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Urban Intensification in Metropolitan Khartoum: Influential Factors, Benefits and Applicability

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Abstract

This dissertation explores the theoretical and methodological implications involved in the policy framework needed to intensify urban residential areas in a developing country. Metropolitan Khartoum, Sudan, has been chosen as a case study. The aim of the study is to further our understanding of the implications of transforming a sprawling city form to an intensified form. The objectives are: to identify the factors that have shaped Sudanese urban form in general and Metropolitan Khartoum in specific; to identify the policies that can intensify the urban residential neighborhoods in Metropolitan Khartoum; and, to influence both the demand and requisite housing needs for this intensified form. This research is qualitative in its nature: the complexity of the study problematic required the adoption of a constructivist paradigm as the fundamental set of beliefs. Inductive arguments are used in conjunction with a wide range of methods, including detailed descriptions of Sudan and metropolitan Khartoum, with special emphasis on how local environment, urban challenges, policy, legislation and practices affect the study problematic. The theoretical premises of intensification are reviewed along with development issues, urban infrastructure challenges and opportunities in developing countries and local acceptability of intensification. The different forces that can shape urban forms have been described and the suitability of metropolitan Khartoum, with different general urban intensification policies and practices and of urban management tools in large African cities has been investigated. The outcome of the study provides detail for a discussion of results that work to explain some of the cause and effect of urban sprawl in Metropolitan Khartoum. It also suggests possible change in both policy and regulation to induce successful city reform towards intensification.

Key words: Intensification, urban form, factors that shape urban form, developing countries, infrastructure cost, metropolitan Khartoum, Sudan.

Preface and Acknowledgments

There is an increasing interest in how the form of cities can contribute to their sustainability. The main focus, in developed countries, has been on the impacts of different urban forms on travel behaviour and transport provision, resource efficiency, social equity, accessibility and economic viability. The outcome from this debate has been a strong advocacy of the 'compact city' model. However, research in developing countries is still underway regarding the benefits, relevancy and applicability of this form.

I began my research in the area of sustainable provision of urban infrastructure with my master's degree program at KTH, Stockholm, Sweden (1996-1998). In my MSc. thesis I concluded that the administrative structure and the division of responsibilities between the various actors in infrastructure provision cannot impact sustainability if the system is not functioning. Since then, I have been studying urban forms and the effect of urban design in sustainability as tool for assisting the functioning of city-systems. This dissertation is a result of a four-year study program in Urban Planning at KTH. It explores the capacity of urban intensification in Khartoum State, Sudan. The study was financed jointly by KTH and the Ministry of Science and Technology (MOST), Sudan.

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Burhan Elghazali
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PART I

- Chapter 1 -

Introduction

This section provides a brief background to the problem and provides detail on how the study will address these problems. Furthermore, it defines the concepts needed to understand and resolve the research problem and enable the reader to more readily follow the research process.

Background

Urbanization is an international trend with significant consequences. As world populations continue to grow, cities and urban regions will both emerge and develop. Effective monitoring and planning of urban growth and changes in urban form are essential for ensuring that adequate infrastructure, efficient resource utilization, employment opportunities and environmental health standards are achieved and maintained.

Urbanization in developed countries was initially driven by the industrialization process, providing opportunities for people in the city's industries. People in developing countries also believe that cities can provide new and possibly better lives; thus migration to cities continues to accelerate. Yet, there are often not enough work opportunities to absorb the continued flow of rural people who are arriving to try to find better ways of life.

It is often extreme poverty that drives people to migrate from rural areas to cities in hope of finding a job to so as to support their families. Thus, urbanization is being driven from the wrong terminal of the system; not due to the 'pull' of an excess of

jobs in cities but due the 'push' of the poverty of the rural population. This leads to a desperate struggle in cities among people for work opportunities as well as improved social services.

Apart from growth in in-migration, cities can also exhibit natural growth, so competition for jobs can be quite severe. This is especially the case in countries where cities have had a longer history of urbanization.

The failure of the rate of economic development to match the rate of demographic growth can only lead to deterioration in all aspects of sustainability (UNDP, 1992; Satterthwaite, 1999). High demographic growth, low levels of economic development, high income inequalities, small urban budgets and shortages of environmental infrastructure, shelter and basic services have a critical effect on densification policies and the effectiveness of policy instruments. The merits of densification at a high level of development may disappear at a lower level and may actually be counterproductive without significant improvements to this level (Jenks and Burgess, 2000). These improvements may require new urban forms of different land-use plans, technologies in infrastructure provision and transport strategies.

The urban forms in most growing cities in developing countries are inefficient and environmentally damaging. Government agencies in high-growth areas are aware of these problems and are adapting land use plans and transport strategies to provide more sustainable urban forms. These strategies and plans have created an awareness of the potentially negative impacts on livability that past urban development practices might have in meeting the needs of forecasted population growth. Often these strategies focus on principles governing future growth through objectives, targets and desired outcomes based on regional performance. These outcomes may form prerequisites for future major housing projects to show that they are consistent with expectations outlined in established strategies. With government agencies recognizing the importance of encouraging development that achieves acceptable social, economic

and environmental (therefore, political objectives), there is a need to provide decision makers with integrated multi-disciplinary planning views (ibid).

1.1 Sustainable Development and Urban Sprawl

It has been increasingly understood that there is a direct relationship between the 'mis-use' of land and political and economical instability (Brundtland, 1987; Blackwell *et al*, 1991; UNCED, 1992). The issue of sustainability also has been raised as awareness of the economic costs of unsustainable development have grown since the findings of the broad linkages that link population, resources, environment, and development (UNCED, 1992). Sustainable development, accordingly, was defined as: the development that meets the needs of the current generations without compromising the ability of future generations to meet their own needs (Brundtland, 1987).

With respect to 'urban sprawl', it is worth mentioning that one of the earliest uses of the word 'sprawl' in terms of land use was in a 1937 speech by Earle Draper, when he argued that the sprawled form of Tennessee Valley made the countryside ugly and un economic in terms of 'services' and 'social value' (PW, 2001). Unfortunately, there is little agreement about what constitutes sprawl. One common use of sprawl is as a stereotype or common form of growth found in a particular area (Galster *et al*, 2000): it may be seen as the outcome of poor planning, or as the cause of congestion or increased pollution. Sometimes 'sprawl' is used to describe almost any urban growth (Weber, 2005).

