APPLICATION OF THE CONCEPT OF THE SUSTAINABLE CITY IN LOW – INCOME HOUSING AREAS: A CASE STUDY OF AMBLETON HOUSING AREA, MSUNDUZI MUNICIPALITY

By

REV. CYPRIAN OBIORA ALOKWU

Submitted in partial fulfillment of the academic requirements for the degree of Master of Environment and Development, School of Environmental Sciences, Faculty of Science and Agriculture, University of KwaZulu- Natal, Pietermaritzburg

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Abstract

The growing urban population in South Africa has challenged the government's ability to provide adequate housing for the urban poor. In order to respond to the challenges, the government embarked on the initiative of providing Low – Income Housing (LIH). There is, however, a growing concern that these LIH developments may not be sustainable due to a number of reasons, including issues relating to land use and sub- standard construction of houses. There is need to make these LIH areas more sustainable. This can be done by employing the concept of the sustainable city. The concept in recent times has been considered by many people as an ideal to which cities should aspire. The main thrust of this study is to evaluate the concept of the sustainable city in the context of LIH in Ambleton, a settlement constructed by the government to relocate people from illegal, informal settlements within the inner city especially those found adjacent to the industrial areas. The study focuses on the issues of land use in LIH. This focus on land use is underpinned by the fundamental views that land use contributes to urban sustainability. As a result, it is necessary to examine ways in which land is being used in LIH areas and see if the current land use in Ambleton contributes to sustainability. The study shows that some people are satisfied with the amount of open spaces around their houses. Many others, however, are not satisfied because they considered open spaces in their yard inadequate. Furthermore, public open spaces are not properly managed because there are no services to manage it. In the same vein, people have to travel long distances to get to their places of work and town for economic and leisure activities. Similarly, the provision of waste services and medical services in the study area is grossly inadequate. The study argues on that basis that the above scenario is not in accordance with the concept of sustainable city and can not therefore contribute to the sustainability of the area of study.

PREFACE

The research described in this mini- dissertation was carried out as part of the requirements for the award of the Master of Environment and Development at the Center for Environment, Agriculture and Development, University of Kwazulu- Natal. The research was conducted under the supervision of Professor Rob Fincham and Ms. Mary Lawhon.

The mini- dissertation represents the original work of the author and has not been submitted in any form for any degree or diploma at any university. Where use was made of the works of others, it has been acknowledged in the text.

The work was divided into two components. Component "A" comprises the official requirements according the Center for Environment, Agriculture and Development, University of Kwazulu- Natal. Component "B" which focused on the results from the research is presented in the form of a paper suitable for acceptance in a journal. The journal chosen for this purpose is "The South African Geographical Journal".

Signed_____ Student

Signed_____ Supervisor

Signed_____ Co- Supervisor

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

Chapter One

Introduction and Problem Contextualization

This section presents the general introduction to the study. This is done by providing the context under which the study was carried out. The context that created the need for the study is highlighted in the form of the statement of the problem. The introduction further states the aim and the objectives of the study. It finally provides a conceptual framework, which the study adopts.

1.1 Towards the establishment of a sustainable city

The provision of goods and services for the residents of low income housing (LIH) units in many African states is generally believed to be in appalling condition (UN Habitat 2002). This worsening situation of service delivery is being continuously exacerbated and accelerated by the spontaneous urban growth being currently witnessed in the continent. Although it has been observed that there is a global trend in the rapid rate of expansion of the urban areas, the fastest growth is occurring in developing countries and Africa is no exception in this regard (Brown and Pierre 1994, UNCHS 1996, Bartone 2000). The above was explicitly presented by the World Health Organization publication titled "Global Challenges in Cities: With Focus on Africa" that: stated:

> Africa's rates of demographic and urban growth are the highest in the world. Urban growth rates in many African countries exceed 4%, whereas in developed countries urban growth is static or even negative. In Africa, the percentage of the population living in urban areas is 37%. This is expected to reach 54% in 2030, and in a few countries, it will be as high as 80%. (WHO Undated p: 1).

Rural –urban migration, expansion of urban activities and boundaries as well as the natural population growth are some of the key contributing factors to this phenomenon (Envirofact undated). It has been argued that urban expansion in developing countries, more so Africa is not going to stop or

stabilize in the near future (UNCHS 1996, Srinivas 1996). For instance, Schwartz (2002) is of the opinion that although the world's three largest cities in 1960 were all in the developed countries (New York-14.2m; Tokyo 11.0m; and London 9.11 m), it is projected that by the year 2015 two of the five cities will now be in the developing countries (Mumbai 26.2 m and Lagos 24.6 m).

The rapid growth of urban cities and the resultant effects should be seen both in terms of its immediate and cumulative effects on the natural environment, the built environment and the socio-economic environment (UNEP undated). The environment generally is placed under pressure because of urban growth. Natural environment in this context refers to resources, processes and effects related to flora and fauna, human beings, minerals, water, land, air. The built environment refers to the resources, processes and effects related to buildings, housing roads, railways, electricity, water supply, gas, etc. Socio-economic environment on the other hand considers issues relating to resources, processes and effects related to human activities, education, health, arts and culture, economic and business activities, and urban life styles in general (ibid). The effects of urban growth and activities have outweighed the relative advantages thereof in many instances. For example, along with the so-called benefits of urbanization come also the fear of resource exhaustion resulting from undue pressure on the natural environment, the acceleration of the processes of the socio-economic activities through globalization and industrialization. The built environment has also been adversely affected by other anthropogenic activities. Of very significant consideration is the effect of urbanization on urban health especially the urban poor (McKinney 2002).

A partial consideration of these effects on only an aspect of the environment referred to above at the exclusion of others, poses the inevitable danger of moving towards unsustainable cities. Therefore, a clear understanding of the dynamics, the interdependent relationship at play in the three aspects of the *environments* as well as the interdisciplinary and multidisciplinary approach is needed. This has become crucial to the development of coherent and sustainable policies and programmes aimed at addressing the challenges of

urban growth in the continent where it is assumed that the population explosion is occurring at a faster rate (Simone 1999).

The implication of the above calls for urgent and concerted effort in addressing the problem of urban expansion in Africa. Uncoordinated and unmanaged process of urbanization poses a very serious threat to the whole concept of sustainable city in many developing countries of the world. Africa is no exception. The table below summarizes the problems associated with urbanization especially in the continent.

Table1.1 Problems of Urbanization

Unemployment	Two-thirds (2/3) of migrants from rural to urban centers are in the age group 15–29 years. They create a demand for employment that only a few cities are able to meet.
Poverty	High rates of rural migration and low levels of economic growth are causing an increase in urban poverty. African cities have the highest rate of poverty (40%) of all the world regions.
Environmental Pollution and Degradation	The informal economy of urban settlements in the region contributes to the degradation of the environment through: Weak regulatory structures that lead to haphazard disposal of industrial by-products; Poorly constructed residential workplaces with large amount of soil and water pollution; and Porly enforced emissions regulations for factories and motor vehicles

Health problems	Residents, especially the poor, of African cities are suffering from health problems related to both underdevelopment and industrialization. Underdevelopment is characterized by low incomes, limited education, overcrowding, inadequate food and unsanitary conditions. There is a heavy burden of communicable diseases: malaria, diarrhea, upper respiratory tract infections and skin diseases. Almost half of the children in Africa show signs of malnutrition.

Source: (after WHO Regional Office, Brazzaville. Undated).

"Sustainable city in this context refers to the concept of the establishment of urban forms and processes that are both more environmentally benign and better able to deliver improvements in quality of life to the majority of the urban inhabitants" (Habitat International 2005:35). Sustainable city is achieved through minimizing resource inputs and waste output. Urbanization has consequently brought about the present concern in many African states on how best to make urban cities both livable and sustainable (UNHCS 1996).

The concerns being expressed by African governments on the rapid rate of urbanization has generated some thought provoking questions. For instance, the question of whether African countries have the capacity, the political will, appropriate policies, appropriate technology and skills and other relevant resources to adequately tackle the demands placed on the continent by the current growth rate is very crucial. Srinivas (1996:264) contends that, "inadequate financial resources, ineffective institutional structures, weak legislation or their implementation, lopsided policies and lack of adequate trained manpower (sic) are some of the major factors militating against the concept of sustainable city in African states". An articulation of solution to the

above challenges has particularly become necessary in order to ensure that these cities are not only livable but also are sustainable.

1.2 The Context of the Study

Environmental discourse on urbanization has recently assumed a central position within the wider discussions of sustainable development. The concentration of population in urban cities apparently reveals the extent to which economic activities create both costs and benefits (Unsworth 2004). Cities are increasingly becoming the *engines* of national economic growth and the magnets for new residents flooding in from rural areas (Moore and Richardson undated). Natural growth is also recognized as one of the contributing factor to this trend of urban growth. This is because families expand through marriages and birth rates thereby resulting in the expansion of number of people and urban growth.

Urban population is not only responsible for more than half of the global production of goods and services; it also accounts for a much larger proportion of all wastes and pollution (Unsworth 2004). Urban lifestyles and consumption patterns could be attributable to most if not all the environmental problems that we currently encounter in the world today (UNEP undated). The rate of urban growth and its demands on various governments casts doubts on their ability to adequately meet the challenges of service delivery in the context of sustainable city. High population in cities has placed an increased demand on basic infrastructure and services such as housing, sanitation, water, schools and health facilities. There has not been corresponding infrastructure and service development in most African states urban environments in Africa are therefore characterized by insufficient provision of safe water, appropriate sanitation, and disposal of solid waste, drainage of surface water, housing, education and health infrastructure. As a result, a large number of urban populations especially the poor are exposed to hazards of poverty, poor sanitation, disease, psychological and social stress (Unsworth 2004).

Rural to urban migration in South Africa however has a peculiar context. This is because racially exclusive   policies of apartheid were introduced in the early

20th century during the apartheid era as a means to control and restrict different population groups in settling in the urban areas (Erika 2003). However, when the apartheid regime, which hitherto restricted people's movement, was dismantled and a new democratic government installed, there was a mass movement of people from rural to urban areas. This is particularly evident from the suggestion that in Free State alone, up to 50 per cent of rural people on commercial farms in the province have migrated to urban areas since 1999, settling mainly in informal settlements on the periphery of almost all urban areas in the province (Marais and Krige 1997).The Free State experience is true of almost all the provinces in the country. As a result, it is estimated that since the new democratic government came into existence, 57% or 21 million of all South Africans have migrated to towns and cities mainly because of the lifting of racial restrictions on where people may live and work (Envirofacts undated). Low levels of economic growth and unemployment have also been identified as one of the additional causes of urban growth in South Africa. Economic recession in rural areas drives people to the cities (UNCHS 1996). Underemployment and unemployment, one of the factors that pushed people to the cities, keep poor people trapped in slums and squatter settlements (Marais and Krige 1997).

Because of the scenario described above, urban population growth experienced in South Africa has resulted in the increase of pressure on the existing land available for, inter-alia, urban development, on basic infrastructure, municipal services, facilities and jobs. There is, therefore, a growing concern from many quarters about whether this increase in population could be adequately matched with the ability of various municipal governments to provide for such needs as food, energy, housing, employment, education and health care services while at the same time protecting our *fragile* environment. However, one has to acknowledge that it is not the duty of government alone to provide the aforementioned social needs and services. The private sector, non- governmental organizations and individuals all have to complement government effort in this regard (personal observation). This concern has become critical considering the rate of unemployment being experienced in many of South African cities. Many of the people who migrated to cities always have high hopes of finding jobs as

Aristotle in his popular dictum put it that "men come together in cities for security; they stay together for good life" (Blumenfeld 1979:34). However, many of them end up being frustrated. This is because when they finally arrive at the cities, they discover to their utter disappointment that the housing, jobs, incomes, amenities and the dreamt *rosy life* that had attracted them to the city are not available or are inaccessible. Unemployment, lack of accommodation and other essential services in themselves can have tremendous negative consequences on both the environment and the urban poor. Some of the major consequences of unemployment are considered below (Srinivas 1996).

Firstly, since many unemployed find it difficult to make ends meet, they usually resort to the exploitation of their immediate environment as a survival strategy in the face of adverse economic situations.

Secondly, because the unemployed are primarily concerned with meeting the necessities of life like food, water, shelter and clothing, the issue of environmental sanitation or environmental protection is often not accorded the priority attention it deserves.

Thirdly, the issue of traffic congestion as a result of increase in the number of motor vehicles becomes a very critical one. The critical areas of concern are mainly the incessant accidents in and around the urban areas together with the problem of air pollution especially in the form of carbon emissions (World Bank Agenda 1996).

Fourthly, urbanization comes with a heavy demand for housing. Because of the great number of urban migrants, many African governments have not been able to adequately address the issue of housing (Unsworth 2004). South Africa is not an exception in this regard. The housing situation in South Africa at the moment is still very critical. However, there has been a tremendous improvement on what it used to be during the apartheid regime. The difficulty and delay of the South African government to provide enough accommodation for their teeming urban population has given rise to the

ubiquitous sprouting of informal settlements, which are usually located in the urban peripheries. Although these outlying areas are easy to settle on because they are less costly and coupled with the fact that they are very far from the *eyes* of the government, the big problem however is that services that go on in these areas are either grossly inadequate or as in most cases non existent (Shelter Forum 2002). In a bid to respond to these housing problems, the government embarked on the provision of LIH to accommodate its urban population. The provision of the LIH has its own challenges on the ability of the government to provide basic services to the residents. The living conditions of the urban poor have been negatively influenced by the severe backlog in housing and services. This expression underscores the synergetic importance of a study of this nature because it will provide the basis for the appraisal of the policy that established the LIH.

The implications of the above on both the natural environment and the health of the urban residents are enormous. This implication has also created the need to explore the links between LIH resident's health and the natural environment since humanity's total environment is a synthesis of man-made and natural systems (Church 1980). This exploration is necessary to understand the dynamics of the natural and urban environment and their roles in the sustainability of cities with regard to LIH. This understanding will determine, to a large extent, the application of appropriate approach(s) in the pursuit of a sustainable city. Apparently, efforts in achieving sustainable city will invariably lead to a better management of the natural environment. Better environmental management will lead to the materialization of the South African constitutional provision of a safe environment for all South Africans.

In pursuing the aforementioned aspiration of the constitutional provision for a safe environment, it is apparent therefore that some fundamental policy reforms, which were initiated by the present democratic government especially in the areas of LIH, be strengthened so as to realize the concept of sustainable city in its entirety. This review has become necessary considering the fact that there is a presumed gap between these policy reforms and their implementation (Ngcobo 2004).

The growing concern and the subsequent debate around sustainable cities have generated a substantial academic and policy literature. The concept of ' the Sustainable City' is fast gaining ground as an ideal to which cities should aspire and has almost become a converging ground for many environmental activists, professionals and politicians in recent years. Underpinned by fundamental views on what urban sustainability constitutes, the concept of sustainable city denotes concerted and deliberate efforts aimed at reversing and where possible, halting those trends that pose threats to ecosystems health and the well-being of cities in general. It is becoming increasingly clear that there are a number of different approaches and models through which sustainable city could be pursued (Wheeler and Beatley 2004).

Sustainable city proponents argue that by dealing with such issues as solid waste, rain sewage, land-use, transportation, housing, energy efficiency, social conflict and poverty (these could hamper the ecosystems health), cities can be turned into more livable environments. The main goal of sustainable cities, they argue, is the conceptualization and implementation of the urban sustainability agenda (Nyambe 2005, pers.comm). Urban sustainability agenda seeks to explore means of protecting the urban ecosystems health while promoting the welfare of urban population. However, proponents have not generally agreed upon ways and means of achieving this. As a result, there has been a long-standing debate on the most effective means of achieving sustainable city, hence the review of various models.

The concept of sustainable city it appears has been implemented with some degree of success in developed countries of the world (Hardoy and Satterthwaite 2001). The problem however is whether it could be successfully implemented at the same degree in developing world especially in Africa. This question has become necessary because there are huge differences between the cities of for example, Europe, North America, Asia and Africa (William 1996). These differences are not only reflected in the context of land usage but also in attitudes and perceptions of people informed by different worldviews on city life. Therefore questioning the appropriateness of these models is not only logical but also irresistible since there is no guarantee that whatever worked in these developed

countries will automatically work in Africa. The problem that confronts many environmental activists, city administrators, policy makers and indeed all who are concerned about the sustainability of cities in African context, is to determine an appropriate approach or if possible develop criteria that are uniquely African, which would specifically address those factors that militate against the realization of urban sustainability especially with regard to LIH areas.

