4) What was the motivation for the existence of this area?
NEED OF NEW HOUSING — REUSE OF LOW QUALITY LAND.

5) What is the spatial relevance in terms of its location?
CLOSE TO INNER CITY AREA, WATER FRONT, TIGHTERING OF
THE URBAN AREA

6) What are the key factors ensuring the success of this area?
LOCATION, GOOD TRANSPORT, DESIGN VARIATIONS, EFFECTIVE
LAND USE, LUCKILY A POSITIVE ECONOMY

7) What was the estimate financial investment for the planning and implementation?
30 BILLIONS

8) a) Are you familiar with the term 'Ecosystem services'? _NO_

b) Would you say that there is a focus on Ecosystem services in this area? Please elaborate by using examples from this specific area.

WE CALL IT "SYMBIO CITY" AND MIGHT BE SIMILAR. THE RECYCLING OF WATER, WASTE, ENERGY AND MOBILITY. AN ECO CYCLE SYSTEM.
WASTE TURNED INTO ENERGY AND NEW MATERIALS.
SEWAGE-WATER TURNED INTO FERTILATION AND ENERGY (ADD FRESH WATER)
BIOGAS FROM BOTH SEWAGE AND SOLID WASTE.
LOW CAR USE WITHIN THE AREA AND COMMUTING

9) Please fill in the following table by providing what you think is the area's strengths, weaknesses, opportunities and threats:

Strengths:	Weaknesses:
POPULAR LOCATION MODERN VARIED DESIGN WATERFRONT SHOPS AND RESTAURANTS	SEGREGATION/ECONOMICALLY LACK OF SOCIAL MIX
Opportunities:	Threats:
ADDING MORE WORK-PLACES/OFFICES EXPERIENCES TO NEW URBAN AREAS	OVERFLOODING CHANGE IN ECONOMY

Thank you for your time!

185

Annexure C3

<u>Evaluating the spatial and environmental benefits of green space: An international and local comparison on rural areas</u>

Date: 17/9/2014.   Location: Jan Kempdorp

Name of participant: Liesbet Barrett

Designation: Project Manager - WIN Project.

Experience with green space planning: Very little - depending on need

Questionnaire:

1) Would you say that green spaces in South Africa can be seen as **successful** in terms of the planning done here? Please motivate your answer.

No, no prior planning or needs assessment was planned! Now green spaces are logistically unaccessible to far for the communities.

2) Would you say that the 'green planning' in South Africa is done **within legislation**? Please motivate your answer.

No, because to many projects have been build and they are not sustainable.

3) Who are all the **key role players who are involved in the planning process** for green spaces in South Africa? Different professions?

Community, Municipalities, Recreation, & Town planners

4) What would you say is the **motivation for the existence** of green spaces?

Our youth and recreation and leisure needs as well as education.

5) What is the **spatial relevance** of green spaces in SA?

Relevance → transformation. I know alot of commis. are trying to implement better planning however we are still trying to catch up after apartheid.

6) What would you say are the **key factors ensuring the success** of green spaces in SA?

Inter-sectorial partnerships.

7) Do you know of any **financial investment** for the planning and implementation of green spaces in SA?

Yes.

8) a) Are you familiar with the term 'Ecosystem services'? Yes.

b) Would you say that there is a focus on Ecosystem services in the planning of green spaces in SA? Please elaborate by using examples you are familiar with in SA.

The one's I know of are from the WFW (Working for Water) - programme that clears mountain catchments and riparian zones of intrucive plants to restore the natural fire regimes.

9) Please fill in the following table by providing what you think are the strengths, weaknesses, opportunities and threats of the **planning process for green spaces** in SA:

Strengths:	Weaknesses:
- Creates more trans-disciplinary opportunity. - Strengthens the 'green' movement.	- Not all communities want green spaces thus "destroy" them after implementation
Opportunities:	Threats:
- Get more youths of the community involved in planning process.	- Top down approaches towards implementation.

Thank you for your time!

187

Annexure C4

Evaluating the spatial and environmental benefits of green space: An international and local comparison on rural areas

Date: 15/9/2014   Location: Potchefstroom

Name of participant: Nicolaas Johannes Blignaut

Designation: Professional Town- & Regional Planner

Experience with green space planning: 20 Years experience in Town Planning & related services.

Questionnaire:

1) Would you say that green spaces in South Africa can be seen as **successful** in terms of the planning done here? Please motivate your answer.

   Green areas conserved according to SDF, however Finances & maintenance lacks

2) Would you say that the 'green planning' in South Africa is done **within legislation**? Please motivate your answer.

   Yes, according to ordinance, SEA & new legislation

3) Who are all the **key role players who are involved in the planning process** for green spaces in South Africa? Different professions?

   Town Planners appointed for Land Use Management + Environmentalists & Engineers

4) What would you say is the **motivation for the existence** of green spaces?

   Depending on specific area
   Most unused open spaces → Developed for estates

5) What is the **spatial relevance** of green spaces in SA?

   Green spaces depends on the area it is situated in

6) What would you say are the **key factors ensuring the success** of green spaces in SA?

   The successful areas are those that recieve maintenance

7) Do you know of any **financial investment** for the planning and implementation of green spaces in SA?

   No provision made in SA.

8) a) Are you familiar with the term 'Ecosystem services'? ___No___

b) Would you say that there is a focus on Ecosystem services in the planning of green spaces in SA? Please elaborate by using examples you are familiar with in SA.