However, it is well known that in most cities and towns, growth is occurring outside the urban core area with very low densities of residential and commercial activity in surrounding areas. In some developing countries, this growth is often pushed well beyond natural trends with environmental, economical or political accelerators. This condition of urban sprawl has been subject to a wide range of criticism, including its negative effects on travel behavior, infrastructure cost, social

integration and use of natural resources. Therefore, research in many developing (and developed) countries seeks to uncover and understand the benefits of intensification along with the factors that determine this intensification.

1.2 Urban Growth and Urban Density

Urban planners, designers, policy makers and decision makers are confronted with an increasing demand for efficiency in the urban environment: better use of land and natural resources, infrastructure, and human and financial resources. For efficiency and better use of resources, population density of urban areas is a measure that plays a significant role (Acioly and Davidson, 1996). (Examples related to benefits that can be drawn from intensified urban forms are shown in Chapter 4 in this study.)

1.2.1 Population density in general

'Population density' can be used as a measure of any tangible item, but it is most often applied to living organism. Population density is usually expressed in terms of items or organisms per unit space (Wikipedia, 2004). It is useful to remark that population density measures depend of the scale of the sampling area under consideration. For instance, if the items concerned are modelled as discrete points, population density will vary greatly between and among points. Modelling individuals as spatially extended objects raises other issues as the scale of the sampling area approaches the scale of an object—for example, one person's scale may be naturally related to her/his dwelling place, whereas another person's this scale may involve a large area (ibid).

Generally, population density is measured as the number of persons per unit area, which may include or exclude inland water. It may also be expressed relative to habitable, inhabited, productive (or potentially productive) or cultivated areas. For human spatial development, it is frequently measured in persons per square

mile/kilometre/hectare, which is simply calculated by dividing the number of persons by the land area measured in square miles/kilometres/hectares (ibid).

1.2.2 Population density in urban planning

In urban planning, population density is an important issue for the technical and financial assessment of the distribution and consumption of land, infrastructure and public services in residential areas. In principle, housing practitioners have assumed that the higher the population density, the better the utilization of infrastructure and land (Acioly and Davidson, 1996). Numerous empirical studies have been carried out in relation to infrastructure cost per capita, labor productivity, and city size and its productive efficiency on the one hand and the benefits of population density on the other (Garn, 1987; Smoluk and Andrews, 2005; Seitz, 1995). In addition, high population density has benefits for environmental, developmental and regional innovation systems (Anderson and Karlsson, 2004; Porter, 1990).

Closely linked to density is crowding, which implies too many people living or working in a given neighborhood, plot, dwelling or room. Studies in Guinea-Bissau, for example, reveal a strong correlation between crowding and ill health (Acioly and Davidson, 1996). Overcrowding and densification of neighborhoods are sometimes argued to be one of the major negative effects of constrained land and housing markets, rather than the results of direct planning decisions (Jenks and Burgess, 2000). It should be noted that there is an important difference between higher housing density and crowding. It is possible to have high density of housing without crowding. Case studies in Brazil have shown that government policies, plans and development control instruments can shape cities and densities in a way which optimizes infrastructure, municipal services, land and public resources (Acioly and Davidson, 1996). In Other case studies in UK, Jenks (2000) concludes that various combinations of the characteristics of an area, its socio-economic make-up and the type of

intensification could lead to either negative or positive impacts and that predicting the impacts was context specific.

1.2.3 Population density and urban intensification in comparison

Population density, in this study, refers to the number of persons per unit of an inhabited area within which inland water is excluded. It is measured in persons per square kilometre.

Population density is usually increased through a process referred to as 'intensification'. However, urban intensification is commonly understood as a process whereby new buildings in cities are built at higher densities, vacant land in urban areas is developed and high-density redevelopment takes place (Williams, 2004). In developed countries (different from developing countries), the compact city model focuses on maintaining or increasing urban populations, which have been steadily declining, thus making urban living popular again. This can be traced to the fact that societies in developed countries often believe that continued population growth has acted to slow the de-concentration process in their areas. Nevertheless, they believe that de-concentration is likely to continue in the future because of lower social costs in low-density areas and preferences for living in lower density areas (Speare and White, 1990).

By comparison, cities in developed countries are characterised by rapid urbanisation in fast growing cities and regions (Richardson *et al.*, 2000) and therefore, the compact city model focuses on 'organizing' population growth rather than maintaining or increasing urban population. The argument provided for this 'organizing' process is that intensification is needed for efficient and better use of resources.

However, intensification and sustainable development are only likely to be successful (both in developed or developing countries) if the process can be managed

and implemented in a way that is acceptable to local people (Jenks, 2000, p 245). There are certain types and combinations of factors that are both acceptable to, and positively valued by, residents. These relate to the type of intensification, the type of the area within which it takes place and the social characteristics of the people in the area (ibid).

1.3 Urban Form and the Sustainable Cities

There has been considerable debate about the relationship between urban form and sustainability (Jenks *et al*, 1997; Breheny, 1992), much of which supports the intensification of high-density, mixed-use settlements. This debate represents an important area of empirical research regarding urban form. In existing urban settlements, planners have a substantive knowledge of how cities, economies and ecologies interact, and they should put forth specific and farsighted proposals for designs that promote the sustainable city: land-use design and development control are traditional planning tools in this respect. The potential for balance between economic and environmental interests exists in design itself, as that in a 'greenbelt community*'. 'Clustered development', higher densities and 'live-work communities' are designs that are moving toward such a balance (Sherlock, 1996). Some dispute the inherent benefits of the compact city (Elkin *et al*, 1991). Therefore, local acceptability of intensification is a determinant factor in any intensification policy (Jenks, 2000, p 245). A complication in promoting and implementing intensification policy is that not all economic-environmental conflicts have their roots in spatial or architectural problems. As a result, apparent solutions may be merely symbols of ecological-economic balance, without actually solving an inherent conflict. Nevertheless, land-use planning arguably remains the most powerful tool available to planners, who should not worry too much

* A greenbelt is a community of sorts. It is a welcoming community with a wide embrace where many people – of all ages, traditions and backgrounds – feel at home (GO, 2006).

if it does not manage all problems (Hudson, 1991; Campbell, 1996). This is because intensification policies, as an example of land use planning policy, are *necessary* for sustainability but *not sufficient* (Jenks, 2000). Williams argues that certain aspects of intensification, in some places, have contributed to sustainability, while others clearly have not.