In South Africa, for example, population growth trends, a consequence of the lifting of the apartheid restriction which had hitherto restricted people's movement especially blacks from living in cities has resulted in the provision of LIH to address this population explosion. There is a growing concern that these LIH after all may not be sustainable due to a number of reasons including land use issues. The challenge now is how to make these LIH areas more sustainable by employing the ideals of sustainable city.

As a result, it has become absolutely necessary to examine ways in which lands are being used in LIH areas and see if the current land use could contribute to sustainability. This is because improper land use could drastically affect the ecosystems health and therefore impede sustainability. There is need to encourage optimal use of available land space with a view to improving the ecosystems health and that of the residents of LIH in general. This is exactly the contribution, which this study hopes to make.

1.3.1 Aim

The aim of the study is to investigate current land use within the context of sustainable city criteria.

1.3.2 Objectives

In the light of the above aim, five objectives are identified. They are:

1. Through a literature review, establish criteria under which the concept of sustainable city in LIH could be assessed.

2. To examine the current land uses in Ambleton and see if they contribute to sustainability.

3. To apply sustainable city criteria to evaluate land use status in Ambleton.

4. To assess the usefulness of sustainable city criteria to the case of Ambleton.

5. Make appropriate recommendations, based on the study, of how the LIH in Ambleton can best achieve sustainability.

1.4 Conceptual Framework

This conceptual framework is used by the researcher to guide the execution of the study. The framework, an outcome of interaction with theoretical concepts from various literatures, identifies the link between sustainable city and the concept of sustainable development. The concept of sustainable development whose fundamental implication is that development should not be achieved at the detriment of the environment in general, shares certain characteristics with the concept of sustainable city because of their emphasis on sustainability with reference to the future generations- (intergenerational concerns). The study establishes models and criteria for assessing sustainability. These are identified as open space, compactness and urban agriculture. They were used as benchmark for evaluating the sustainability of the LIH areas in the context of sustainable city. The study also examined the current land use based on these

criteria with a view to determining how they contribute or hinder sustainability in LIH in the study area. It also focuses on various approaches for achieving sustainable city. Finally, the findings of the study is expected to serve as a contribution to the general discourse on sustainable city as well as a feedback to the policy, which established LIH in the Msunduzi municipality. This feedback will be communicated to the local government authority, the local stakeholders, and the councilors who are the representatives of the community.
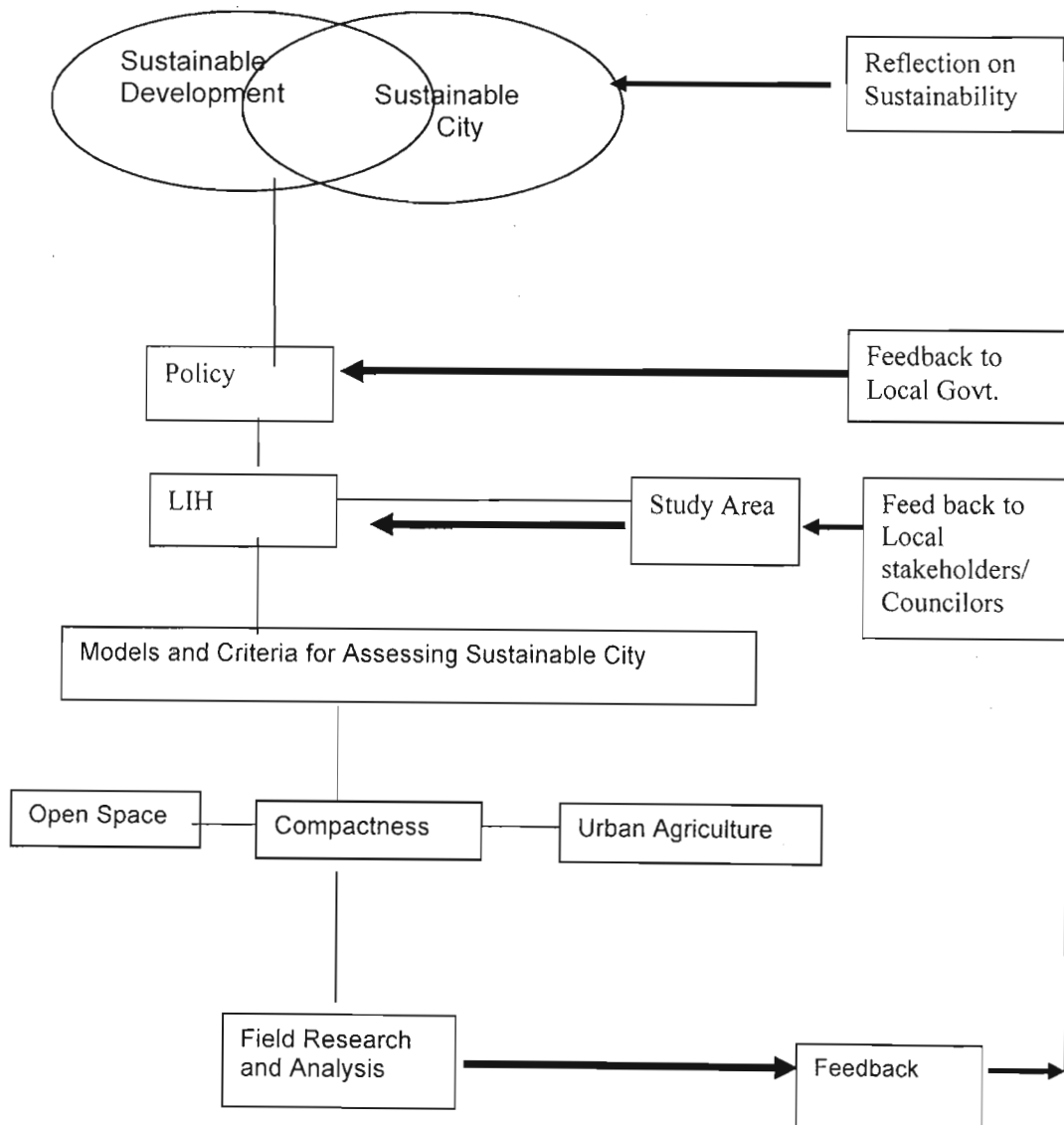
Figure 1.1 Conceptual Framework for the study

1.5 Conclusion

This chapter has presented a general introduction to the study. It has also dealt with the context that created the need and the relevance of the study. This was done in the context of the problem statement, which addressed the current rate of urban growth and the resultant inadequate service delivery. Furthermore, it articulated the aim and the objectives of the study as well as the conceptual framework which identifies the link between Sustainable Development and the Concept of Sustainable city

Chapter Two

Sustainable City: An Historical Analysis

This chapter traces the historical emergence of sustainable development and how it is associated or related to the concept of the sustainable city. Various concepts and models of cities are also examined. One of the salient views is the one that sees sustainable city as both ecosystem and a living organism. It is evident from the discussion on this section that sustainable development has greatly contributed to the shaping of environmental discourse since its appearance in the development arena.

2.1 The Concept of Urban Sustainable City

For a better and easier understanding of the concept of sustainable city, it is necessary for one to begin with the concept of sustainable development, which is a more familiar, and general concept in development discourse. Sustainable development has become a widely discussed and sometimes a controversial theme in development theory. Sustainable development is such a broad concept that it means different things to different people. Because of its broad nature, it can be approached from different dimensions and disciplines. It is therefore a multi –dimensional concept that cuts across various disciplines.

Development from which sustainable development derives, generally is a multi –faceted process through which human well –being is promoted (Kamaara 2002) via improved education, incomes, skills development and empowerment (Macro Environment and Telecommunications undated). The term whose home discipline is economics, gained prominence after the Second World War and is equated to Western Industrial Capitalism as a means through which newly independent developing countries would catch up with developed nations (Koshy 2000). Initially, development referred exclusively to material well-being of nations and individuals, using economic growth as an indicator (Kamaara 2002). Thus, the level of a country's development is usually measured by its economic growth by the usage of

such terms as Gross National Product (GNP) and Gross Domestic product (GDP) (ibid).

With the passage of time, a recognition that saw human person not just as body in material terms but also as mind and soul emerged (Kamaara 2002).This paradigm shift in development discourse saw the emergence of such phrases as "human development", "integral development" and more recently "sustainable development". Kamaara (2002) observes that the idea of "human development" and "integral development" speaks to the notion of human personality and emphasizes the need to recognize the multi- faceted aspects of the human person while discussing the issue of development. This is what she referred to as the realization of *real* development. One has to observe here that Kamaara's notion of human development is not different from Paulo Freire's concept of humanization, which basically talks about the development of the total man (Freire 2003).

2.2 Sustainable Development: Historical Perspective

The term "sustainable development" appears to have been used for the first time in the 1972 book, *Limits to Growth,* and has been applied widely to urban planning and architecture (Wheeler and Bealtley 2004). The concept of sustainable development has continued to receive global acclamation ever since it was publicized by the World Conservation Union in its world conservation strategy (Redcliff 1997). Since then, there have emerged several meanings of this concept from different fields of study and discourses so much so that there is polyphony and almost discordant voices about a consensus definition of the concept.It has been continuously modified over the past decades and this has given rise to a number of different meanings and ideas that it has almost become an ambiguous concept which lacks consistency in its use (Binns 1995). It has been argued that the search for a unitary and precise meaning of sustainable development may prove abortive (Redcliff and Woodgate 1997). This is because according to Huby (1998), it has become a statement of idealistic philosophy, a confused and contradictory concept reflecting ambivalent social goals. As a result, a large body of literature has emerged all in a bid to explore the meaning of this "enigmatic" term.

This section seeks to highlight some of the salient definitions of the concept, its historical development and how the concept of sustainable city evolved over time through the concept of sustainable development. In tracing the historical emergence of this term, great emphasis and reference will be made on the insights provided by Wheeler and Bealtley (2004) in the preceding three paragraphs. Here, attention is paid to the late 19th and early 20th century social reformers who showed much concern about the deterioration of urban conditions and the need for alternative living environments. One of the most influential of these was Ebenezer Howard, who inspired generations of urban planners and designers. Howard and his contemporaries like Patrick Geddes and Lewis Mumford saw the extreme overcrowding of early industrial cities-with its accompanying problems of sanitation, poor waste management services, pollution and public health as the main problems to be addressed. They called for a new balance between city and country in which population were decentralized into carefully planned new communities in the countryside.

These social critics of the early 20th century laid the foundation on which the professions of landscape architecture and city planning now stand. These professions mainly focused on providing picturesque parks and living environments to urban residents and also ensured the forms of infrastructure, housing, land use, transportation and other services that were viewed necessary for orderly urban setting.

Another prominent discipline that followed in this concern was the field of economics. This focused on the notion of economic growth and limitations of economics in regulating human and natural systems. Prominent personalities in this field are the British economist and social critic, John Struart Mill who first raised the notion that a *steady – state economy* is much more desirable (ibid). This notion was popularized by other economics such as Kenneth Boulding, E.F.Schumacher and Herman Daly. They are all in consensus that economic growth and development should be considered in relation to the limited resources which the earth is capable of producing. Schumacher in particular was famous for what is called his "wise counsel" in which he was

quoted as saying "we must live simply that others may simply live" thereby advocating for what he called "voluntary simplicity" (Cock 1991:64). This statement was later to serve as a benchmark in development discourse in relation to people's consumption styles.

Wheeler and Bealtley (2004), argue that the history of sustainable development has a more direct association with the field of natural resource management. The concept of managing ecosystems for sustained resource yield was applied to wildlife species and fisheries as well as to forestry by Germany and America who were experiencing severe problems of over cutting of forests and depletion of natural resources (ibid). The "conservationist" perception which was based on the thinking that humans are different from nature and managing natural resources for human use is contrasted with the preservationist perceptive. The preservationists maintained that nature has intrinsic value and should therefore be protected for its own sake. Perhaps Lynn White was speaking from a preservationist point of view when he particularly accused Christianity and the Western anthropocentric attitude, of "sowing the seed of the contemporary environmental crisis" (Connelly and Smith 1999:11). Both perceptions have played a role in recent sustainable development discourses and have contributed to the philosophy that urges human responsibility to care for and work towards the restoration of the natural systems. The fundamental issue to be considered here in terms of ecosystems sustainability is the role of humanity within it. This relationship or the role of humanity in my opinion, determines the type and level of interaction human beings have with nature.

Moreover, there are still others who argue that *Sustainable development* as a phrase is associated with the fields of biology, cosmology and ecology, and it relates to the idea of interdependency, association and co-operation existing between all animate and inanimate beings (Kamaara 2002). Sustainable development being such a wide and multi- dimensional discourse is elastic and can be stretched to any imaginable length from any discipline.

In theological treatise for example, sustainable development has also become a welcome phenomena to be discussed from a theological perspective. For example, The World Council of Churches in its document, *One Earth Community, Ethical Principles for Environment and Development*, which is intended to complement the Rio Declaration; urges human society to bear a (stewardship) responsibility towards the Earth in its wholeness (Wamback 2001).

No event in the history of sustainable development had a profound effect, which brought the discussion and debates to global limelight in the recent times than the Brundtland commission. In 1987, the United Nations Commission on Environment and Development issued its landmark report, *Our Common Future,* commonly known as the Brundtland Report (ibid). The Brundtland Commission report succeeded in calling attention to the need for sustainable development and a common global agenda in that regard. It thus laid a strong foundation for the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 with the famous declaration known as *Agenda 21*, which established directions for sustainable urban development (Wheeler and Bealtley 2004).

Many other subsequent events and programmes followed. For example, The 1996 Habitat II known as "City summit" which produced a lengthy consensus document on urban development principles and best practices in city – building, the 2002 World Summit on sustainable development held in South Africa and other conferences (ibid)

The Rio Declaration on Environment and Development gave prominence to the classic and still fashionable term used to refer to the type of development, which takes the environment seriously, *sustainable development.* It defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Wamback 2001). Sustainable development is a reminder to us that our natural resources are limited and is in fact, in danger of running out. It is also a warning that development beyond certain levels could not only

jeopardize the ecosystems but that the continued existence of man on the surface of Earth is also in jeopardy. Sustainable development is therefore a caveat that reminds both individuals and governments that for development to continue, the limited, fragile life – supporting resilient capacities of our planet must be preserved (ibid).

Despite the multiplicity of meanings from social, political, economic, and lately religious dimensions, there is what looks like a convergence of views, an emerging consensus of ideas of what sustainable development meant to many different people from different orientations. The central themes that cut across the term "sustainable development" are encapsulated in the articulation made by Redcliff and Woodgate (1997), which stated that sustainable development:

- Is applicable to all geographic scales. It is a concept that has received global recognition and acceptability
- is concerned with improving the living standards and conditions of people especially the poor and the disadvantaged;
- is aimed at promoting equity within and between generations as well as between and within nations;
- Facilitates popular participation in development or decision –making

For sustainable development to be realized, individuals, NGOs, religious organizations and governments must as a matter of necessity strive to work towards achieving a sustainable society. Sustainable society from my own understanding has some similitude with the concept of sustainable city. This similarity was clearly brought out by Wamback (2001:83) who defined a sustainable society as a "society whose renewable resources are consumed no faster than they can be renewed and non- renewable resources are consumed no more rapidly than renewable substitute can be found".

2.3 Conceptualizing the City

The city as one finds it in history is the point of maximum concentration for power and culture of a community (Wheeler and Bealtley 2004). The aim of this section is to find out the various thinking about cities. What are cities, why should they matter to us both as human beings and as environmentalists? What are those

things that make cities and their contents so significant to us? How can we make cities more livable and sustainable? Given the nature of this study, one has to admit that one might not be able to provide all the answers to the above questions. Apparently, one of the ways to approach the above issues is to consider the argument that cities are significant to us because essentially they represent places, that is, specific locations in space that provide an anchor and a meaning to who we are as individuals and communities. Ralph (1976:43) provided us with the basis for this thinking about the significant role of cities in our lives when he argues that:

> "There is for virtually everyone a deep association with and consciousness of the places where we were born and grew up, where we live now or where we have had particularly moving experiences".