___No, —___

9) Please fill in the following table by providing what you think are the strengths, weaknesses, opportunities and threats of the **planning process for green spaces** in SA:

| Strengths:	Weaknesses:
* SA has great environmental value. * Parks-department plays a role.	* Lack of Financial investment & Maintenance.
Opportunities:	Threats:
* Public green spaces can bring more interaction & recreation * Green spaces need more emphasis in planning	—

Thank you for your time!

189

Annexure D: Complete Land Cover map of Vaalharts

Land Cover 2012

- Broad Leaved Bushes and Shrubs
- Broad Leaved Deciduous Trees
- Broad Leaved Evergreen Trees
- Built-up Industrial, Commercial and Non-Residential Areas
- Built-up Linear Feature
- Built-up Object
- Built-up Urban / Residential Areas
- Canals
- Consolidated Bare Rock and Coarse Fragments
- Consolidated Cuttings
- Consolidated Hardpans
- Cultivated Aquatic or Regularly Flooded Vegetated Areas
- Forbs and Herbland
- Graminoids
- Herbaceous
- Herbaceous Graminoids
- Herbaceous Non-Graminoids
- Loose and Shifting Sands
- Natural Salt-Pans
- Needle Leaved Trees
- Non-Built-up Artificial Bare Area
- Non-Perennial Pans
- Non-Perennial Rivers
- Ocean
- Perennial Freshwater Lakes
- Perennial Rivers
- Shrubs and Bushes
- Standing Artificial Water-Bodies
- Trees
- Unconsolidated Bare Soil
- Urban Vegetated Areas
- Woody Wetlands
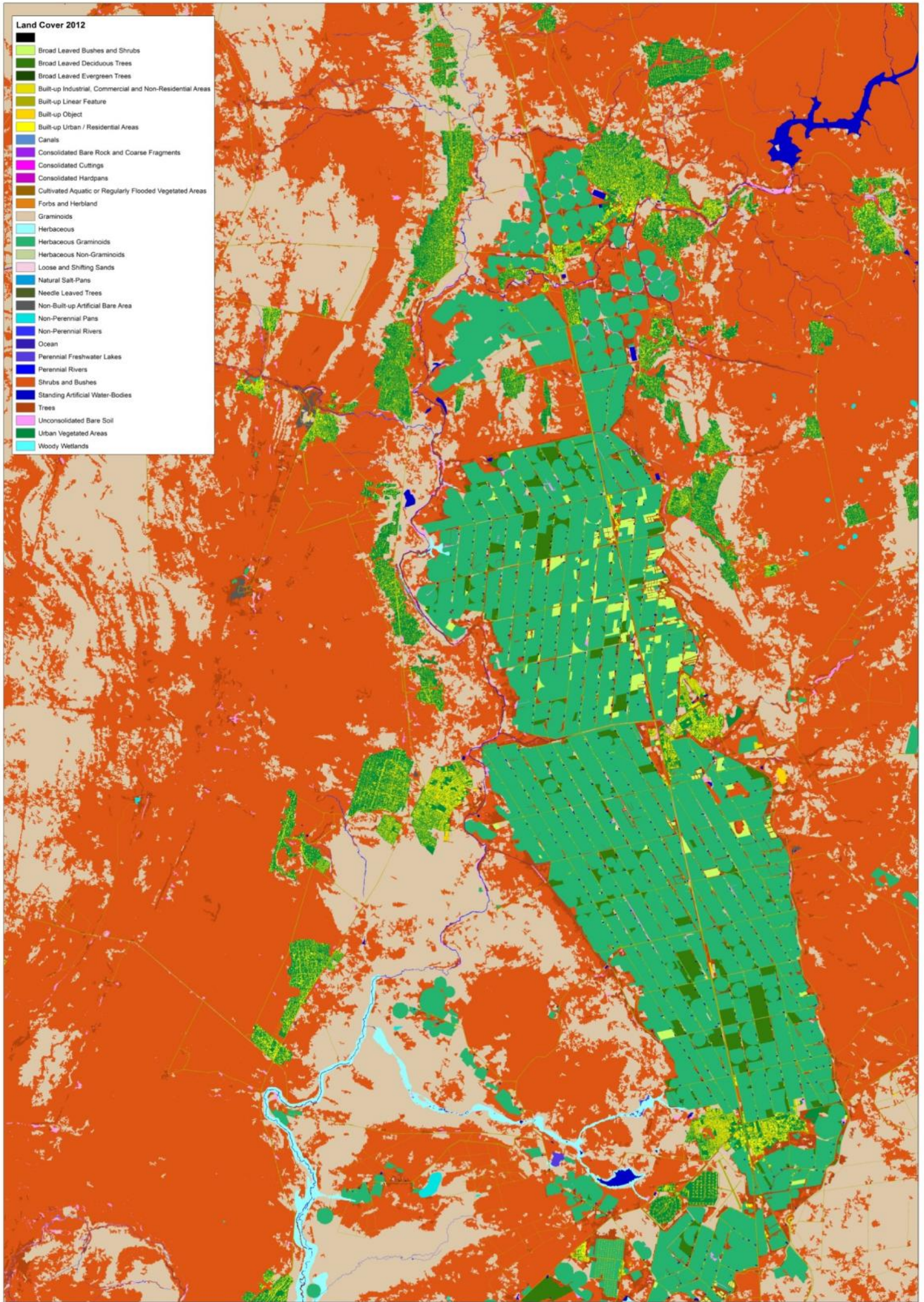
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