Another major consideration in urban planning in developing countries is the space required to meet population projections (Campbell, 1996). Considerations for identifying areas of potential development include issues of land suitability and serviceability: for example the cost of water supply and sanitation infrastructure. The space required to accommodate population growth is typically addressed in planning processes using population density approaches. Policies addressing urban growth may adopt the continuation of current densities or, possibly, a decrease in density.

One objective of the planning process may be to spatially allocate land for development to meet a specified population target so that economic, social and environmental needs are maintained.

1.4 Problem Statement

Metropolitan Khartoum in 2006 is inhabited by more than 6 million persons, and has an annual average growth of 4 %. In the absence of a purposefully designed response to population growth, the built area of the city has extended at low density with unaffordable infrastructure cost, long transport distances and associated problems.

The annual demand for new housing is estimated at 8 %, of which 75 % is from new immigrants/internally displaced persons. More than 92 % of Metropolitan Khartoum dwelling plots consist of low-density ground floor development of 300-500 sq meters per plot in size and are inhabited by single families of 6 persons on average. The cost of the use of urban infrastructure is high even for the high-income inhabitants, when compared to current income levels.

The fear of losing environmental quality, the high cost of infrastructure services in the city and challenges to economic performance have sharpened the awareness that the present form of the city and housing policy does not comply with current needs and demands. Policy changes that can move the city form towards a more sustainable pattern with affordable services for the urban majority are necessary.

Optimal population density, within sustainable city form, is used as a tool in this study to: reduce infrastructure cost per capita; make infrastructure use cost effective for all (especially for the disadvantaged); improve the economic performance of the inhabitants, and; meet the shortage in housing facilitation.

1.5 Scope and Delimitations

Compact cities ideally grow around centres of social and commercial activities located at public transport nodes. These nodes provide the focal points around which neighbourhoods develop (Rogers, 1998). For this reason the compact city may be described as a network of neighbourhood nodes. This study addresses intensification of residential areas within such nodes.

The process through which cities could be intensified is a complicated one, and is connected with other issues in the field of built environment (Figure 5.1). Settlement layouts and transport systems are significant factors and have influent technical and architectural applications. Discussions about the different options of settlement layouts and transport systems in metropolitan Khartoum are not within the scope of this study. The study is limited to policy and planning frameworks that are deemed acceptable and applicable to the common multi-floor, multi-family mode of living in Metropolitan Khartoum residential areas within neighborhood nodes. These factors include: cultural acceptability; housing market demand; building designs, and; building-materials costs.

1.6 Aims and Objectives

Urban reform has become a major strategy for realizing sustainability benefits of intensification in developing, as well as developed, countries. A number of spatial models and strategies have been developed to change urban form to achieve the desired benefits. The most widely adopted model concerns the creation of 'concentrated decentralization' within the urban structure that encourages the adoption of a multi-family, multi-floor category of living, i.e. many families living together in multi-floor buildings.

Against this background, the aim of the study is to contribute to the understanding of how to transform a sprawled city form to an intensified form. The objectives of this study are to:

a) Identify the factors that shaped urban forms in Sudan in general and in Metropolitan Khartoum in specific;
b) Identify policies that may reshape the Metropolitan Khartoum urban form to a more compact multi-family multi-floor mode of living, and;
c) Influence both the inhabitants' demand behavior and housing and shelter facilities toward such reform.

The suitability of different existing intensification urban practices and urban management tools from various contexts will thus need to be investigated. As the sustainability benefits of a compact city environment cannot be attained in the absence of the required prerequisites of localized guiding policies, the study first must identify them.

1.7 Fundamental Assumptions

This study is built on a number of assumptions:

1. Urban form is necessary for city systems to function.

2. Urban sprawl results in high cost of urban infrastructure and leads to inefficient use of resources.
3. Urban intensification is significant for sustainable development in large cities, therefore, planning has to support its adoption.
4. Design of urban form depends on many factors; therefore, it could be controlled by planning procedures.
5. Policy change can affect the inhabitants' attitude towards intensification.

1.8 Interpretive Paradigm, Method and Materials

The research in this study is qualitative in nature. Qualitative research is characterized by an emphasis on describing, understanding, and explaining complex phenomena (Norman *et al*, 2003). The focus is on the consideration of the full multi-dimensional, dynamic picture of the subject of study; therefore, the 'Constructivist Paradigms' is adopted. A paradigm is the interpretive framework or set of beliefs that guides action (Guba, 1990, p. 17). This paradigm is adopted on the belief that all entities in every urban form are in a state of mutual and simultaneous shaping. Further, it is adopted on the belief that there are multiple constructed realities and by understanding these, some level of understanding may be achieved.

The task of this study is to provide explanations for the phenomenon of urban sprawl, but because the existence of causes does not necessarily imply that the given urban form of a city is a desirable one, we are also interested in identifying the efficient urban form of cities, and of suggesting means of achieving them. This is because the fundamental intent of this study is not just to explain the unfortunate realities, but also to offer means for improvement.

The set of arguments adopted in this study is inductive, i.e. moving from the specific to the general. A wide range of methods was used to gather the requisite data for this study, including: collection and analysis of archival, administrative and

performance data; case study research; content analysis of data; cognitive interviews; and, structured observations of meetings. The selection of these methods was intended to tailor the complexity of questions being studied and the setting for research.

Given the large amounts of qualitative materials collected during the fieldwork stage, SPSS was used to manage and analyze the data. Secondary data was collected from published and unpublished resources. The study makes use of three papers written by the author: urban infrastructure management in Khartoum State (Bushra, 1997); the acceptability of a multi-floor form of living (Bushra, 2001), and; environmental economics and sustainable development in Sudan (Bushra, 2002). Scientific publications are used for the published data sources. Unpublished resources include local official reports.

The study tackles its theme though three main stages concerned with: identifying the benefits of intensification; uncovering the influential factors which caused urban sprawl (and can reverse the process), and; factors related to the applicability of the suggested policy and city reforms.

1.9 Summary of the Outcomes

The study outcomes support its fundamental assumptions. The outcomes are concerned with: the perceived benefits of intensification; the influential factors that have shaped metropolitan Khartoum urban form, and; the policy framework that can reshape the urban form. The factors that shaped Khartoum urban forms were: the population transformation, in terms of displacement and internal migration that has taken place for several decades; the adoption of the liberalization policy that contributed negatively to the employment market structure and works as an accelerator in a rural to urban migration process; the availability of un-adaptable real estate leasing policies and fiscal policies, which cause failure in housing facilitations

market for multi-floor housing mode of multi-flats; the lack of climate comfort measures in building design and the ignorance of cultural heritage in forms of houses and shelter which made Khartoum inhabitants reluctant to accepting the compact form of living; and, the entrepreneurship behavior of the new immigrants that tends to concentration.