Defining and delimiting cities are difficult. This is because cities, towns or urban areas are used synonymously and they have different connotations to different people, and can be used in different contexts. Sociologists, anthropologists, economists and environmentalists all have different perceptions of what a city is. However, there seems to be a common ground where all these different fields of studies converge on issues relating to cities. One can easily observe what basically looks like a central theme in the different perceptions of city. Such central features or characteristics of a city is seen in the thinking that regarded city as a dense zone of human habitation where economic, political and other forms of social and religious activities are highly differentiated and primarily non agricultural in character (Calhoun 2002).

Geographers, demographers, sociologists and other students of urban form draw numerous distinctions among types of cities, forms of administration and dominant functions. According to these distinctions, cities are categorized into commercial, industrial, residential and capital cities depending on their primary functions (ibid). There are however, cities, which can combine all, or

most of these features by providing political, cultural, economic, social and religious functions simultaneously. Such cities are referred to as "primate cities" (ibid).

Recently, attention has been drawn to the phenomenon of "edge cities". Edge cities are regarded as peripheral to major cities that have served much of their connection to the traditional down town, becoming independent concentrations of residential, work and retail activity (ibid). Much of the discussions in this study will be concentrated on the thinking that regards cities as both "edge cities" and "primate cities" because many of the urban populations are interspersed between these forms of cities. This is also where city life styles resulting in many challenges of urbanization are mostly felt.

Amos Hawley, a sociologist at the university of Michigan, strengthened and transformed these thinking and different perceptions of cities into a theory that alluded to cities as a mechanism for the adaptation of human beings to life in a larger environment (Orum *et al* 2003). He postulated the idea of *interdependence* of the various groups of the city and noted how such *interdependence* was a key element to the survival of the human community in cities. Although one can deduce from this concept of cities as a mechanism for the adaptation of human beings with the exclusion of other components of the environment as representing a very anthropocentric stance, it nevertheless influenced and greatly contributed to subsequent thinking on different concepts on the meaning of sustainable city.

2.4 What is a Sustainable City

Perhaps it is pertinent at this juncture to ask what a sustainable city would mean. The Oxford English Dictionary defines sustainable as "the ability to be maintained at a certain rate or level". Sustainability in relation to city is seen as the equitable preservation of the built and natural environments, cultural heritages, and economic opportunities (Unsworth 2004). This implies that there is no fixed standard of sustainability since it varies according to the context in which it is defined. The standard of sustainability differs from country to country and is considered in many different ways - especially in different

geographical/economical/social contexts according to level of development (Chakrabarti 2001). However, the general idea behind the concept of sustainable city is that it seeks to achieve the goals and aspirations of sustainable development, which is meeting the needs of the present such as food, shelter, health care and other human needs, without compromising the needs of the future generations (Drakakis- Smith 2000).

The concept of sustainable city to me is not only elastic; it is also fraught with some ambiguities. This view on the elastic and ambiguous nature of sustainability is in consonance with Mitchell's (1997) view when he argued that sustainable city like its twin sister sustainable development is a utopia. Redcliff (1987) was explicit on the elusive and complex nature of this concept when he metaphorically opined that like motherhood and God, it is difficult not to approve of it. At the same time, he accepted that the concept of sustainable development is fraught with contradictions. The point I want to emphasize here by referring to Redcliff's view is that sustainability as a concept whether it is in relation to development or city; is ambiguous, complex and even contradictory to some degree. This contradictions according to Redcliff (1987) is clearly brought out in a manner that makes the concept susceptible to controversy especially when one considers the fact that there are no truly environmentally, socially, and economically sustainable cities. This is hard to come by, not even in the so-called developed world when one considers the real meaning and implication of the concept.

However, my aim here is not to engage in the controversy of whether sustainable city as a concept is a utopia or not, but to lend a *supporting voice* to Johnston et al (1994) who reminded us, that if not for any other thing, the concept has provided a focal point for discussion and debate in what he called "the current chaotic realm of global change". This "focus" has usefully served as a reminder, nay, not a mere reminder but a caveat that our natural resources are limited and are in fact, in danger of running out. Therefore the quest to meet the basic demands placed on cities by the current spate of urban growth beyond certain levels could not only jeopardize the ecosystems but that human health and the entire existence of man on the surface of earth

is also in danger. This reminder or more accurately warning will help government at all levels to integrate issues of environmental conservation with those of urban environmental planning especially in the developing world including Africa.

Every city is a living body, a living organism as St. Augustine said (Szerszynski 2004). Cities are constantly evolving, changing, and taking new forms, and one could argue that the sustainable city is one that simply lasts through the ages, which also has the ability to rebuild itself and adapt to the changes of time (ibid). One characteristic of sustainable city is that it has no universally accepted definition. However, issues relating to quality of life are universally central to the concept of sustainable city. For example, the *Urban 21 Conference* (sustainable city Undated), had the achievement of improving the quality of life in a city, including ecological, cultural, political, institutional, socio and economic components without leaving a burden on the future generations, as one of its main agenda.

The Mountain Association for Community Economic Development (MACED) conceives of sustainable city as the ability of city inhabitants to make development choices, which respect the relationship between the three "Es"- economy, ecology and equity (Hart Environmental Data, undated). In their view, economic activities should serve the common good, be self –renewing and build local assets and self-reliance. It has to recognize also that human beings are part of nature and that nature has limits. Therefore, communities should be responsible for protecting and building natural assets. Equity on the other hand, speaks to the notion of granting of equal opportunity for full participation of all in all activities, benefits and decision making of a society. Another view on sustainable city regards sustainable city as a community, which uses its resources to meet current needs while ensuring that adequate resources are available for future generation (Concern, inc.1993). The sustainable city seeks to improve public health and a better quality of life for all its residents by limiting waste, preventing pollution, maximizing conservation and promoting efficiency (ibid).

The Institute for Sustainable Communities captures a broader view of the meaning of sustainable city when it defined it as:

> Towns and Cities that have taken steps to remain healthy over the long term. These communities value healthy ecosystems, use resource efficiently, and actively seek to retain and enhance a locally based economy. Partnerships between and among government, the business sector, and non profit organizations are common. Unlike traditional community development approaches, sustainability strategies emphasize the whole community (instead of just disadvantaged neighborhoods); ecosystem protection; meaningful and broad- based citizen participation; and economic self-reliance. *(Institute for Sustainable Communities. Undated).*

One can, therefore, on the basis of the above definition, argue that it covers almost all the essential characteristics of sustainable city which Drakakis-Smith (2000) noted is all about achieving the goals and aspirations of sustainable development with respect to meeting the needs of people as well as protecting the environment.

2.5.1 What is an Ecosystem?

Ecosystem is a natural complex of plants and animal populations and the particular sets of physical conditions under which they exist (Gilpin 1976). The word "ecosystem" is derived from two words – "ecology" and "system" and appears to have been coined by A.G Tansley, a British ecologist in 1935 (ibid). The "eco" part of the word implies environment while the "system" part of the word refers to the interacting, interdependent complex (ibid). It is used to refer to a community of interdependent organisms and the physical environment they inhabit. The individual organisms interact with each other and with their environment in a series of relationship made possible by the flow of matter and energy within and through the system (ibid).

Natural ecosystems are theoretically self-sustaining, but increasing human interference is threatening their sustainability in many parts of the world and various methods of ecosystem management have been introduced in an attempt to preserve and protect the natural ecosystems (Kemp1998).

The concept of dynamic balance among the constituents of the environment is referred to as environmental equilibrium (ibid). This concept means that changes in one of the components, tending to produce instability are countered by changes in others, which attempt to restore the balance. It is a dynamic process that includes a continuing series of mutual adjustments among the elements involved. The rate, nature and extent of the adjustments required will vary with the amount of disequilibrium introduced into the system. There are however periods in every environment when relative stability will be maintained with only minor adjustments.

This inherent stability of the environment tends to dampen the impact of changes even as they happen and any detrimental effects that they produce may go unnoticed. At other times, the equilibrium is so disturbed that stability is lost and major responses are required to restore the balance. Many environmentalists view the current environmental deterioration as the result of human interference in the system at a level that has pushed the stabilizing mechanisms to their limits (ibid).This distorting human interference informs the current emphasis placed on preservation and restoration of the ecosystems so as to continually maintain the balance.

2.5.2 The Sustainable City as an Ecosystem

The purpose of this section is to investigate or rather explore how patterns of human and ecological responses emerge from the interactions between human and the natural environment and how these patterns affect ecological resilience in urban ecosystems. Today, we are bombarded with alarming statistics on the rate of urban growth, which presents a bleak and perilous future for our ever-growing cities. For example, according to United Nations report, 60% of earth's inhabitants will live in cities by 2030, in the same year, global carbon dioxide-emissions are expected to increase by almost two-thirds of what they are today. By 2025, worldwide energy consumption is expected to grow by 54%, while worldwide oil production is predicted to begin declining in 2016 (Leddy 2005).

This exponential growth of urban cites has some serious implications when one considers the increasing rate of pollution and the declining rate of both renewable and non-renewable resources. While the data presented in the previous paragraph might be debatable or frightening depending on how one looks at it, the underlying realities however cannot in any way be ignored. The underlying realities are that we live in a time of unprecedented urban growth and global change occasioned by our own attitude to environment and our life styles. By referring to these facts, one is neither treading on the path of *survivalism*, nor advocating for a *prometheanism* approach to these environmental problems. Referring to these data is only intended to generate some thought – provoking questions in us, thereby invoking in us a *praxis*, which ultimately will lead us to the desired level of *conscientization* as Paulo Freire propounded in his *pedagogy of the oppressed (*Freire1993).

The thought – provoking, pertinent and wise question that should occupy the mind of every environmentally *conscientized* person is, how can we preserve and sustain our environment while at the same time meet the needs of the present and future generations? What will become of our cities in the future?

To understand this scenario and be able to address the above concerns, it is pertinent here to establish the link between human beings and the ecosystem in general. It is equally important to put the above perspective into context by

operationalizing the term *ecosystem,* as it will be used in this study. Continuous references will also be made to existing literatures on ecosystems.

2.5.3 Sustainable City as a Living Organism

Human ecology which is the study of the structures and development of human communities and societies in terms of the process by which human populations adapt to their environment (Gilpin 1976), is related to the idea that cities are also living organisms. Perhaps St. Augustine recognized this idea when in his popular dictum he inferred that every city is a living body, a living organism (Szerszynski 2004). According to St. Augustine, cities are not just the empty spaces; they include both the natural and the built environments, animals and plants as well the interactions thereof. Ecologists are paying increasing attention to the relationship between urbanization and the environment but few have directly addressed how human and ecological patterns emerge from interactions between socio economic and biophysical process (Bioscience 20003).

For a better understanding of the relationship between urban life and urban environment in the context of the city as a living organism, urban areas should not be treated as homogeneous phenomenon, which combines all anthropogenic factors into one variable (ibid). My thinking is that this way of conceptualizing urbanization as a homogeneous entity, is unrealistic because it presents urbanization as one-dimensional phenomena. Urbanization in my opinion is a multidimensional phenomenon considering various factors involved in the interaction between it and different forms of elements in the environment. There is inextricable link between the natural environment, the built environment and human beings. This again is completely in consonance with St. Augustine's idea of the city as a living organism.

The GAIA hypothesis which was developed in 1972 by James Lovelock (Kemp 1998), will help us to better understand the concept of the sustainable city as a living organism. The GAIA hypothesis views the earth as a single organism in which the individual elements co- exist in a symbiotic relationship. It is an all-encompassing term for related concepts that hold that living organisms will

affect the nature of their environment - to make it more suitable for their living. These sets of theories hold that all organisms on earth regulate the biosphere to the benefit of the whole (Oneness Commitment undated).

This has much in common with the concept of environmental equilibrium but goes further in presenting the view that the living components of the environment are capable of working together actively to provide and retain optimum conditions for their own survival.

This concept is clearly illustrated in the case in which animals take up oxygen during respiration and return carbon dioxide to the atmosphere. This process is reversed in plants when carbon dioxide is being absorbed while oxygen is released. In this case, what is regarded as waste in a particular group becomes a resource for others. GAIA hypothesis reinforces the *mutualism* relationship between organisms and different species in which all organisms benefit from the relationship. This *mutualism* relationship is incongruous with the current anthropocentric view. This is because anthropocentricism inhibits human involvement in this mutual relationship where all benefits and depends on others for existence. Our perception of the place and role of humanity in the bigger picture of nature influences our response to the above concerns. This perception hinges on what we make out of some ethical, philosophical and theological treatise that informs different biases we always have towards nature. Whatever our bias or perception is, the irony is that our *influenced actions* do not only affect the health of the ecosystem but also human health. The health of the environment has a lot to do with human activities on it. The fundamental question that needs to be addressed is how human beings are perceived in nature.

- Are human beings one of the many animals in a global ecosystem?, or
- Are they separate from nature, having dominion over it and using it as a means to achieving their ends irrespective of how their actions affect the ecosystems

2.6 Conclusion

This chapter discussed the historical emergence of the concept of sustainable development and the related concept of sustainable city. Various concepts and models of cities were also examined. From the discussion, there is the need to perceive cities as both ecosystems and living organisms. This perception will ensure that people take adequate care and, therefore, protect the environment since the health of the ecosystem also affects people's health and general well-being. It is evident from the discussion on this section that sustainable development, with all its shortcomings has greatly contributed to the shaping of environmental discourse since its appearance in the development arena.

Chapter Three

Sustainable City: A Theoretical Review

This chapter will discuss the characteristics of a sustainable city. It will also discuss some of the approaches to achieving a sustainable city as well as highlight some of the barriers to achieving it. The last section of the chapter discusses some of the models and criteria for assessing a sustainable city. Some of the criteria that the study intends to use as benchmarks in the study area are open space, urban agriculture and compactness.

3.1 Characteristics of a Sustainable City

The purpose of this section is to highlight various thoughts on the characteristic features of a sustainable city. In other words, it aims to present some of these characteristics in general. The scope of this study will not allow time to look at all the characteristics of a sustainable city. However, attempt has been made to look at a few of these characteristics in a more detailed manner.

In spite of the fact that the concept of sustainable city like sustainable development as noted earlier, is fraught with some ambiguities, complexities and sometimes contradictory in nature, it however has some distinct characteristic properties. My interaction with various literatures reveals that these characteristic features are a reflection of many approaches used in articulating sustainable city model, and they cut across various disciplines. Although these characteristics may change across countries and geographical regions, they still have some central themes common to all of them. By looking at and reflecting on these characteristics, it is anticipated that a better insight could be provided in understanding sustainable city.

The Centre of Excellence for Sustainable development (1999) has encapsulated the characteristics of a sustainable city, and they include the following:

- the formulation of goals that are rooted in a respect for both the natural environment and human nature which call for the use of technology in an appropriate way;

- the placement of high values on quality of life;
- respect of the natural environment;
- optimization of key resources;
- maintenance scale and capacity;
- adoption of a systems approach;
- support of life cycles;
- responsiveness and proactiveness;
- value for diversity; and preservation of heritage.

Other ways of looking at the characteristics of a sustainable city include interrogating the behavioral patterns, resource consumption patterns and life styles, government policies and examining the general attitude of communities to the issues of environmental protection. Provided below in a tabular form are some of the features that depict a community's perceptions, behavior and attitudes to issues concerning sustainability of cities. An influential proponent of sustainable city, Richardson (undated) propounded that a society's consciousness as far as the issues of sustainability of cities is concerned will be reflected and judged by its attitude to its environment in terms of the provision of services and goods. The table below illustrates how a community's behavior and attitude to the environment on the issues of sustainable city could be understood.

Table 3.1 Features which depict people's attitudes to the environment.

More sustainable features	Less sustainable features
Compact forms of residential development	Low density, spread out residential development
Movement on foot and bicycle and transit	Heavy dependence on private cars
Wind and solar energy	Thermal and nuclear energy
Protection and use of natural hydrologic systems	Hard surfaces preventing infiltration; channeling natural water- courses

Natural open space ,protection of wetlands, streams habitats	Destruction of natural landscape, parkland with exotic species
Use of manure, compost	Heavy use of chemicals, fertilizers, herbicides and pesticides
Reduction of wastes, recovery, re use and recycling of waste materials	Land fill, incinerators

Source: after Richardson (undated).

The features in the above table show the extent of people's commitment to issues relating to sustainability. The columns under more sustainable features reflect characteristics of a community that is conscious of the need to protect its environment while trying to meet its needs. The column under less sustainable features on the other hand, reflects a community that cares less for the protection of its environment while trying to meet its needs.