For a city development to succeed, policy change is needed to influence both the inhabitants' demand behavior and housing and shelter facilitations. This study finds that major change in fiscal policies, real estate leasing legislation and building regulations are likely to be needed to help successful management and implementation of Metropolitan Khartoum city reform towards greater compaction. Physical planning has a role to play in removing large holdings of low land-use values, such as the military areas and the civil airport.

1.10 Organization of the Study

The study is written in five parts with twelve chapters. Part one is introductory: it formulates the problem and states the main research questions that will be answered within an outlined research framework and methodological approach. Part two is more theoretical and focuses on the benefits of urban intensification and the factors involved in influencing it. This part presents the full theoretical framework and connects it with the local conditions of the study. Existing challenges and opportunities are explored and compared with cases from countries having similar conditions. Part three describes the local context of Sudan in general and in Metropolitan Khartoum in particular. It presents the political, economic and environmental situation with its effects, as influential factors in any policy and/or city reform, on sustainability for Sudan. Further, it describes the urbanization problem and its consequences in detail**.** It also provides information, based on primary and secondary sources, about the social, cultural and economic factors that effect

acceptability of the compact form of housing in Metropolitan Khartoum. Part four details the results obtained from the study, according to the research questions raised in Part one. Part five discusses the results of the study and places them into a global context as well as offering a way forward.

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PART II

- Chapter 2 -

Urban Infrastructure Finance and Sustainability in Developing countries

This Chapter is concerned with the benefits of intensification for urban infrastructure finance as 'pushing' factors. The following sections detail urbanization trends in the world, the role of urban infrastructure provision and facilitation in sustainable development and benefits that may accrue to urban intensification.

2.1 Introduction

Urbanization is a dominant demographic trend in developing countries. By the year 2000, nearly 45 % of the total population in developing countries is located in urban areas. By the year 2025 that proportion could rise to 60 %, comprising some 5 billion people. This rapid urban population growth is placing (and will continue to place) severe strains on the water supply and sanitation services in most major countries, especially those in developing countries (Jackson, 1995). The World Health Organization's figures for 1988 show that only 67 % of the combined urban population of developing countries had adequate facilities for excreta disposal, and that only a minority of these was served with piped sewerage system (World Health Statistics Report, 1989).

In urban areas reciprocal impacts between population and the environment are clearly evident. Growing urban populations directly transform the environment. For

example, water pollution and the inadequate disposal of waste have a direct impact on the health of urban populations.

In this chapter, I will consider water and sanitation as examples in analyzing urban infrastructure finance problems in developing countries. The main reason for this choice is the inclusions of water as a target under the UN Millennium Development Goals. In addition, water and sanitation are intrinsically linked and are fundamental requisites for human life and dignity.

2.2 Urban Infrastructure and Sustainability

The term 'Urban Infrastructure' is used in this study to refer to the physical infrastructure that has a direct relation with the physical environment, such as: provision and/or facilitation of water and sanitation, surface water drainage, waste management, transportation and energy supply.

In the field of urban infrastructure provision as facilitation, since the 1990s there are two main issues in the forefront of urban policy in developed countries: firstly, there is a need to adapt and expand urban areas to meet the economic challenges and demand of population growth; secondly, there is a need to reduce harmful impacts of urban life on the environment and to develop environmentally acceptable and sustainable forms of urban living (OECD, 1991). These two issues, to some extent, are similar in developed and developing countries.

A significant characteristic of the urban infrastructure is that cities and regions are open systems that evidence flows of people, goods, pollution and waste across boundaries. In recognition of this complex exchange and flow, there is also a growing awareness that urban development and integrated urban and regional infrastructure are crucial for achieving sustainable development (UNCED, 1992).

The forecast for the year 2025 that the population proportion in cities could rise to 60 % (comprising of some 5 billion people) indicates a potential global

environmental and development crisis. To avoid such a crisis the role of urban infrastructure is thus vital for both development and sustainability.

2.3 Urban Infrastructure and Economic Growth

It is obvious that developed countries have comparatively well-established infrastructure, whereas developing countries are typically challenged in infrastructure provision. Based on this observation, research has been conducted to investigate the relation between economic growth and urban infrastructure. Seitz (1995) produces two important results. The first is that the provision of local public infrastructure services contributes positively to the production costs of goods and services. The second result is that cost elasticity is growing over time, suggesting that cities could further support the productivity performance of private business firms by additional investments in urban infrastructure.

The relation between economic growth and environmental degradation that results mainly from supply deficit of urban infrastructure Radetzki (1992) argues that 'environmental wear' rises with income levels until a certain point, beyond which it begins to fall, generating an inverse U-shape relationship. Such a relation is attributed to two related notions: the 'income elasticity of demand for environmental quality' and the 'pollution of poverty'. The former asserts that growth will change preferences toward environmental quality while the latter asserts that growth will relieve pressure on the exploitation of ecosystems.

Furthermore, to become competitive in the global economy, cities have to offer secure urban infrastructure. As a challenge, cities must include urban disadvantaged and look ahead to find sustainable solutions for their chronic problems.

2.4 Urban Infrastructure Investment Needs

Discussions of finance tend to be dominated by investment needs. But it is equally important to provide for recurring expenditures on administrative overheads, operations, maintenance, routine repairs and periodic replacements.

A common assumption is that the normal revenues of, for instance, water utilities cover these. But this is often not the case in developing countries, and shortfalls for repairs and maintenance, in due cours,e lead to a need for higher investment. Adequate budgeting for recurrent spending items, backed by good cost recovery, can minimize future investment needs to a certain degree.

The main funding source for water and sanitation comes from water users themselves (Table 2.1). The fees they pay or their willingness-to-pay are the major determinant of projects' feasibility and technology affordability (Winpenny, 2003). For this reason, it is easy to find finance for water and sanitation in well off areas. In this case, large companies would compete on the ground of high and modern technologies to draw acceptance from their client. But the case is different in impoverished urban areas as it shown in the following sections.