3.2 Approaches to Achieving a Sustainable City

Because sustainable city is such a broad and complex concept, concerns have been expressed at both national and international levels on the most appropriate ways of achieving it. The Earth Summit held in Johannesburg in 2002 was just one of such international concerns aimed at finding ways of managing cities in order to achieve sustainability. Many ideas and themes have since emerged from such concerns. Reasons for the emergence of such a diverse range of approaches to achieving a sustainable city relates to a wide variety of concerns mentioned above. Scholars, city managers and authorities on urban planning are however not in agreement on the most appropriate method or approach. To many, these approaches are sophisticated, complex and unrealistic and therefore a mere utopia. Pacione is one of such persons who regard such approaches as utopia (Harris 2004).He identifies a number of models from a range of philosophers, architects, economics and planners which he calls "utopia" cities.

Harris (2004) has articulated a few of these "utopia models/ approaches" which are presented here.

Table 3.2 Various Models and Approaches to Achieving Sustainable City

Green city	This concept originated with the idea of Ebenezer Howard's garden city concept and Patrick Gedde's theories of urban planning, which were developed later by the landscape architect, Ian Mcharg. This concept is basically focused on abundant space available in the city and where the city population is large and relatively mobile population.
Dispersed city	This concept is focused on decentralized settlements. It is popularized by EF. Schumacher in his book "small is beautiful". The key concept was that all activities were small – scale and therefore easily managed. This will therefore have minimal adverse impact on the environment.
Compact city	This concept became popular during the period when the development of high – rise-building techniques is receiving attention and recognition. This concept emphasized the social and economic benefits of high-density urban living, where services can be provided more easily to the population.
Transit metropolis	This focuses on the ways in which mass public transport can improve cities not only by removing private transport. This has been applied at least in part in medium sized, mixed-use cities such as Singapore, but may not be a suitable strategy for all cities.
Regional city	This refers to series of small settlements linked across open recreation space by major roads. A version of this is to some extent emerging in the US and parts of UK, with the development of out – of – town shopping malls and the pressure for more edge of city housing. There are examples of such developments in the mega cities of the developing world particularly Mexico, Johannesburg and Lagos

Informationa l city	This concept, which is based on the analysis of castells, is in part based on the recognition of the development of cities as post – industrial entities where the focus is increasingly on knowledge and information industries, which are facilitated by advances in information and communications technologies. Some have argued that this city will reduce environmental impacts, as it is focused on the production and trading of information, which is less environmentally damaging. This concept is likely to underestimate that informational flows may stimulate demand for travel and for goods, which may in itself have an environmental burden.

Source: after Harris (2004).

Mc Granahan and Satterhwaite in their own opinion are not particularly against any approach that may be used to achieve sustainable city (Harris 2004).Their concern however is that these approaches should be categorized to create boundaries or levels at which they should be applied. This categorization was emphasized in their "Green Agenda –Brown agenda" in which they drew attention to the distinction about boundaries and levels of operation. For example, in their characterization of approaches, "Brown agenda" focuses on immediate, local impacts on human health, usually affecting lower income groups, while "Green Agenda" takes a much more broader view considering ecosystems health on a global or regional scale. The Green Agenda seeks to address long-term problems and the benefits of future generations instead of focusing on immediate, local needs.

Hardoy et al (2001) suggest three basic goals upon which to measure any model for sustainable city. These basic goals are:

a. Healthy environment in which the inhabitants can live and work.

b. Provision of infrastructure and services required for healthy living and prosperous economic base for all, including water supply, sanitation, waste collection and disposal, paved roads and footpaths.

c. Balanced and sustainable relationship between the demands of consumer and businesses and the resources, waste sinks and ecosystems on which they draw.

Harris (2004) in his own opinion suggests a number of ways to achieve a sustainable city. These suggestions have been itemized as follows:

- Integrate planning in ways that maximize resource use efficiency
- Make use of the multi- function potential of green spaces
- Maximize livelihood opportunities and self – sufficiency opportunities. For example, encourage recycling of wastes as compost, or wastewater or rainwater for irrigation.
- Protect ecological integrity for the urban ecology in order to reduce the ecological load imposed on distant ecosystems
- Aim for zero impact development, and where distortion of ecosystems is inevitable, compensate by rehabilitation elsewhere

3.3 Barriers to Achieving Sustainable City

The following barriers have been identified as constraints to achieving sustainability.

3.3.1 Complex Nature of the Concept

The concept of the sustainable city as has been observed is a very complex one. The very nature of its complexity, in itself, is a barrier to its achievement. A lot of models and approaches have been articulated on how to achieve this concept, but there is also recognition that there are lots of disagreements. Since there are many divergent views on the applicability of the concept, its applicability is also problematic.

3.3.2 Perceptions about Development

The paths towards sustainable cities often require changes in our current attitudes, practices and actions. It requires different social attitudes, long-term thinking, a different decision-making process etc. For the realization of a sustainable city to be feasible, Wamback (2001:83) calls for a "behavioral

change". He suggests that the society should adopt an attitude in which it should learn to consume resources no faster than the resources can be renewed, thereby placing less stress on the environment. Implementing sustainable change can be a complex task with numerous organizations and competing issues involved. Therefore its realization requires that "all hands must be on deck" to complement government initiatives. However, one is not oblivious of the fact that different communities face different challenges because of different population structures, cultural beliefs, and regulations, degrees of government stability, financial resources, human resources, and developmental stages.

Considering all these issues, there are still a number of major obstacles that hinder the achievement of sustainable cities - even though it is getting more and more widely accepted that this is the only way to go in the long run. The following barriers to sustainability are further compilations of research findings.

Table 3.3 Some of the Identified Factors Militating Against the Realization of the Sustainable City

Inadequate financial resources	Some times in prioritizing government's lean financial resources, environmental issues often receive less attention.
Lack of employment opportunities	This has the potential to exacerbate environmental exploitation as many unemployed fall back on the environment for their survival.
Increasing homelessness and expansion of squatter settlements	Many migrants from the rural areas find it difficult to secure accommodation in the cities. The result is that some end up living and sleeping in the streets while the fortunate ones locate to the squatter settlements.
Increased poverty and an underlying gap between rich and	Perhaps the gap between the rich and the poor is mostly experienced in the cities.

poor	
Growing insecurity and rising crime rates	Poverty, unemployment and homelessness all can contribute to growing rate of crime and insecurity.
Inadequate and deteriorating building stock, services and infrastructure	One of the major challenges facing many governments especially in developing countries is how to provide houses and service delivery to its teeming population.
Lack of health and educational facilities	The achievement and maintenance of good health depends upon having access to the resources to meet the basic needs in a safe and unpolluted environment and also having access to health facilities, which are often not available to the urban poor. Sometimes the children of the urban poor study in the environment that is unsafe and un conducive to learning.
Insecure land tenure	The problem of land tenure especially in south Africa where land is inaccessible to majority of the population will further complicate the achievement of sustainable city.
Rising traffic congestion	The environmental effects of motor transport are not confined to gaseous emissions but also the risks of death or injury from traffic accidents pose environmental hazards in their right.
Increasing pollution	Environmental stress has often been seen as the result of the growing demand on scarce resources and the pollution generated by the rising living standards of the relatively affluent. Poverty also pollutes the environment. In fact, poverty and environmental degradation perpetuate each other.

Inadequate water supply and sanitation	Of all the basic needs, access to clean water is probably the most important. Closely linked to water provision is the removal of waste through sewerage systems. The health problems created by poor water and sanitation facilities are enormous.
Uncoordinated urban development	Inappropriate planning and legislation can exacerbate and compound the achievement of sustainable city. This is often an outcome of piecemeal approaches to development or inefficiencies in the administrative infrastructure.
An increasing vulnerability to disaster	The growing demands for housing and other places for economic activities in the cities can result in risk from sub - standard construction of houses and workshops .this results in the urban poor being subjected to places that are vulnerable to disaster and other risks.
Civic society involvement	The public has not on a collective basis shown much interest on environmental issues. This is because of the fact that most people are concerned about job and employment opportunities. Because of the current level of poverty and unemployment rate, environmental issues have not received much attention from the public and therefore there is not much pressure from the public. However there are a few non-governmental environmental organisations who are acting as "watch dogs" for the public interest.

Information	Sufficient information which enhances decision-making as well as information being accessible to the public is very crucial to the achievement of a sustainable city. My opinion is that more often than not because of poor public participation in environmental issues, coupled with government's inability to undertake environmental research and feasibility study, policy makers sometimes do not have sufficient baseline information to formulate policies that would be effectively implemented to bring about the much needed sustainable city.

Source: Moore, *et al* in Lead 2001:214

All of the above (though not exhaustive) have seriously challenged the capacities of Governments particularly those in the developing countries, at all levels, to realize economic development, social development and environmental protection, which are all components of sustainable city.

Having discussed some of the suggested models or approaches and challenges militating against the achievement of a sustainable city, this study will now examine in detail some of these models or approaches. Attention will be paid to the following suggested areas viz- Open space, Compactness and Urban Agriculture. I have decided to focus on these selected areas because they are almost represented directly or indirectly as "bench marks" in most of the models and approaches propounded by many authorities in urban planning and management. Another reason why I have chosen these selected areas is because they all speak to the issue of land use, which in my own understanding is very crucial to the concept of sustainability. Furthermore, the choice for these models is premised on the understanding that they will provide the basis for a review of the current policy on LIH and

contribute to future policy formulation on urban planning with regard to LIH in terms of patterns of landscape, forms and land use.

3.4 Model and Criteria for assessing a sustainable city

The diagram represents the models or criteria, which the study used for measuring the concept of sustainable city in the study area. It specifically focuses on the issue of land use (open space, compactness and urban agriculture). The aim is to use these criteria as a benchmark for the evaluation of sustainable city in Ambleton.
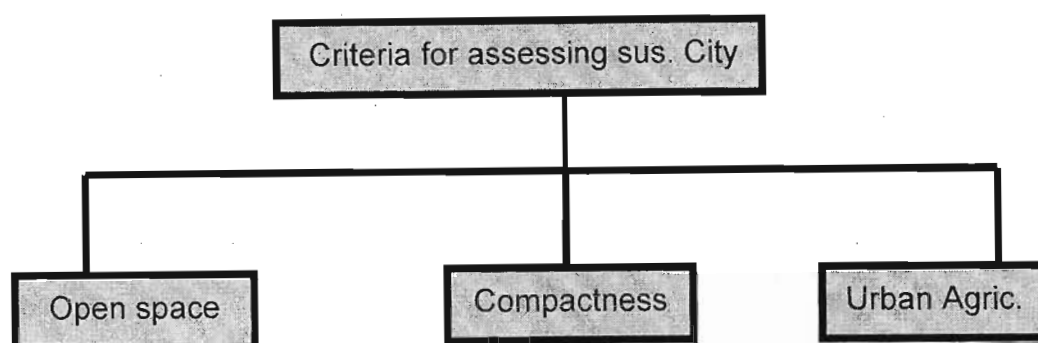
Figure 3.1 Criteria for Assessing Sustainability in the Study Area

3.4.1 Open Space

The incorporation of "standards" into LIH projects in Africa is a controversial one especially with regards to layouts. Werlin (1998) argues that there is a lack of open spaces in most LIH areas in Africa. This is because some of the LIH projects are undertaken without holistic frameworks, which address such issues as open space and other social amenities.

It has been recognized that the availability of open space is one of the criteria for assessing the sustainability of a city. Urban open or green spaces play a key role in improving the livability of cities. This recognition is as a result of the recent scientific understanding of how trees, parks, open and green space benefit people in cities (Wolf 2004). Urban open spaces are important because of the valuable amenities it provides for city dwellers. Urban open spaces are considered in terms of the social, environmental and economic benefits they provide.

3.4.1.1 Social Benefits of Open Space

From social perspective, appropriate types of green space can offer a greater diversity of land uses and opportunity for a wide range of activities. Well-managed and maintained green and open spaces can contribute immensely to social interaction by creating opportunities for people of all ages to interact. It could also enhance cultural life by providing venues for local festivals, civic celebrations and theatrical performances (MacHarg 1971).

Open space can also provide a safe play space for children and serves an important role in the basic education of school children with regard to the environment and nature.

3.4.1.2 Health Benefits of Open Space

Urban open space can contribute tremendously to urban health in various ways. For example, recent studies have established that the presence of trees and "nearby nature" in human communities generates numerous psychosocial benefits (ibid). Kuo (2003) opined that having trees in public housing neighborhoods lowers levels of fear, contributes to less violent and aggressive behavior, encourages better neighbor relationships and better coping skills. Other studies confirm that hospital patients recover more quickly and require fewer pain- killing medications when having a view of nature (Wolf 2004). Still, other studies suggest that office workers with a view of nature are more productive, report fewer illnesses and have higher job satisfaction (ibid). The above-mentioned examples reflect the extensive psychological, health and even economic benefits for urban people who have views of trees and nature in the course of their normal, everyday activities and experiences.

3.4.1.3 Environmental Benefits of Open Space

Other values of open space are considered in terms of environmental benefits and costs. This will be understood when we realize that ecological systems provide an invaluable number of services to human societies. Trees and green spaces are elements of the ecosystems that clean air and surface

water, provide or renew portable water and reduce energy consumption (Wolf 2004).

3.4.1.4 Economic Benefits of Open Space

Furthermore, from an economic perspective, open and green space might deliver products such as wood or fruits and also compost and energy because of urban green production. Their presence may create an increase in the economic value of an area and thus provide some kind of jobs.

Despite these mounting scientific evidences and other empirical observations on the unquantifiable benefits derived from open space, urban open space are regrettably becoming scarce in many African countries. Much of our green and open spaces are earmarked for urban development and consolidation. Many factors account for this including ignorance about the risks to human health and quality of life associated with their deterioration or loss. Another major threat to urban open space is what Moore (1995) called wrong perception of social and public value of urban green space. This wrong perception of public value system and ignorance mentioned earlier, are in my opinion responsible for the spate of uncoordinated and unrestrained development taking place in some areas that otherwise would not have happen in many African cities today. For example, estate developers of various kinds and owners of golf courses have contributed to the depletion of urban open space. Some of the Government reserved Areas (GRA) in the form of open spaces are fast being turned into economic uses. The challenge for city planners and government authorities now, is to create awareness and to restore public value system in order to save our urban open space because of the important role they play in contributing to sustainability of our cities.

3.4.2 Compactness

The current rate of urbanization being experienced across the globe particularly in the developing countries has the tendency to create "conflicts" in the society. Such conflicts as environmental degradation, energy problems and food crisis are already being experienced in most urban cities of the developing world thereby resulting in the deterioration of urban living

condition (Kaji undated). Ameliorating the living condition of urban cities requires a development of policy which makes it possible to achieve maximum quality of urban life with the given resources. Planners and urban managers internationally and locally are researching to see if there is anything in compact city theory or practice that will help to address this problem.

In the early 1990s, the European Union found an advantage in the concept of compact city approach as a sustainable urban form, which is expected to solve the problem of urban deterioration (Kaji undated). For EU, the compact city approach seemed to be appropriate to achieve the following goals:

- Saving resources and energy (land, transportation, pollutant emissions, wastes etc)
- Revitalizing inner city to control an infinite expansion to the suburbs of urban areas resulting from automobile dependent society.

Compact city in general terms refers to a city of high density of population. The United Nations Global Compact Cities Programme uses the term to refer to the geographical spread of urban areas. They also refer to their built form and patterns of movement and interaction and to concepts such as "densifying" the city, urban renewal or revitalization and urban containment (Clark undated).The most obvious way of reducing the impact of the population of a city is to make it more compact. The thinking is that making cities more compact will reduce the overall areas of the built environment. The advantages of this are that resources will be used minimally and social infrastructures and amenities will be provided in the most economical way. Sibley-Behloul (2002), argues that the concept of compact city will be difficult to apply in the local context because it may lead to a situation where we may have a poorer environment ecologically because it will tend to have lower vegetation covers. Cities need to have open green spaces and trees because of the social, economic and health benefits derivable from nature as has been noted earlier.