Table 2.1 - Water and Sanitation Fund Sources

- **Water users,** such as households, farmers and businesses. Householders, particularly in rural areas and in poorer urban districts, invest their cash, labor and materials in wells, pipes, basic sanitation and other facilities. Farmers invest large sums in tube wells, pumps and surface irrigation systems, either on their own or as members of associations and user groups. In some regions, farmers with surplus water from their own sources invest in distribution systems to dispose of their surplus to others. Industrial and commercial firms often develop their own water supplies and effluent treatment facilities. Some large firms even supply the general population. Users also cross-subsidize each other through paying different tariffs.
- **Informal suppliers.** In cities where growth has outstripped the public network, local entrepreneurs, often acting outside the law, fill the vacuum by selling water in bulk from tankers—or in containers and bottles.
- **Public water authorities and utilities**, which fund recurrent spending and some new investment from revenues provided by user charges (gross operating cash flow), loans and some times public subsidies.
- **Private companies**, either local or foreign, are providing funds from sources similar to public utilities, plus equity injection.
- **Non-governmental organizations and local communities**, raising funds from voluntary private contributions or grants from international agencies.
- **Local banks and other financial institutions**, offering short-term or medium-term loans at market rates.
- **International banks and export credit agencies**, providing larger volumes of finance than local sources, against corporate guarantees or project cash flow.
- **International aid from multilateral and bilateral sources**, available as loans on concessional terms or grants.
- **Multilateral financial institutions**: Loans on near-market terms.
- **National central and local governments**, providing subsidies, guarantees of loans, and proceeds of bond issues.

Source: Winpenny (2003, p 7)

2.5 Provision of Services for the Urban Disadvantaged

Access to clean water, appropriate sanitation, and attention to wastewater treatment has proven benefits to public health. Poor provision of water and sanitation is an important cause of diseases s(uch as diarrhea) in developing countries (4 billion cases each year, with 2.2 million deaths), intestinal worms (affecting 10% of the population of the developing world), blindness from trachoma (6 million cases), cholera (where there have been 90 separate outbreaks since 1996) and schistosomiasis (200 million

people infected). Carrying water long distances and waiting at water sources wastes energy and time, particularly of women and children, at the expense of family activities, education and productive work (McRobie, 1996; Adelegan and Ojo, 1999).

2.6 Low-Cost Technologies for the Urban Disadvantaged

Conventional high-tech solutions do not work for low-income earners as they are relatively high in cost per household and, accordingly, relatively few households can be serviced (McRobie, 1996, p 7)., However, many impoverished communities could afford the basic services essential for healthy living at a low cost per household. They are often quite capable of organizing themselves to manage the installation, operation and maintenance of requisite local services. Only by mobilizing the energy and resources of disadvantaged urban dwellers can the huge task of creating an adequate public health service for the urban majority become feasible. But, to what extent can low-cost technologies continue to play a role for the urban disadvantaged?

A study (Adelegan and Ojo, 1999) for selected urban centers in Nigeria (state capitals and key urban centers) recommends that five out of the 30 urban centers should adopt shallow sewerage systems as a lower - cost sanitation technology. The remaining 25 urban centers should continue practicing the on-site sanitation systems, using mainly the septic tank (22 urban centers) and pour-flush toilets (3 urban centers). Both technology and cost of the shallow sewage-system are relatively high when compared with on-site sanitation systems.

The Nigerian study has strong support from an empirical study carried out by Garn (1987, p 29) as a feasibility study for large drinking water projects. Garn has estimated a general cost equation for a water project with a design horizon of 10-15 years. According to that equation he finds that a new water system for a city of 3 million inhabitants would incur an average capital cost of USD 26 per capita. He also

finds that a similar system for a city of half a million inhabitants would require USD 48 per capita. Garn's study confirms that high-cost solutions that can offer low-cost per capita require a population density higher than that suitable for the adoption of low-cost solutions.

2.7 Financing Tools for Local Infrastructure Investments

Many market-based financing tools for local infrastructure investments were developed in developing countries for self-sustaining financial organizations and on commercial principles. Their objectives were to attract the private sector into the market of finance of local infrastructure projects. Table (2.2) provides brief description for these tools.

Table 2.2 - Financing Tools for Local Infrastructure Investments

- **Municipal Development Funds (MDFs)**. The idea of this tool is to draw funds from domestic and international capital markets. The procedures used by MDFs in allocation of loan capital to local government investment projects are similar to those used by the World Bank. It requires special types of loan guarantees. The main difference is that the MDFs are able to reach more local authorities and smaller investments projects.
- **Micro-Finance Institutions (MFIs)**. This market-based tool is neither commercial nor public sector – nearly all MFIs are NGOs. It works amongst the disadvantaged households and offers small loans with flexible collateral requirements
- **Local Government (Municipal) Bonds**. It is an entity that sells its own securities and re-lends bond proceeds to local government entities.
- **Small Enterprises**. Small enterprises can work profitably with lower overheads and manage service delivery at micro-level.
- **Infrastructure banks**. These banks operate as a link to private credit markets in borrowing on the domestic market. They are based on commercial principles.
- **Project Finance**. It works well where institutional arrangements on project planning, preparation and implementation capacity are in place. It requires cost recovery capabilities.

Source: Agevi (2004)

Table (2.2) shows that cost recovery and creditworthiness are important in general for every self-sustained financial organization.

There are, indeed, other financing tools for local infrastructure investment in disadvantaged communities (Table 2.3). These options to raise financial resources can be combined to meet the investment needs of basic services for the urban disadvantaged (Agevi, 2004).

Table 2.3 – Other Financing Tools for Local Infrastructure Investments

i)	Savings and Credit Co-operative Organizations (SACCOs)
ii)	Expansion of general revenue base for Infrastructure services;
iii)	Creating special revenue or funds from specific revenue sources e.g. betterment levy, tax surcharges, import duties fees and fines, amusement or entertainment taxes or lotteries.
iv)	Adoption of user charges with a direct relation among the cost of provision being recovered by taxing surplus value due to service provision;
v)	Mobilization of Government resources-loan guarantees, mortgage finance, creation of secondary mortgage market or subsidized credits-for borrowing by individuals or private sector agencies;
vi)	Adoption of co-finance and/or cost –sharing arrangements – the user participates in providing a service. Thus reducing the overall cost to a level lower than if the service were provided entirely by the government.
vii)	Using government assets- publicly owned real property, to provide security to borrow funds.
viii)	Use of indirect subsidies from government to the private sector to provide services or provision of services like streetlights, access roads, sideways to stimulate private investment in the development of low-income areas.
ix)	Exchange of services or labor, of beneficiaries in return for extension of services or infrastructure by local government or assessment of change on neighborhood residents by municipal government to extend services to a community.
x)	Lobbying of ad hoc contributions and donations or use community festivals and lotteries to raise capital for exhausting services.