The aim of the compact city as reflected in its definition is reducing societal dependency on automobiles in order to achieve a sustainable society. Successful implementation of compact city in the continent may be difficult due to the following reasons considered by Sibley-Behloul (2002) and Williams (undated):

- There is presently in the continent a lack of social infrastructure caused by the current urban population explosion, which has exceeded economic growth
- Because of the increase in urban population, squatter settlements has been on the rise
- There is also difficulty of urban redevelopment through demolishment of squatters
- There is also a perceived lack of planning capacity
- Income inequalities
- Small urban budgets and lack of effectiveness in policy instruments

Considering the above issues which seem to be militating against the achievement of compact city in the continent, it seem therefore that the theory of compact city may not after all be the "magic wand" that is needed to transform African cities to a more livable ones. If the above factors cannot be mitigated, the suggestion is that compact city approach seems to be significant argument only to cities in the developed countries. It may not be applicable to the existing mega cities in developing countries due to lack of the above-mentioned reasons. The seeming inapplicability of the concept of compactness was expressed in the notion that South African cities were designed to marginalize (Special Development Framework 2004).The geographic separateness of the largest segment of the population is a classic feature of this fact. Urban settlements (mainly for blacks) are located far from employment centers. Long distances have to be travelled to reach workplace and the city center for shopping and other leisure activities.

However, Halls (1996) argues that the concept of compact city can be implemented anywhere. His argument was premised on the understanding

that initially, all cities were compact and relied on walking and other "soft" forms of transportation. He therefore suggests that areas within easy walking distance, is a sound basis for planning modern urban areas in ways that will help minimize environmental impact and create the attractive and easily used places necessary if more sustainable life styles are to be achieved. Williams (1998) agrees with Halls. He argues that the theory of compact city could be difficult to apply in developing world but not impossible to achieve. He opined that what is needed is management ability, which will translate to the provision of high quality infrastructure such as affordable, well-managed and reliable public transport system, basic services in the form of water, drainage, electricity, health care service, education and other important services appropriate to city residents.

3.4.3 Urban Agriculture

Urban agriculture is defined as the practice of farming within the boundaries or within residential areas in vacant plots (open spaces) of towns or cities (Gundell and Butterworth 2003). Urban agriculture is primarily for own consumption because most of the farm products are perishable. Farming in this context refers to crop cultivation, animal rearing, fish farming etc. (Obosu-Mensah undated). Other examples of urban agricultural activities include medicinal herbs, bee keeping, management of green space and parks, forestry, horticulture and its many "green industry" components (Urban Agriculture undated). Agricultural activities within cities have been going on since the first urban populations were established thousands of years ago. Castillo recalls the conventional thinking about urban agriculture, which hitherto thought that this practice would eventually disappear as cities become more industrialized and modernized (Castillo 2003). This conventional thought was mainly accepted because urban agriculture was then considered as having no economic importance, a mere symbol of rural life which would be abandoned once residents became part of formal urban employment sector. Nevertheless, contrary to this conventional and parochial thought, urban agriculture has gathered momentum and survived even in the face of current industrialization and modernization taking place globally.

One of the arguments in support of urban agriculture is its environmental benefits, which are seen in an increase in soil quality because of implementing the trench – bed method of gardening (Webb 1998).Trench method is the digging of a trench by one meter deep by one meter wide by two meter long. The soil that is initially removed from the trench is then replaced in thin layers, alternating with waste materials. This is said to have improved water retention qualities and fertility levels because of the introduction of compost (ibid). In addition, bio degradable waste accumulating in dumps and other open spaces are used in urban agriculture and this also adds to the soil quality.

Reasons for the survival of urban agriculture in spite of the current modernization especially in developing countries, is because the increasing urbanization has not been matched by infrastructural and economic development. Many urban residents discover to their disappointment that the white-collar jobs and lucrative businesses that had attracted them to the city in the first place, were not forth coming. One of the options left for them therefore is urban agriculture in order to survive.

Another important reason deduced for the persistence of urban agriculture according to Sanyal (1985) is the impact of economic recession resulting from the effects of Structural Adjustment Programmes and the attendant declining purchasing power for many urban workers and residents. This situation has further been exacerbated by the shrinking job opportunities in urban areas. The result is that poor urban households in various large cities spent huge sums of their income on food. This scenario has therefore given impetus to the recognition of urban agriculture as a means of improving the quality of life of urban residents and a panacea to urban poverty.

Moreover, urban agriculture is being advocated because it contributes to reduction in urban dependency on food import from surrounding areas and even from farther countries (Webb 1998). The benefits of city's self-reliance are assumed to be to the advantage of the urban poor, who literally will not have to buy everything in the market.

Other benefits of urban agriculture includes the increase of available green space, clearing of accumulated rubbish and garbage dumps and recycling of house hold wastes and greater awareness of environmental concerns. Urban farmers become more ecologically sensitive and begin to clean up and beautify unsightly surroundings to create clean and healthy environment. Cleanliness, they say is next to Godliness.

Obosu-Mensah (undated) recognizes two main types of urban cultivation. These are enclosed and open – space cultivation. Enclosed cultivators refer to those who engage in enclosed form of farming, for example within their compounds and surroundings. While open –space cultivation refers to any cultivation away from the individual's residence. In this form of cultivation, land is not enclosed by any wall or fence. Open – space cultivators are usually of lower socio-economic status. Most of the open- space cultivators do not even know the owners of the land on which they cultivate because they cultivate any land that is not currently in use.

Urban agriculture has its problems. One of the salient problems is the scarcity of land. Many cities have limited space for such farming. South Africa for example is one of the countries in the continent with the greatest scarcity of land. Scarcity of land renders the practice of urban agriculture impracticable. Again, scarcity of water is another inhibition to urban agriculture. During dry season, many urban farmers find it difficult to farm because of scarcity of water.

The problem of urban agriculture becomes evident when one considers that many cities in Africa were generally constructed according to the model of Western cities where it is assumed that urban residents would be absorbed in wage labour employment. They would use their earnings to buy food rather than cultivate it themselves. This type of Western model of city planning as mentioned above to my mind will make it difficult for urban agriculture using the compact city approach. For example, in Singapore, the state - housing programme destroyed a Malay type of settlement called *kamung,* which was very prevalent (Castillo undated).This type of settlements made it possible for

residents to raise animals and grow fruits and vegetables. However, these settlements were destroyed by the government and replaced with high – rise structures. Because of this demolition exercise by the government, many families lost their home gardens and plots. This resulted in increased bills spent on food items. A similar example was the recent demolition exercise undertaken by the Zimbabwean government, which did not only affect urban agriculture but the whole formal and informal sector. Obviously, this government attitude does not promote or encourage self- sufficiency. Urban agriculture as a representation of self – sufficiency promotes food security, improves participant's health and quality of life. It also creates a dynamic and aesthetic outlook for the cities.

3.5 Conclusion

This chapter has discussed the characteristics of a sustainable city. It also discussed some of the approaches to achieving a sustainable city as well as some of the barriers encountered in achieving it. The last section of the chapter discussed some of the models and criteria for assessing a sustainable city. Some of the criteria that the study intends to use as a benchmark in the study area are open space, urban agriculture and compactness. Discussing these criterion also presented the benefits of each of the criteria, which justifies their inclusion as the benchmark for the study.

Chapter Four

Study Area and Methodology

Chapter four presents a brief description of the study area. It also discusses the methodology of the study- the research design, methods of data collection and analysis, and the limitations of the study.

4.1 The Study Area

Ambleton is within the Greater Edendale Area in Pietermaritzburg (Msunduzi Municipality). The residents commonly call it "France". The origin of this name is not quite known, but some people believe that it has something to do with the similarity of experience during the French revolution in which people were removed from the main city to the outskirts of the town (Fincham, Pers.comm). It is one of those settlements constructed by the government to decongest the inner city of Pietermeritzburg. People were therefore removed from the main city to the outskirts of the city; hence their experience was linked to that of French revolution. Msunduzi municipality is located along the N3 at a junction of an industrial corridor from Durban to Pietermaritzburg and an agro-industrial corridor stretching from Pietermaritzburg to Escourt. It has the second largest urban center within the province of KwaZulu-Natal and the main economic hub within Umgungundlovu District municipality (IDP 2004).

The Msunduzi Municipality area is made up of a number of identifiable components, viz the original Pietermaritzburg Municipal area, which became the enlarged Pietermaritzburg Msunduzi Transitional Local Council area (the original municipal area, together with Greater Edendale, including Imbali, Shenstone, Ambleton and Foxhill (ibid).

Figure 4.1 shows the location of the study area. It also shows the industrial zones within the city of Pietermaritzburg as well as the distance of the study area to all the industrial zones and the CBD.
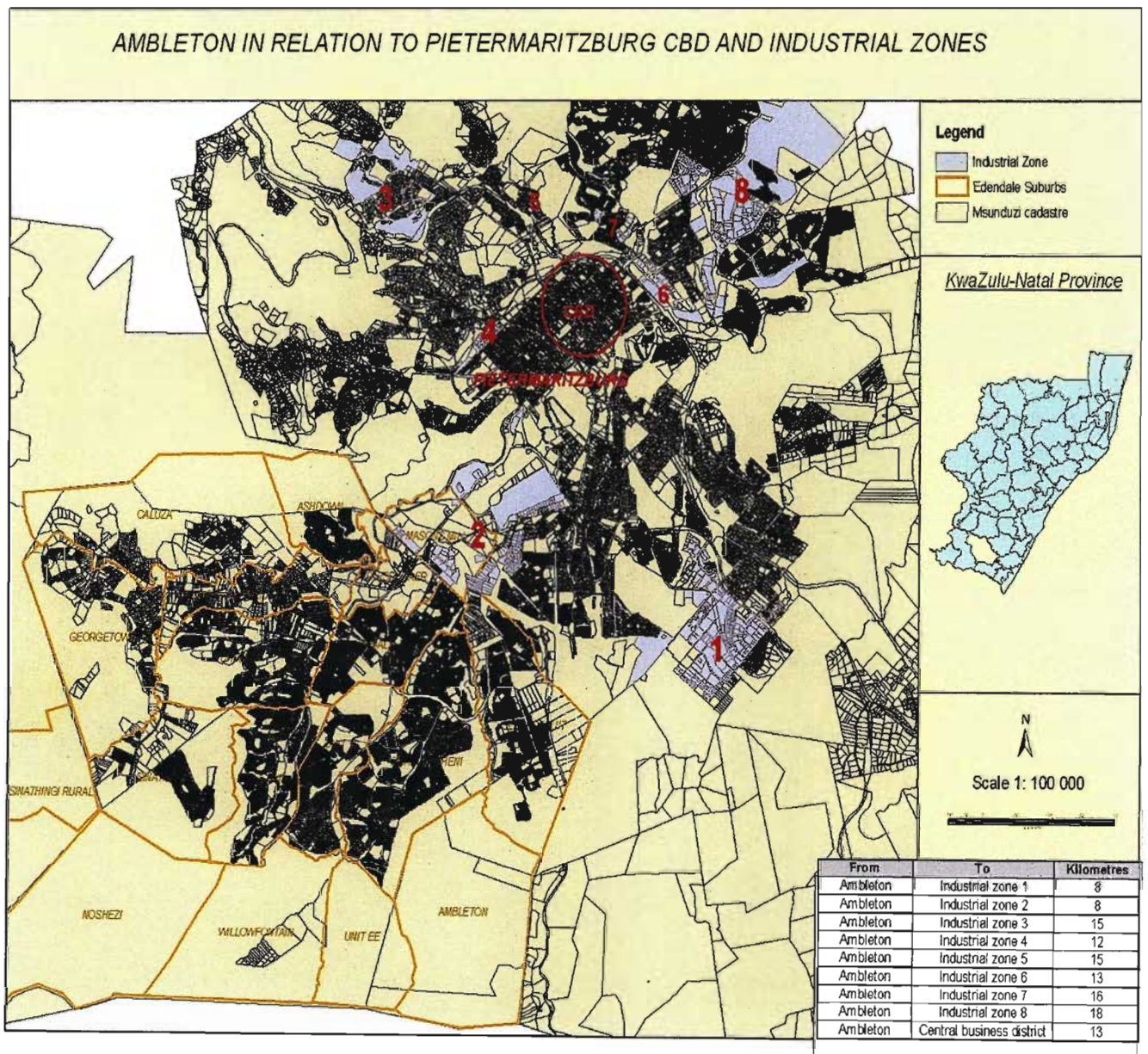
Figure 4.1 Map of Msunduzi Municipality

Source: Msunduzi Municipal IDP(2005)

Plate 4.1 showing a section of the New Phase of LIH

Source: Personal Collection, 2005.

4.2 Research Methods

Research methods refer to the tools used to collect data (Bailey 1978). Data are empirical evidence or information (it could be qualitative or quantitative) that one gathers carefully according to rules or procedures specified by the nature of the research (Neuman 1997).

During the course of the study, various models and criteria of sustainable city were examined. Literature review was used in this regard to familiarize oneself with different opinions and views held by different people on the topic being researched. In order to gain a theoretical and background knowledge of the study, the researcher examined existing literature from, journals, theses and dissertations.

The method for this research is a combination of both qualitative and quantitative approaches. It also engages in descriptive analysis. The combination of the two methods mentioned was expected to produce a good result. This is because they are ideally suited for this type of study in the sense that quantitative research views reality as a singular, static and existing independently of observers (Mtshali 2002).

Qualitative research on the other hand directs one towards gaining an understanding of the meaning of people's everyday life from their own perspective. It therefore provides the detailed descriptions of particular social settings under investigation and an explanation of the behavior that occurs therein (Chapman and Maclean 1990). Qualitative research offers good results because of the opportunity it offers to researchers to interact negotiate and involve the people being researched.

In order to determine an appropriate approach towards making LIH in Ambleton sustainable, the researcher engaged in field work for an on the spot observation and assessment of the housing and land use situation and data collection by using the following key criteria and their methods of investigation.

4.3 Methods of Data collection

Open space: In using open space as a criterion for assessment, the use of density measurement per square meter was considered here. This was done by using the "site plan" of the area to determine the Floor Area Ratio (FAR). FAR is the size of a building divided by the size of its parcel. It is the ratio of the amount of floor area of a building to the amount of its size (City.davis undated). The FAR standard which the study used was drawn from the recommendation on the housing estates in Vienna and France, which states that housing area whose FAR is within 1.0 to 3 should be sufficient for settlements on the fringe of the city, as well as higher densities on the inner city and district centers respectively (Gielge undated).Using FAR will help to determine the availability of open spaces for individual households by measuring the proportion of open spaces with respect to total area.

Compactness: The use of the map of the city helped to determine the distance of the area from the Central Business District (CBD), places where people work, major industries and shopping or market centers. This showed whether the distance is a walking distance or whether people will have to use vehicles to commute to town.

A structured questionnaire was administered to the residents of the area to ascertain the cost of transportation from their residence to their places of work or to town for other economic and or commercial purposes. The use of questionnaire is important because it is one of the ways of understanding issues relating to transportation in analyzing compactness. The theory of compactness is that people can live near to their work place and leisure facilities; therefore the demand for travel is reduced (Spatial Development Framework 2004). Structured questionnaire was used for data collection on the following issues- Open space, urban agriculture and transportation issue.

Urban Agriculture: the study also used closed – ended questions to determine whether people are engaged in agricultural activities.

Direct observation: The researcher visited the study area on several occasions for observation and administration of the questionnaire.

The reason for combining FAR as an instrument of measurement, direct observation and questionnaire as a method is that it was considered the best that suited this kind of study. This consideration was because it brings out clearly the true picture of the housing situation and the various land uses in the study area. Direct personal observation complemented the aerial photograph interpretation. Moreover, the use of questionnaires ensured that relevant issues not covered in interpreting the map of the area and personal observation were clarified.

4.4 Identification of Respondents

The criterion used for selecting respondents was via a stratified sampling procedure. This was necessary because the study area is divided or demarcated in sections (what looks like streets). Stratified sampling allows the researcher to divide the population into strata and by drawing a random sample from each sub population (Neuman 2000). Using stratified sampling in this study allowed the researcher to categorize the houses in the study area according to their already demarcated phases. Questionnaires were administered systematically to every tenth household in each stratum. This guaranteed representativeness of the different sections of the whole study area.

4.5 Data Analysis

Data analysis refers to the search for pattern in data, recurring behaviors, objects or a body of language (Neuman 1997). It involves classification and numbering or coding of items (questions) prior to or after going into the field. The responses are given codes to enhance their classification according to the arrangement adopted (Silvey 1975).

Data analysis in this study was used in a tabular form where all the questions were recorded. The questions were given new codes. Responses were also recorded in the same table. The SPSS data package was used to analyze the data in both quantitative and qualitative forms. FAR analysis was done using the archview GIS software supplied by the Department of Local Government and Traditional Affairs of Msunduzi Municipality.