Source: Agevi (2004)

The tools shown in Table 2.3 are typical short-term solutions. Such solutions can build a service facility but cannot secure its sustainable functioning because disadvantaged communities, due to the financial constrains, have to prioritize their needs and act accordingly. According to their list of priorities they can afford built one low cost

technology facility at a time and then shift to the next on their list, after several years. In this case no finance could be available for repair and maintenance of any facility until they complete their list of priorities.

However, Agevi (2005, p 28) argues that financing and upgrading infrastructure in low income and low consumption areas are difficult tasks for any organization. Agevi's arguments provide additional support for the idea of the compact form of living as a new initiative. Therefore, compaction should be studied and tested as a possible solution for urban infrastructure provision in developing countries in general, and for urban disadvantaged in particular.

2.8 The Need for New Initiatives

The Nigerian study of Adelegan and Ojo (1999) and the empirical studies of Garn (1987), provide a clear vision about the future of low-cost technologies and their adaptability to high rates of population density. They recommend a new set of slightly higher-cost technologies where population density is relatively high. Furthermore, Agevi's (2005) arguments confirm the difficulty of financing and upgrading infrastructure in low income and low consumption rate areas.

Against these arguments, it is appropriate to shift to the suitability and affordability of infrastructure in those areas of concern in line with benefits that may be drawn from economies of scale in highly intensified urban centers. Prior to this, however, it is useful to review managerial approaches and to explore its capacity in solving urban infrastructure provision and facilitation in large cities in Africa. Management challenges in large cities in Africa are the subject of the next Chapter.

Summary of Chapter 2

The main ideas in this chapter may be summarized as follows:

1. Urbanization is a dominant demographic trend in developing (and developed) countries. In urban areas reciprocal impacts between population and the environment are clearly evident.
2. Sustainable provision and facilitation of infrastructure services contributes positively to production costs of goods and services and to general economic growth.
3. Adequate budgeting for recurrent spending items, backed by secured cost recovery can minimize future investment needs.
4. User fees and user's willingness-to-pay are the major determinant of projects' feasibility and technology affordability.
5. Cost recovery and creditworthiness are important factors, in general, for any self sustained financial organization. Therefore, financing and upgrading of infrastructure in low income and low consumption rate areas are hard tasks for any organization.
6. Low-cost technologies are not cost effective in large cities.
7. The use of high cost solutions may become more affordable when population density is high.

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- Chapter 3 -

Management Challenges in Large Cities in Africa

The previous chapter dealt with urban infrastructure challenges in developing countries in general. This chapter reviews the managerial approaches and explores its capacity in solving urban infrastructure provision in large cities in Africa. The main purpose of this chapter is to introduce the reader to the compact form of cities as a solution for urban infrastructure challenges in fast growing cities.

The chapter concludes that the potential for balance between economic and environmental interests of infrastructure provision exists in appropriate city design and that designs for compact developments, higher densities and live-work communities move toward such a balance.

3.1 Management Problems of Africa

Most mega-cities share common problems brought about by: rapid population growth and spatial expansion; over-concentration of national activities; duality and multiplicity of their social and spatial structures, and; extreme disparities. In addition, mega-city governments are faced with major additional demands brought about by virtue of these cities' positions and roles within their national urban systems and global urban networks. At the same time, mega-city governments often do not have authority, power, or resources to deal effectively with these demands. Inefficient revenue collection practices and limitations imposed by highly centralized national governments on revenue raising strain the municipal governments' ability to keep up

with urban service needs. The result is an ever-widening gap between the supply of and demand for jobs as well as services and utilities, and shortages in urban land and housing, particularly for the urban disadvantaged.

Stren and White's (1989) collection of articles on the management problems of several African cities provides valuable information on the factors that frustrate the planning efforts. Apart from exogenous factors such as stagnating export markets for primary products and the huge costs of debt servicing and repayment, there are a number of endogenous problems that seem to trouble many urban governments in African countries. Among these are the lack of adaptability of urban management, the lack of power on the part of urban authorities, the lack of coordination between predominantly sectoral departments, and the inappropriateness of systems of land allocation, registration and taxation (Stren and White, 1989, pp 307-11).

An article on mega-cities by Linden (1993) claims that, four decades ago, cities such as Cairo were relatively attractive places to live, with little traffic along their spacious, cleanly swept boulevards. Now that their populations have quadrupled and their quality of life is greatly degenerated they are now seen as the first and second most polluted capitals in the world. Whereas the mega–cities in-migration rates have now declined, people continue to flock to small cities. This suggests that living conditions in mega-cities can eventually become intolerable. Given the various scenarios of decentralization in response to combination of market forces and governmental actions, it becomes questionable whether future population growth projections of mega cities will in fact be materialized (ibid).

Mega-cities in Africa are projected to grow rapidly in the foreseeable future. In the process, such growth expands the city's influence and function over a much wider region, including other cities and rural settlements and a frequently uncontrolled and unplanned periphery. This requires a re-definition of the nature and structure of future mega-cities. Current administrative and political boundaries and definitions of mega-

cities in effect lose their meaning. It is equally clear that the pressures, demands, and challenges facing urban governments and planners in African mega-cities, as well as their capacity to respond to them are, in large part, determined by national and international forces and pressures beyond their control.

Most developing countries perceive the spatial distribution of their population and the resulting city patterns as unacceptable, and many governments have attempted to change such patterns through indirect national policies or explicit spatial development strategies.

3.2 Managerial 'Successful' Practices in Large Cities

This section demonstrates the 'successful' lessons that could be drawn from some practices in Africa. These practices which include networking and sustainable cities programs experience were classified 'successful' by a number of researchers as shown by the followings.

In terms of networking for metropolitan planning and management, the experience of Calcutta's Metropolitan Planning Organization (CMPO) and of the Greater Cairo Planning Commission provides solid examples of such initiatives (Stren and White, 1989). For years, the Calcutta metropolitan region was plagued with factionalism, fragmentation and conflicts of interest among various levels of administration. There was no legal or administrative recognition of a growing metro area of some 6 million people until the creation of the Calcutta Metropolitan Planning Organization in 1961. This was set up by the state government to prepare a master plan for water supply and drainage and to recommend measures for the economic and physical regeneration of the metropolis (Sivaramakrishnan and Green, 1986). The Ford Foundation, the United Nations Development Programme and the World Health Organization provided help and international experts to the CMPO, which quickly grew to a staff of 600 and which by 1966 produced a 'Basic Development

Plan'. In addition to a set of immediate specific projects, the plan aimed at directing future population growth, strengthening development planning and implementation, and mobilizing finance and local government more effectively (ibid).