4.6 Limitations

Language barrier is one of the constraints encountered in this study. The questions have to be translated in the local language. Information has to be collected in the local language and the services of a local interpreter have to be employed.

My limited knowledge of GIS is also one the major problems encountered in interpreting the aerial photograph. As a result, I employed the services of an expert in GIS to help in the interpretation of the aerial photograph.

4.7 Conclusion

Chapter four presented a brief description of the study area, discussed the methodology of the study- the research design, methods of data collection and analysis, procedure of the research and its limitation.

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Appendix A

Centre for Environment, Agriculture and Development

University of Kwazulu – Natal.

Questionnaire administered to the residents of Low - Income Housing area in Ambleton.

Introduction.

I am Cyprian, a student from the University of Kwazulu – Natal. I am here to administer a questionnaire to you as part of my research work. My questions are centered on issues relating to open space, urban agriculture and compactness (ie. how residences are located, their distances from particular areas of town and issues relating to transportation). My findings will provide me with an understanding of the various land uses and issues of sustainability concerning the area .The results will form part of my research work but will also serve as a feed back to the community, the city council and other interest groups involved in decision - making.

The study does not promise any immediate direct benefit to the community. Your participation in this exercise is understood to be voluntary. Therefore, I cannot provide compensations for your participation. Should you be uncomfortable at any point in time with the questions or the whole exercise and wish to discontinue, you are welcome to do so. The questionnaire will be administered with confidentiality. As such, you may choose to be anonymous.

If you are unsure of any answer, or uncomfortable answering any particular question, please just let us know.

Are you comfortable to engage in the exercise? Yes/No

Research Description

The research is looking at the issue of open spaces and various land uses in the context of sustainability. It aims to find out how the available open spaces are being used, as well as other issue relevant to sustainability.

Open Spaces in the yard

1. What is your household's view on the amount of available space in this yard? Tick as applied.

Too much	Just right	Not certain	Not quite enough	Extremely not enough

2. What does your household use the yard in this house for? Pls. Tick as many as applied

For children's playing around	Gardens: vegetables.	Flowers	Car park	Others purposes	Please supply the missing option

Agricultural activities

3. Does your household engage in agricultural activities? If not, why not?

Not interested	Land not big enough	land not suitable	needs a fence, and we don't have money to fence it	Please supply the missing option

4. If yes what kinds of things do you grow?

vegetables	crops	Flowers	Please supply the missing option

General /public open space

5. Do you use the general /public open spaces in Ambleton?

If so, what do you use them for? (please tick as many as applied)

Recreational purposes	Public	Open	Cultivation	Dumping of	Please supply the

	gathering	green space		refuse	missing item

6. Do you see a need for more management of open spaces by the government or the community? Yes/no

(please .Explain)_____

7. How would you like to see the open spaces used?

Remain as currently used	Public gathering	Market	Agricultural purposes	Open green space	Public utilities like hospital, clinic, schools, church etc	Supply the missing option

Compactness

The following two questions are meant to gauge the availability and your use of the services in ambleton. The first is about which are actually available, and the second about which you actually use.

8. Which of these services are available within ambleton? (Please. Tick as many as applicable)

Hospital	Clinics	Shopping	Groceries	Work	Leisure/entertainment	Please include any other

9 for which of these do you travel outside ambleton for? (Please tick as many as apply)

Hospital	Clinics	Shopping	Groceries	Work	Leisure/entertainment	Pls. Supply the missing option

10. How do you get to these places? For each answer supplied in q8, please choose

Hospital	Walk (how long)	Public transport (cost)
	A. Less than five minutes	A. Less than r5
	B. More than five minutes but not up to ten minutes	B.r5
	C. Ten minutes but not up to twenty minutes	C. Above r5 but less than r10
	D. Twenty minutes and above	D. R10 and above
Clinics	Walk (how long)	Public transport (cost)
	A. Less than five minutes	A. Less than r5
	B. More than five minutes but not up to ten minutes	B.r5
	C.ten minutes but not up to twenty minutes	C. Above r5 but less than r10
	D. Twenty minutes and above	D . R10 and above
Shopping	Walk (how long)	Public transport (cost)
	A. Less than five minutes	A. Less than r5
	B. More than five minutes but not up to ten minutes	B.r5
	C.ten minutes but not up to twenty minutes	C. Above r5 but less than r10
	D. Twenty minutes and above	D.r10 and above
Groceries	Walk (how long)	Public transport (cost)
	A. Less than five minutes	A. Less than r5

	B. More than five minutes but not up to ten minutes	B.r5
		C. Above r5 but less than r10
	C.ten minutes but not up to twenty minutes	
	D. Twenty minutes and above	D. R10 and above
Work	Walk (how long)	Public transport (cost)
	A. Less than five minutes	A. Less than r5
	B. More than five minutes but not up to ten minutes	B.r5
		C. Above r5 but less than r10
	C.ten minutes but not up to twenty minutes	
	D. Twenty minutes and above	D. R10 and above
Leisure/entertainment	Walk (how long)	Public transport (cost)
	A. Less than five minutes	A. Less than r5
	B. More than five minutes but not up to ten minutes	B.r5
		C. Above r5 but less than r10
	C.ten minutes but not up to twenty minutes	
	D. Twenty minutes and above	D. R10 and above

11. Why do you go elsewhere? (pls. Tick as applied)

Price,	Quality,	Choice,	Pls. Supply the missing option.

TABLE OF CONTENTS FOR COMPONENT B

The Challenges of Low – Income Housing Development in the Context of the Sustainable City

Abstract

The growing urban population in South Africa has challenged the government's ability to provide adequate housing for the urban poor. In order to respond to the challenges, the government embarked on the initiative of providing Low – Income Housing (LIH). There is, however, a growing concern that these LIH developments may not be sustainable due to a number of reasons. One of the reasons includes issues relating to land use and sub- standard construction of houses. There is a need to make these LIH areas more sustainable. This can be done by employing the concept of the sustainable city. The concept in recent times, has been considered by many people as an ideal to which cities should aspire. The main thrust of this study is to evaluate the concept of the sustainable city in the context of LIH in Ambleton. Ambleton is a settlement constructed by the government to relocate people from illegal, informal settlements within the inner city, especially those found adjacent to the industrial areas. The study focuses on the issues of land use in LIH areas. This focus on land use is underpinned by the fundamental views that land use contributes to urban sustainability. As a result, it is necessary to examine ways in which land is being used in LIH areas and see if the current land use in Ambleton contributes to sustainability. The study shows that some people are satisfied with the amount of open spaces around their buildings. Many others, however, are not satisfied because they considered open spaces in their yard inadequate. Furthermore, public open spaces are not properly managed because there are no services for such management. In the same vein, people

have to travel a long distance to get to their place of work and town for services and leisure activities. Similarly, the provision of waste and medical services in the study area is grossly inadequate. The study therefore argues on that basis that the above scenario is not in accordance with the concept of sustainable city and cannot therefore contribute to the sustainability of the area of study.

Introduction

The growing concern and the subsequent debate around sustainable cities have generated substantial academic and policy literature. The concept of the 'Sustainable City' has in recent times been recognized as an ideal to which cities should aspire. This recognition of its importance has led to a lot of debates among environmental activists, professionals and politicians about what the concept of sustainable city actually means (Bartone 2000). Underpinned by fundamental views on what urban sustainability constitutes, the concept of sustainable city denotes concerted and deliberate efforts aimed at reversing and where possible, halting those trends that pose threats to ecosystems health and the well-being of cities dwellers in general. It is becoming increasingly clear that urban poverty and housing needs ought to be considered as integral part of the concept of urban sustainability.

Sustainable city proponents argue that by dealing with such issues as housing, land-use, solid waste, water sewage, transportation, energy efficiency, social conflict and poverty, cities can be turned into more livable and sustainable environments. The main goal of sustainable cities, they argue, is the conceptualization and implementation of the urban sustainability agenda (ibid). Urban sustainability agenda seeks to explore means of protecting the urban ecosystems health while promoting the welfare of urban population.

This paper seeks to investigate the various land uses in low - income housing (LIH) in Ambleton within the context of sustainable city criteria. Ambelton is one of

those settlements constructed by the government in their bid to relocate people from illegal, informal settlements within the inner city especially those found adjacent to the industrial areas. It is within the Greater Edendale Area in Pietermaritzburg- (Msunduzi Municipality). Msunduzi municipality is located along the N3 at a junction of an industrial corridor from Durban to Pietermaritzburg and an agro-industrial corridor stretching from Pietermaritzburg to Escourt (IDP 2004).

It is necessary to evaluate the current land uses in Ambleton in order to see if they contribute to sustainability. The paper establishes criteria through which the concept of sustainable city in LIH is assessed. It then applies these criteria to evaluate land use status in Ambleton. Furthermore, it assesses the usefulness of sustainable city criteria in the case of Ambleton. Finally, the paper makes recommendations based on the study on how LIH in Ambleton can best achieve sustainability. These recommendations could also apply to other LIH developments within and outside South Africa.

The Context of the Study
The provision of goods and services for the residents of LIH in many African states are generally believed to be in appalling condition (UN Habitat undated). This appalling situation of service delivery is being continuously exacerbated by the urban growth being currently witnessed in the continent. Although there is a global trend in the rapid rate of expansion of the urban areas, the fastest growth is occurring in developing countries, particularly countries in Africa (Brown and Pierre 1994, UNCHS 1996, Bartone 2000). The World Health Organization publication titled "Global Challenges in Cities: With Focus on Africa" captures this picture when it states that:

Africa's rates of demographic and urban growth are the highest in the world. Urban growth rates in many African countries exceed 4%, whereas in developed countries urban growth is static or even negative. In Africa, the percentage of the population living in urban areas is 37%. This is expected to reach 54% in 2030, and in a few countries, it will be as high as 80%. (WHO Undated p: 1).

The concept of sustainable city seems to have been applied with some degree of success in developed countries of the world. The question however is whether it can be successfully implemented to the same degree in the developing world especially in sub – Saharan Africa. This question has become necessary because there are huge differences between the cities of for example Europe, North America, Asia and Africa. These differences are not only reflected in the context of land usage but also in attitudes and perceptions of people informed by different worldviews on city life. The challenge that confronts environmental activists, city administrators, policy makers and indeed all who are concerned about the sustainability of cities in African context, is to determine an appropriate approach or if possible develop criteria that are uniquely African which would specifically address those factors that militate against the realization of urban sustainability especially with regard to LIH areas.

In South Africa, the urban population growth, a consequence of the lifting of the apartheid restriction which had hitherto restricted people's movement and location of residences (especially blacks from living in cities), has resulted in the provision

of LIH to address this population explosion. There is a growing concern about the sustainability of these LIH due to a number of reasons including land use issues. The challenge now is how to make these LIH areas more sustainable. One way to do this is by implementing the criteria of a sustainable city. One of the criteria of measuring a sustainable city is land use.

It is therefore necessary to examine ways in which land is being used in LIH areas and see if the current land use pattern contributes to sustainability. This is because improper land use could drastically impede the sustainability of these LIH in particular and the ecosystems health in general. There is need to encourage optimal use of available land space with a view to improving the ecosystems health and thereby achieve sustainability in LIH.

Achieving a Sustainable City
The Oxford English Dictionary defines sustainable as the ability to be maintained at a certain rate or level. Sustainability in relation to cities is defined as" the equitable preservation of the built and natural environments, cultural heritages, and economic opportunities" (Unsworth 2004 pg.34). This implies that there is no fixed standard of sustainability since it varies according to the context in which it is defined. The standard of sustainability differs from country to country and is considered in many different ways - especially in different geographical /economical/social contexts according to level of development (Chakrabarti 2001).

Mitchell (1997) argued that "the sustainable city", like its twin sister "sustainable development", is unattainable- utopia. Redcliff (1987) was explicit on the elusive and complex nature of this concept when he metaphorically said that like motherhood and God, it is difficult not to approve of it. At the same time, he accepted that the concept of sustainable development is fraught with contradictions. The point I want to emphasize here by this reference is that sustainability, as a concept whether it is in relation to development or city, is ambiguous, complex and therefore controversial. This contradiction according to Redcliff (1987) makes the concept susceptible to controversy especially when one considers the fact that there are no truly environmentally, socially, and economically sustainable cities, not even in the so-called developed world.

Although the concept of sustainable city has not yet received a universally accepted definition, it is universally agreed that issues relating to quality of life are central to it. For example, the *Urban 21 Conference* (Sustainable City Undated), had the achievement of improving the quality of life in a city, including ecological, cultural, political, institutional, socio and economic components without leaving a burden on the future generations, as one of its main agenda.

However, this paper does not engage in the controversy of whether a truly sustainable city is achievable or simply unattainable - utopia. It tries to transcend this ambiguity by envisioning sustainability in terms of a spectrum, with some characteristics as more and less sustainable. The study applies key

criteria which have been determined through a literature review as more and less sustainable in order to measure progress towards sustainability.

Characteristics of a Sustainable City
One of the ways of looking at the characteristics of a sustainable city is by interrogating the behavioral patterns, resource consumption patterns and life styles, government policies and general attitude of communities to the issues concerning the ecosystem health. Below are some of the features that depict actions which can be considered more and less sustainable. An influential proponent of sustainable city, Richardson (undated) propounded that a society's consciousness as far as the issues of sustainability of cities is concerned will be reflected and judged by its attitude to its environment in terms of the provision of goods and services. Some of these features are highlighted in Table 1.

Table 1: People's Attitudes to Issues Relating to Sustainability

More sustainable features	Less sustainable features
Compact forms of residential development	Low density, spread out residential development
Movement on foot and bicycle and transit	Heavy dependence on private cars
Wind and solar energy	Thermal and nuclear energy
Protection and use of natural hydrologic	Hard surfaces

systems	preventing infiltration; channeling natural water- courses
Natural open space protection of wetlands, streams habitats	Destruction of natural landscape, parkland with exotic species
Use of manure, compost	Heavy use of chemicals, fertilizers, herbicides and pesticides
Reduction of wastes, recovery, re-use and recycling of waste materials	Land fill, incinerators

Source: Richardson ('n.d.')

Approaches to Achieving a Sustainable City
Because sustainable city is such a broad and complex concept, concerns have been expressed at both national and international levels on the most appropriate ways of achieving it. Scholars, city mangers and authorities on urban planning are however not in agreement on the most appropriate method or approach. To many, some of the suggested approaches/models are sophisticated, complex and unrealistic and therefore unattainable. Harris (2004) suggests a number of ways to achieve a sustainable city. Some of the ways are, to integrate planning in ways that maximize resource use efficiency, make use of the multi- function potential of green spaces and maximize livelihood opportunities and self – sufficiency opportunities.

Barriers to Achieving Sustainable City

The path towards sustainable cities often requires changes in our current attitudes, practices and actions. It requires different social attitudes, long-term thinking, a different decision-making process etc. For the realization of a sustainable city to be feasible, Wamback (2001:83) calls for a "behavioral change". He suggests that society should adopt an attitude in which it should learn to consume resources no faster than the resources can be renewed, thereby placing less stress on the environment. Implementing sustainable change can be a complex task with numerous organizations and competing issues involved. Therefore its realization requires that "all hands must be on deck" to complement government initiatives. However, one is not oblivious of the fact that different communities face different challenges because of different population structures, cultural beliefs, and regulations, degrees of government stability, financial resources, human resources, and developmental stages.

Considering the above issues, there are still a number of major obstacles found in most communities that hinder the achievement of sustainable cities. Below is a compilation of research findings:

- Lack of employment opportunities;
- Homelessness and squatter settlements;
- Poverty and an underling gap between rich and poor;
- insecurity and crime rates;
- Inadequate and deteriorating building stock, services and infrastructure;
- Lack of health and educational facilities;

- Pollution; and

- Inadequate water supply and sanitation

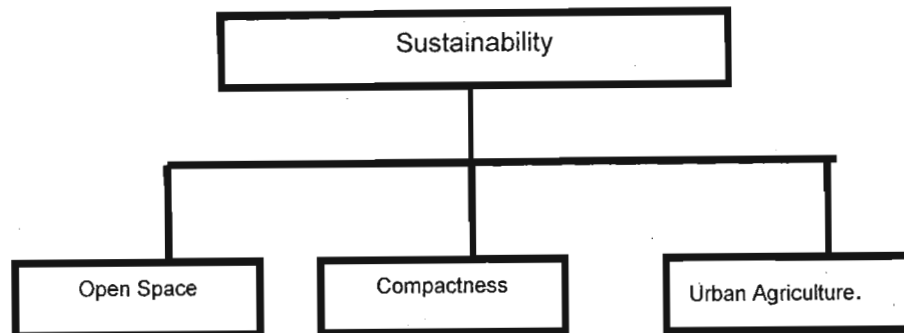*Criteria for Measuring the Sustainability of the Concept of Sustainable City*

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                    ┌─────────────────────────┐
                    │      Sustainability      │
                    └─────────────────────────┘
          ┌───────────────────┼───────────────────┐
    ┌────────────┐      ┌──────────────┐    ┌──────────────────┐
    │ Open Space │      │ Compactness  │    │ Urban Agriculture.│
    └────────────┘      └──────────────┘    └──────────────────┘
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Figure1.1 Criteria for Measuring the Sustainability of the Concept of Sustainable City

Open Space
Availability of open space is one of the criteria for assessing the sustainability of a city. Urban open or green spaces play a key role in improving the livability of cities because of the valuable amenities they provide for city dwellers in terms of social, economic, health and environmental benefits (MacHarg 1971, Woolley 2003)

Recent scientific understanding of how trees, parks, open and green space benefit people in cities have been confirmed (Wolf 2004). Werlin (1998) argues that there is a lack of open spaces in most low- cost housing areas in Africa. This is because some of the low cost housing projects are undertaken without

holistic frameworks, which address such issues as open space and other social amenities.

Despite the mounting scientific evidences and other empirical observations on the unquantifiable benefits derived from open space, urban open spaces are regrettably becoming scarce in many African countries including South Africa. There is therefore the need to create awareness in order to restore public value system in order to save our urban open spaces because of the important role they play in contributing to sustainability of our cities.

Compactness
Compact city in general refers to a city of high density of population. The United Nations Global Compact Cities Programme uses the term to refer to the geographical spread of urban areas. They also refer to their built form and patterns of movement and interaction and to concepts such as "densening" the city, urban renewal or revitalization and urban containment (Clark undated).The most obvious way of reducing the impact of the population of a city is to make it more compact. The thinking is that making cities more compact will reduce the overall areas of the built environment. The advantages of this are that resources will be used minimally and social infrastructures and amenities will be provided in the most economical way.

The goal of the compact city is reducing societal dependency on automobile in order to achieve a sustainable society. The theory of compactness is that people can live near to their work place and leisure facilities; therefore the demand for travel is reduced (Spatial Development Framework 2004).

Successful implementation of compact city in the continent may be difficult due to the following reasons considered by Sibley-Behloul (2002) and Williams ('n.d')

- There is presently in the continent a lack of social infrastructure caused by the current urban population explosion, which has exceeded economic growth;

- Because of the increase of urban population, increase of squatter settlements has been on the rise;

- There is also difficulty of urban redevelopment through demolishment of squatters;

- There is also a perceived lack of planning capacity;

- Small urban budgets and lack of effectiveness in policy instruments.

On the part of South Africa, the seeming difficult implementation of this concept was expressed in the notion that South African cities were designed to marginalize (Spatial Development framework 2004).The geographic separateness of the largest segment of the population is a classic feature of this fact. Urban settlements (mainly for blacks) are located far from employment centers. Long distances have to be travelled to reach workplace and the city center for shopping and other leisure activities.

Urban Agriculture
Urban agriculture is defined as the practice of farming within the boundaries or within residential areas in vacant plots (open spaces) of towns or cities (Gundell and Butterworth 2003). Urban agriculture is primarily for own

consumption because most of the farm products are perishable. Farming in this context refers to crop cultivation, animal rearing, fish farming etc (Obosu-Mensah undated). Other forms of urban agricultural activities include medicinal herbs, bee keeping, management of green space and parks, forestry, horticulture and its many "green industry" components (Urban Agriculture 'n.d.'). There are two main types of urban cultivation-enclosed and open – space cultivation (ibid).

Reasons for the survival of urban agriculture in spite of the current modernization especially in developing countries, Africa inclusive, is because the increasing urbanization has not been matched by infrastructural and economic development (ibid)

Another important reason deduced for the persistence of urban agriculture according to Sanyal (1985) is the impact of economic recession resulting from the effects of Structural Adjustment Programmes and the attendant declining purchasing power for many urban workers and residents. This situation has further been exacerbated by the shrinking job opportunities in urban areas.

Urban agriculture has its problems. One of the salient points is the scarcity of land as in South Africa. Again, scarcity of water is another inhibition to urban agriculture. During dry season, many urban farmers find it difficult to farm because of scarcity of water.

Method

The method used for this evaluation was a combination of both qualitative and quantitative approaches. There was also a combination of the usage of Floor Area Ratio (FAR), as an instrument of measurement, questionnaire and direct observation. This combination was necessary because it brought out clearly the true picture of the available open spaces and the various land uses in the study area. Direct personal observation during field visit provided opportunity for an on-the spot observation of land use situation. This also complemented the FAR interpretation. Moreover, the use of questionnaire ensured that relevant issues not covered in the FAR interpretation and personal observation, were clarified.

Data collection was done focusing on the following key established criteria:

Open Space

In using open space as a criterion for assessment, structured questionnaire was administered to the residents of the settlement. The questions were aimed at understanding the usage of public open spaces as well as open spaces in the yard. The use of Floor Area Ratio (FAR) from the aerial photograph of the area was also considered in determining the amount of available open space.

Urban Agriculture

Structured questions were used to determine whether people are engaged in agricultural activities as well as the type of crops they cultivate. Similarly, questions were asked to understand why people are not engaged in

agricultural practices. Personal direct observation was also used to find out about issues relating to urban agriculture.

Compactness

Structured questionnaire was administered to the residents of the area to ascertain the cost of transportation from their residence to their places of work or to town for other economic and or commercial purposes. The use of questionnaire is important because it provided insights to understanding issues relating to transportation in analyzing compactness. In addition, the use of the map of the area helped to determine its distance from the Central Business District (CBD), major industries and shopping or market centers. This showed whether the area is a walking distance or whether people have to use vehicles to commute to town and places of work.

Identification of Respondents

The criterion used for selecting respondents was a stratified sampling. This was necessary because the study area is divided or demarcated in sections (street – like forms). Stratified sampling allows the researcher to divide the population into strata and by drawing a random sample from each sub population (Neuman 2000). Using stratified sampling in this study allowed the researcher to categorize the houses according to their already demarcated lay outs or sections. Respondents were chosen from each stratum by administering questionnaire to every tenth house. This guaranteed a representative sample of the different sections of the whole study area.

Data Analysis

The SPSS Data software was used to analyze the data in both quantitative and qualitative forms. FAR analysis was done using the Archview GIS computer programme supplied by the Department of Traditional and Local Government Affairs of the Municipality.

Results

Open spaces and land uses are one of the many ways of assessing sustainability of cities and more so low -income housing areas. In determining the availability of open spaces, the study administered some questionnaires to the residents of the area. Opinions of forty respondents (though regarded as a small but significant sample size) from the different sections of the area were sought. These sections are however much the same. Results from the responses obtained from the residents are presented in descriptive format. This is presented by outlining the resident's opinions regarding certain aspects of their housing situation, and their actual use of the available land area in their yard, public open space and agricultural uses. The following were the findings of the study on the different questions relating to the issue of open space and land uses.

Open Space

Satisfaction with the amount of available open space

The types of spaces found in Ambleton were mainly courtyard, open spaces between the buildings, and open squares not landscaped nor adapted for public use. In addition, streets and footpaths joining the housing areas are used as public spaces for informal gatherings of adults and children. The courtyards are often used by the residents for different daily activities, such as drying of laundry, and

gathering with the neighbors. Children are often found playing in these areas, as well as some cars parked permanently or on temporary basis. Having this type of public space was considered as an asset by some of the residents because of the feeling of safety it offers to their children who play around the open spaces within their immediate vicinity.
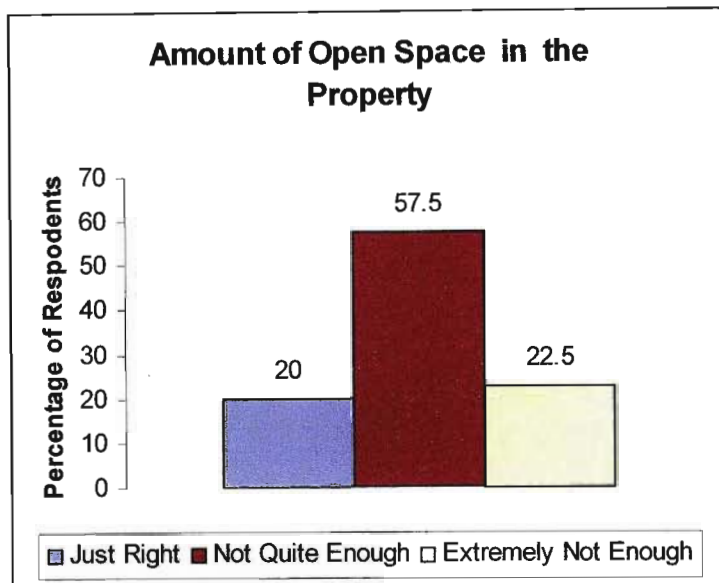
Amount of Open Space in the Property

Figure 1: Amount of open space in the property

Responses from the residents on their satisfaction with the amount of open space in their yard, suggests that 20% of the people were satisfied with the amount of space in their yard. Their satisfaction was based on the fact that previously many of them did not have better places than what the government now provides for them. Some of them according to their explanation were living almost in squalor. Because of this, they were happy with the amount of open space in their yard, satisfied and willing to make do with what they now have. Another reason that accounted for their satisfaction was because the houses were provided free of charge, they neither paid for the land nor did they pay for the houses themselves. Similarly, some of the respondents explained to me that their satisfaction was

based on the fact that the sizes of their yards are quite commensurate to the size (i.e. number) of their family members. Many of them, who expressed satisfaction, have a reasonable size of family members as against those who have too many family members.

However, 57.5% of the people expressed being dissatisfied with the amount of space in their yard. According to them, the amount of space is insufficient. A few however, said that whether they are satisfied or not, there will be no changes on the availability of space because the houses have been built, so it is needless asking whether they are satisfied or not when it is almost impossible to make any changes. This expression was further explained by them to mean that the process of consulting with the people was ignored during the planning of the lay outs and the construction of the buildings.

On the other hand, 22.5% of the respondents expressed extreme dissatisfaction with the availability of open space within their yard. Their dissatisfaction directly relates to the size of the houses where they are occupying. The sizes of the houses according to them are not adequate to accommodate comfortably the members of the family which are in most cases more than five persons for a one room apartment. Their argument was that since the houses were not big enough to accommodate them, open spaces in the yard equally are not enough judging from the number of persons to share the open space. Their argument could be likened to the concept of carrying capacity.

Urban Agriculture

Use of Open Spaces in the Yard to Determine Agricultural Uses

Use of Open Space in the Yard

Percentage of Respondents

- 45
- 40 — **40**
- 35
- 30 — **25**
- 25
- 20 — **17** **17**
- 15
- 10
- 5
- 0

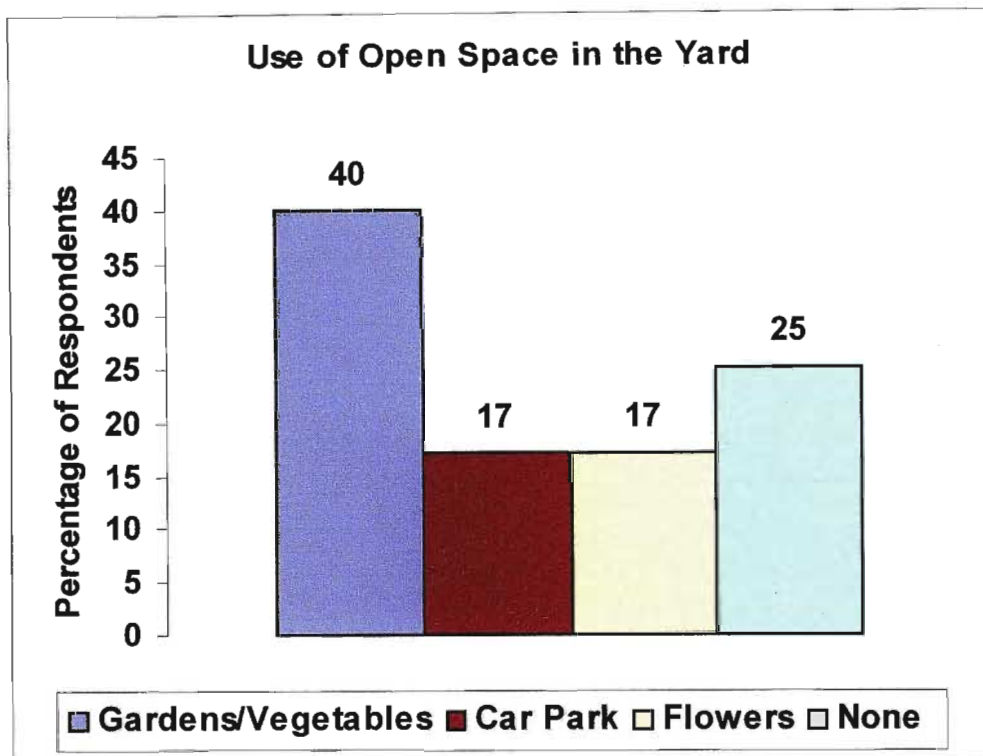▣ **Gardens/Vegetables** ▣ **Car Park** □ **Flowers** □ **None**

Figure 2: Use of open space in the yard

All the respondents feel open space was important and that there is need for its availability. This recognition is evident from the usage of open spaces within their buildings. For example, 40% of the people use the available open space in their yard for such activities as cultivation of vegetables, 17% use it for car parks while additional 17% use it for flowers. However, many of the respondents, representing 25% could not put the available open space in their yard to use. This is because according to the respondents, the lands upon which their buildings are located are either not good enough for any agricultural purposes (as some of them are hilly and rocky) or that they are too small for any meaningful agricultural activity. This view is entirely the opinion of the respondents. No scientific examination of the soil was done to determine whether the soil is good enough for any agricultural purposes.
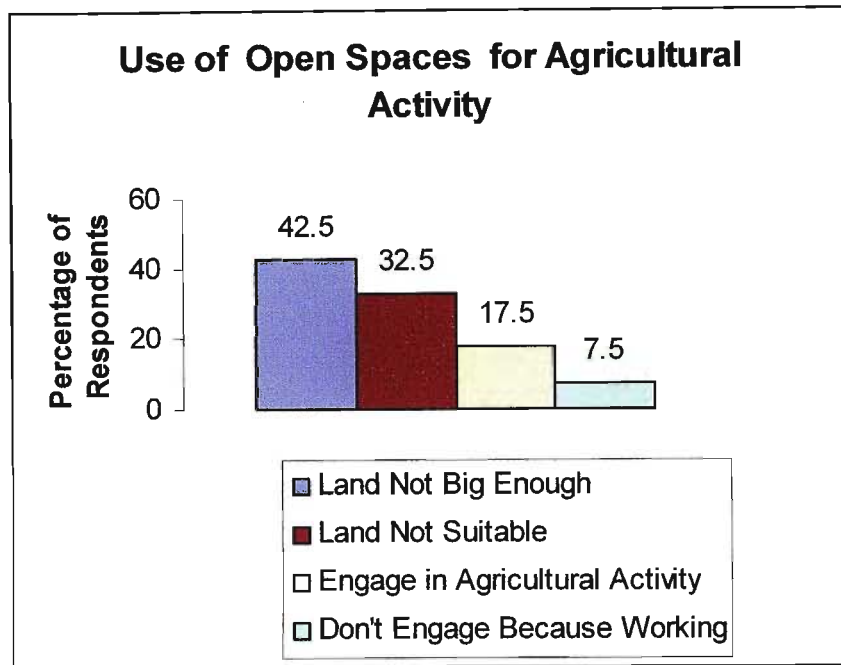
Figure 3: Use of open space for agricultural activity

Though many respondents claimed they need the open spaces for various positive purposes, public open spaces are not however properly managed. For example, 55% of the respondents said that they use the public open spaces for dumping. Twenty-five percent of the respondents said that they do not use it for anything, while twenty percent of the respondents use it for agricultural activities. Personal observation also confirmed greater usage of public open space for dumping. This improper usage of public open spaces according to the respondents, limits the people's desire for a more positive use of the open places.