Concerning sustainable-cities programme (SCP) experience, the SCP as a coordinating and participatory approach to managing cities, was adopted by Dar es Salaam in 1992, as one of 11 cities included in a global initiative of the UN-HABITAT, UNDP and the World Bank. The process of application of SCP has resulted in some notable achievements (Halla, 1994). Among these is the completion of an environmental profile of the city documenting information about the dominant issues. This was followed by consultation meetings with wide participation from the public, private and popular sectors, covering basic issues and priorities. Small working groups of interested citizens were formed to formulate and execute actions plans in response to those issues. Thus action plans and strategies involved local groups and individuals in identifying their needs and development goals.

There are also examples of Local community/NGO partnerships for development. One such example is Cairo's Zabbaleen Environmental and Development Programme (MCP and EQI, 1994)[1]. More examples could be mentioned here such as the Neighbourhood Upgrading Experience and Self-reliance and Environmental Clean Up in Poor Communities in Cairo (Linden, 1993, p 32).

A number of additional efforts have been made to solve the managerial problems in large cities in Africa, including industrial decentralization and privatization. Their success, however, seems to have been very limited. Several reasons have been given for this outcome, among them:

- Government direct involvement or interference in local and community initiatives (Onibokun and Agbola, 1994).

[1] MCP (The Mega-Cities Project) and EQI (Environment Quality International) are non-profit organization.

- Contradictions between government policies, some of which aim at decentralization of population and activities, while others simultaneously reinforce the concentration of economic and political power at the centre (El-Shakhs, 1994).

As a conclusion to this section, it seems that planning for the future development in Africa in general is fraught with tremendous uncertainties, an extremely rapid pace of change, and the seeming inability of governments and the formal sector to cope with such change. Adequate responses would, therefore, have to be based on promoting:

- Flexibility, adaptability and speed of response to change;
- Public participation in the planning process;
- Creativity in problem solving; and,
- Intensive research and capacity building.

However, against all the 'successful' practices mentioned above, many questions could be raised concerning the future of these solutions in light of the requirement of sustainable development:

- For how long should local communities rely on external 'aid' or on 'self help' programs?
- What future these cities can face within the increasing competition of cities to attract investments?
- Is there any sustainable solution in the horizon for these chronic problems?

As an answer to the above-mentioned questions, the following section sheds light on the possible solutions that can induce sustainable city development for the large cities in Africa.

3.3 Light at the end of the tunnel

Smith (1996) provides interpretation for such problems that meet countries in transit, and also provides some hope. He has ultimately linked what happens on the ground in the neighborhoods where people live to the larger political and economic forces at work, putting these connections in a historical framework and using a case study approach. He emphasizes that societies in the world's underdeveloped countries are now undergoing an urban revolution that is drastically altering the fabric of their predominantly rural agrarian nature. He takes the emerging political economy perspective on urbanization, with its focus on global inequality and dependency, as the context for city growth in the Third World. This perspective has allowed Smith to criticize both the conventional ecological view of the city, which assumes an equilibrium model, and the comparative political economy approach that conceptualizes uneven development and inequality as an inevitable result of the expansion of the capitalist world-system. He concludes that very rapid city-growth and the various types of urban imbalances are transitional phases on the path to modernity. Smith's conclusion offers hope for the future of large cities in Africa, but he does not mention whether these transitional phases will 'balance' by themselves without government or external interference.

However, the emphasis on policies pursued by local governments in developed countries is shifting from focusing on local provision of welfare and service to a new set of policies designed to promote and encourage local growth and economic development (Imrie and Thomas, 1995; Hubbard and Hall, 1998). This shift in policy-design represents, from my point of view, the absent player in sustainable provision of services in developing countries. This is due to the fact that almost all of the problems associated with sustainability in developing countries are concerned with the 'inability' of local communities to 'pay' for urban infrastructure services. Again, this shift in

policy-design draws attention to the significance of the relation between the residential areas and work places in every city and to the role that urban infrastructure can play.

These conclusions, together with the outcomes of Chapter 2, lead to the need for study and exploration of the capacity of urban intensification in solving the problem of infrastructure provision in large cities in developing countries. To reiterate, however, it is clear that any intensification of urban areas should be done within a comprehensive development plan.

As a conclusion this chapter, to plan for sustainable provision of services in large cities, in developing countries in general and in Africa in particular, planning for compact development and live-work communities is increasingly significant.

The following chapter details the benefits that could be drawn from intensification for infrastructure services and development.

Summary of Chapter 3

The main ideas in this chapter may be summarized as follows:

1. Most of the large cities in Africa are young and represent new frontiers of urban development in their systems. They are expected to grow rapidly for some time to come. Also, they are in the midst of urbanization processes that have a long way to go.
2. Most developing countries perceive the spatial distribution of their population and the resulting primate city patterns as unacceptable, and many governments have attempted to change such patterns through indirect national policies or explicit spatial development strategies.
3. Designs for compact developments, higher densities and live-work communities can induce sustainable development in large cities in Africa.

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- Chapter 4 –
Benefits of Intensification

The Compact City grows around centres of social and commercial activity located at public transport nodes (Rogers, 1998). These provide the focal points around which neighbourhoods develop. The Compact City is, therefore, a network of these neighbourhoods, each with its own parks and public spaces and accommodating a diversity of overlapping private and public activities. Most importantly, these neighbourhoods bring work and facilities within convenient reach to the community, and this proximity means less driving for everyday needs (ibid).

During the last decades, the main focus in developed countries has been on the impacts of different urban forms on travel behaviour and transport provision, resource efficiency, social equity, accessibility and economic viability. The outcome from this debate was a strong advocacy of the 'compact city' model. The following sections discuss the benefits of compaction and their relevancy for the developing countries.

4.1 Transportation and Compaction

In large cities, mass transit systems can provide high-speed cross-town travel by linking one neighbourhood centre with another, leaving local distribution to local systems. This reduces the volume and impact of through traffic, which can be lowered and controlled, particularly around the public heart of neighbourhoods. Local trains, light railway systems and electric buses become more effective, and cycling and walking more pleasant. Congestion and pollution in the streets are drastically reduced and the sense of security and conviviality of public space is increased. As government policies have fostered sprawling cities, some problems with car-dependent

development have become clear (Sheehan, 2001). Cities develop when they can take advantage of their concentration of human talent and energy. Sprawling cities diminish that potential by segregating and dispersing people (ibid). Car-dependent development consumes land and other resources, degrading watersheds and air in the process. Car-centric cities harm economic productivity by increasing social inequities, wasting resources, and damaging the environment (ibid).