All the respondents acknowledged the need for a proper management of the public open spaces by both the government and the community. Majority of the respondents (95%) wish the public open spaces should be used for public utilities such as hospital, police station, clinics and other uses which they feel is more

valuable. The need for a clinic for the community ranked first among other public utilities needs of the community in terms of what they wish the public space to be used for. According to them, a clinic is a necessity because there is no clinic in the community. They have to travel to "Town" in order to get medical services. The cost for going to the hospital at Edendale is R20, while going to clinics in town costs R10.
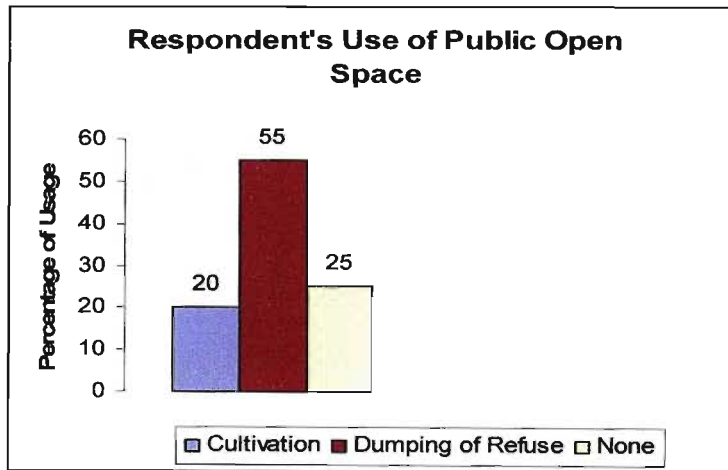

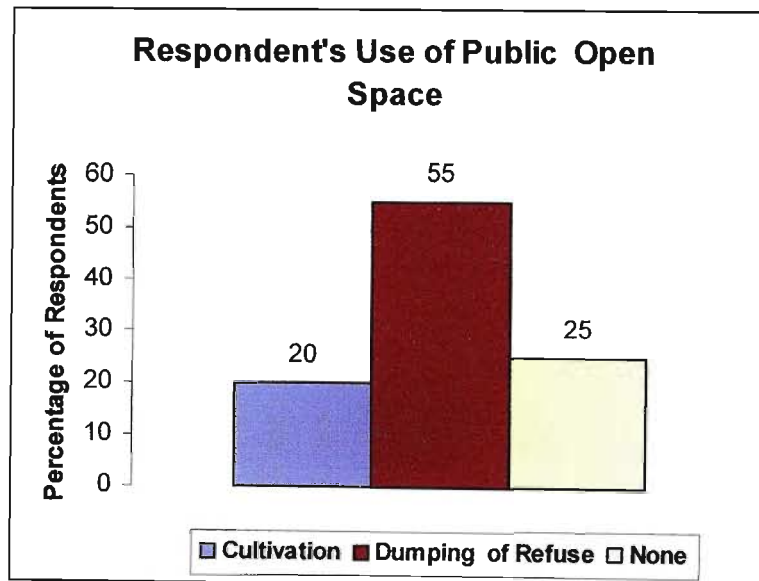*Figure 4: Public perception of the use of public open space*

Figure 5: Use of public open space

Using FAR to determine the amount of open space
The minimum size of the parcel of land upon which the buildings are erected is

$250m^2$ (Ncgobo 2006. "Pers". comm.) The average size of the buildings is $30m^2$.

To calculate the FAR therefore, $250m^2$ divide by $30 m^2 = .12$ (FAR)

The implication of this interpretation is that there is inadequate open space within the yards. This opinion is drawn from the recommendation on the housing estates in Vienna and France, which states that housing area whose FAR is within 1.0 to 3 should be sufficient for settlements on the fringe of the city, as well as higher densities on the inner city and district centers respectively (Gielge 2004). According to this recommendation, it appears best to avoid densities with a floor area ratio lower than 1.0 (ibid). However, I observed that there are differences in the size of the plots. Some of the respondents, whom I asked about these differences, explained that the reason for these discrepancies is because the area was built in phases and as a result those that were built earlier have smaller plot sizes than the ones that were built later on. Some have FAR above .12, while others are within the "Vienna and France" specification mentioned above.

Compactness

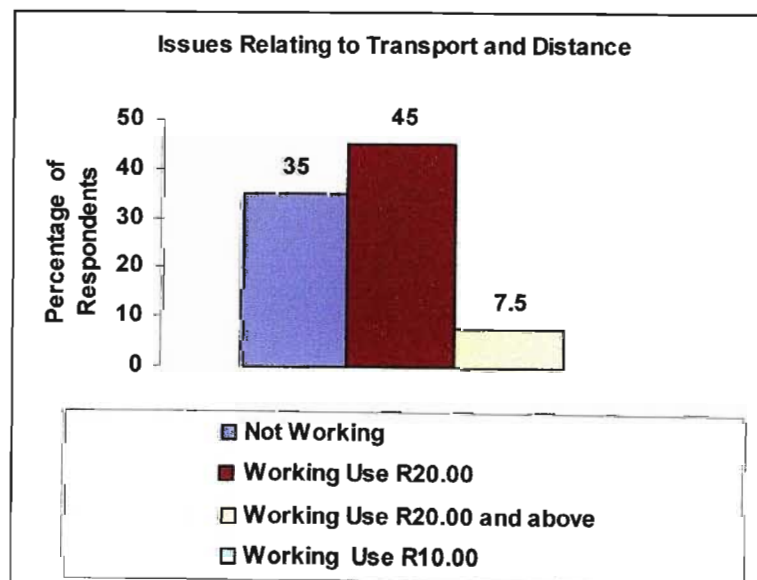*Issues Relating to Transportation and Distance*

Figure 6: Issues relating to transport and distance

Many of the respondents have to use public transport to get to their place of work or town. The respondents comprise those who are working, the unemployed and people who do not have permanent jobs. The respondents did not answer the questions the way they were asked because there were no matching options from the question. However, their answers showed that 45% of the respondents who are working use R20.00 daily to get to their place of work. Seven point five percent of the respondents who are working, use more than R20 to get to their place of work. Only 10% of the respondents who are working use R10.00 to get to their place of work.

Going to town for commercial purposes like buying of groceries, food items and other commodities or for leisure and entertainment purposes costs R10.00 round trip. These descriptions point to a high level of cost for a settlement whose residents are mainly unemployed. Though there are "tuck shops" in the area, people still go to town to buy their essential commodities. One of the reasons why people go to town is that the prices are cheaper in town than in Ambleton. For example, a can of coke which sells for R4.in town sells for R5.50 in Ambleton. Another reason is because the qualities of the commodities are not always good compared with the ones in town. Going to town from Ambleton with public transport takes between 20 and 30 minutes.

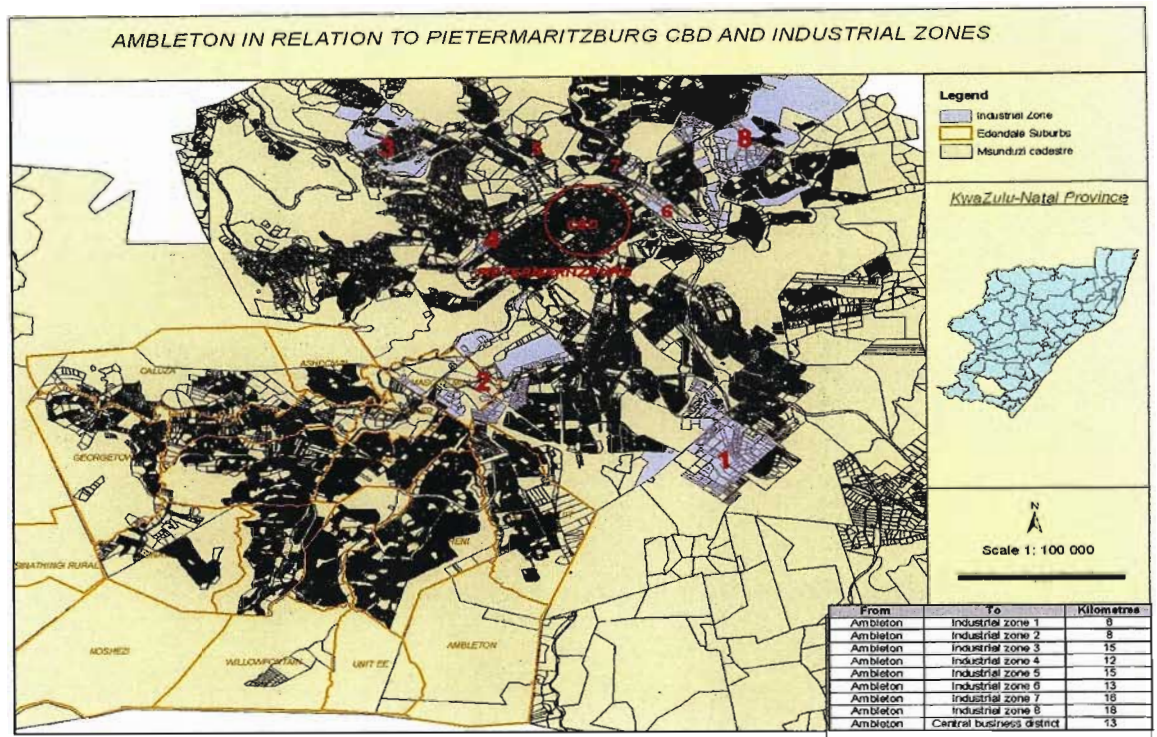*Using the map of the city to understand the distance of the study area.*

Figure 7: Map showing the study area within the city of PMB

There is currently no official land use scheme in the study area. This is because the area is a new settlement. However, the study learnt that the Municipal authority concerned is in the process of developing a land use management schema for the area. From the available aerial photograph, the study observed some provisions for land use in the area. These include:

❖ Educational zone;

❖ Religious /Public worship zone;

❖ Municipal purpose (Reservoir)'

❖ Passive public open space reservation;

❖ Active public open space ;and

❖ Public roads and lanes

In order to determine the distance of the study area from the main industrial locations and the Central Business District, a map of the city was used. Respondents need to travel distances of 8, 12.13,15,16 and 18 kilometers respectively to get to the identified industrial areas from the study area. These figures represent the measurement taken from the map as the "crow- flies". The actual kilometers will vary going by roads. The study did not however determine this. Invariably, it will take more if it is along the roads than what is represented on the map.

Discussion and Recommendations

The study has established criteria for assessing and evaluating the sustainability of the LIH in Ambleton. The research is of the opinion that using the established criteria of assessment of sustainability with regards to open space, urban agriculture and compactness, LIH in the study area like many others in the continent, is yet to meet some of the desired standards, and characteristics that make for more sustainability. Example of such standard is drawn from my earlier reference to Richardson's articulation of people's attitude to issues relating to sustainability and the recommendation on the housing estates in Vienna and France (Gielge Undated). A number of factors pose serious challenges to the successful implementation of the concept of sustainable city in the study area. These factors are considered below.

Open Space

Amount of Open Space in the Yard

Majority of the respondents are not satisfied with the amount of open space in their yard. Two main reasons account for this. Firstly, the sizes of some of the people's families are just too big to be comfortable with the amount of open space which would have been sufficient for a smaller family. Secondly, there are differences in the sizes of the plots. If the standard measurement of $30m^2$ was applied to the entire plots one expects that it would have been enough thereby leading to a greater percentage of people being satisfied. However, the study learnt that the measurement are not the same, as a result some people are satisfied while others are not.

Furthermore, the study found out from some respondents that the process of consulting with the people was flagrantly ignored during the planning of the lay outs and the construction of the buildings. This according to them was part of the reason for their dissatisfaction. If they were consulted during the construction process, they would have made their opinion known which could perhaps influence the sizes of their property.

Usage of Public Open Space

Public open space in the area is not properly managed. From the results of the study, many of the respondents claimed that the public open spaces are used for many undesirable activities ranging from illegal cultivation to dumping of refuse. Personal observation also confirmed this. Dumping of refuse received a greater percentage of usage. Because of this, the potential benefits of public open space such as recreational values, open green spaces, parks and other health benefits could not be realized in Ambleton. It is apparent that unmanaged wastes dumped

in the public open spaces could constitute health hazards. Improper use and poor management of public open spaces constitutes impediment to sustainability. If no plans are put in place to check this trend to make for a proper management of the public open spaces, the concept of substantiality in the area remains a mirage.

Urban Agriculture

In a settlement where the majority of the residents are unemployed, they should be provided with the alternative of engaging in agricultural activities as means of survival in the face of adverse economic situation. However, because the amount of open space in their yard is not big enough, they can not engage in any meaningful agricultural activity. The implication is that urban agriculture which promotes self reliance and serves as a means of alleviating urban poverty could not be practiced in a meaningful manner. Another impediment to the practice of agriculture is the perception of the respondents that the land is unsuitable. Although no soil tests were done, personal observation supported this perception as many of the portions of the land are made of rocky and hilly lands. This made the practice of agriculture extremely difficult, if not almost impossible.

Compactness

Issues Relating to Transportation

Many of the respondents who are working had to travel outside Ambleton using public transport in order to get to their place of work. This is because the settlement is quite distant from the CBD, (approximately 13 kilometers to the CBD). Those who have to travel to town for food items and other commercial or leisure activities have to use public transport in which they spend a minimum of

R10. Obviously, this is against the theory of compactness which encourages people to depend less on automobiles for their movement and to live close to their place of work or other activities. The implication of going contrary to the theory of compactness would mean that the sustainability of the area would be difficult to achieve if the current practice which encourages unsustainability is not halted.

Recommendation

In order to achieve sustainability in the studied area, the study recommends the under listed issues as being paramount with regard to sustainability of the LIH. This recommendation is premised on the understanding that the criteria used in assessing the sustainability of the studied area is quite useful but needs to be religiously implemented.

❖ There is need to develop a more holistic approach in the planning of the LIH areas in ways that would encourage optimal use of the available open spaces. This fact is in consideration of the fact that the studied area does not have proper management plans of the public open space. Since the lay out plan of the area is yet to be fully developed, there is need for the public open spaces to be well managed. This could be done by a joint collaboration between the community and the government.

❖ The importance of urban agriculture cannot be over emphasized.

The residents should be encouraged to engage in agricultural activities as a means of maximizing livelihood opportunities and self-sufficiency especially in the face of adverse unemployment situation evidenced in the study area. However, the study recognizes the perception of some people about the topography of some parts of the area which they feel could not allow for any meaningful agricultural activity in terms of cultivation. There are a few

opportunities for other forms of agriculture (not necessarily cultivation) and economic activities to improve the residents' livelihoods.

❖ Industries and other forms of economic activities should be brought nearer the people so that they can live and work near these places. Most of the respondents who are working have to use public transport in order to get to their place of work. This implies time and financial costs. Those who are not working or employed, cannot even find enough casual work within the area. When people are not gainfully engaged, the likelihood of crime, violence, drug and sex related offences are on the increase.

❖ Provision of health services is another crucial area which needs to be addressed urgently. Unavailability of health services in the studied area limits the opportunity of achieving its sustainability in the context of sustainable city. Accessibility of health services to the residents of LIH in Africa in general is one of the areas that threaten the successful implementation of the concept of sustainable city. The studied area is no exception to this threat because of the near absence of health services. This fact was clearly brought out by the desire of the respondents to see the public open space use for clinics. Improving the sanitary condition of the studied area is very crucial to the achievement of the concept of sustainable city. This research suggests that the municipal waste management department should consider extending its services to the study area. This will reduce the incidence of dumping refuse in the public open space.

I am of the opinion that if the above suggestions are considered firstly in the light of the concept of sustainable development, and secondly in the light of the concept of sustainable city; its realization in the study area (and in the continent for that matter) will be achieved. For the concept of sustainable city to be realized, it is therefore important that government, non – governmental organizations and individuals should work together. This view is based on the suggestion that one of the major reasons why the concept of sustainable city seems not to have been very successful in the continent, has been that town planners, politicians, government agencies and other stake holders had often failed to realize the importance of collaboration between and among various urban -concerned groups. If city planners should recognize other different actors in the pursuit of a sustainable city other than the government, and approach the concept from the perspective of joint venture, then right steps towards the realization of sustainable city must have begun. This collaboration will be premised on the conceptualization of a sustainable society as both a requisite and a panacea for the achievement of a sustainable city.

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