However, some researchers argue that compaction is not appropriate for developing countries (Williams, 2004) and, therefore, they suggest research on an alternative urban form or other physical arrangements to solve the transportation problem. They suggest the 'polycentric city', or the 'linear, transport-oriented' models as alternatives (ibid). I believe there is no contradiction between intensification and the adoption of the 'polycentric city' or the 'linear transport-oriented' models. This can be seen in the case of Curitiba as they are following an intensification policy and at the same time adopting the linear transport-oriented model to solve the transportation problem (see Rabinovitch and Leitman, 2004).

4.2 Environmental Benefits

High-population densities within sustainable compact cities could reinstate the city as the ideal habitat for a community-based society: it is an established type of urban structure that can be interpreted in a number of ways in response to various cultures. This arises due to the fact that cities should be about: the people they shelter; face-to-face contact; condensing the ferment of human activity, and; generating and expressing local culture. It is the compact form that provides a lower level of social segregation (CEC, 1990; Hamnett, 1991; Fox, 1993; Van Kempen, 1994).

The existence of high-population densities also encourages growth and development of many local facilities such as shopping centres (Rees, 1988; Bromley and Thomas, 1993). Further, it makes investment in infrastructure more feasible and,

therefore, improves the environment and the quality of life (Seitz, 1995; Kim, 1997; Jenks and Burgess, 2000).

There are important environmental advantages of a compact form of city that has fewer roads but more landscaped public spaces - parks, gardens, trees and other landscaping provide vegetation that shades and cools streets, courtyards and buildings in summer. Cities are generally 1-2^{0}C warmer than their hinterland. The overall sought effect of rich urban landscaping, of the compact form, is to provide greater opportunities for walking and cycling (Bourne, 1992; Newman, 1992; Bozeat *et al*, 1992) and to encourage upgrading of the local built and natural environment by bringing about new buildings and high quality design (CEC, 1990; Rogers, 1995).

Intensification is, however, a controversial issue. While there may be some disadvantages at high levels of density, there are still certain benefits (Table 4.1 and Figure 4.1).

Table 4.1 details the selected social impacts of urban compaction and lists supporters of each claim. Figure 4.1 presents advantages and disadvantages at high and low densities. It is notable that a number of issues evidence no conflicting claims: better access to facilities; greater opportunities for walking and cycling; reduced domestic living spaces, and; lower level of social segregation. These issues are targeted in many developing countries, and thus compaction could offer the promise to solve these issues of urbanization.

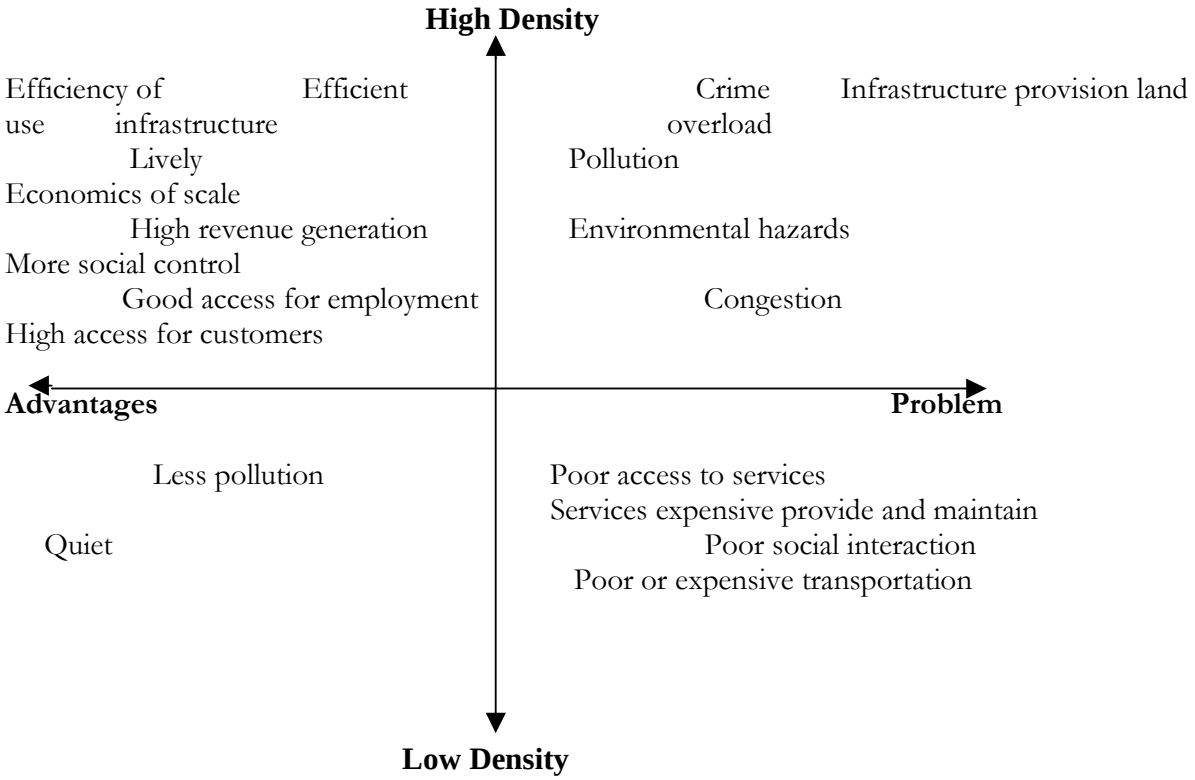
Table 4.1 - Claimed Social Impacts of Urban Compaction

Claimed effect	List of Supporters
Better access to facilities	Rees, 1988; Bromley & Thomas, 1993; DoE, 1992.
Poorer access to green spaces	Breheny, 1992; Knight, 1996; Stretton, 1994)
Better job accessibility	Beer, 1994; Laws, 1994; Elkin et al., 1991.
Greater opportunities for walking and cycling	Bourne, 1992; Newman, 1992; Bozeat et al., 1992.
Reduced domestic living spaces	Brotchie, 1992; Forster, 1994; Stretton, 1996.
Poorer health	Freeman, 1992; McLaren, 1992; Schwartz, 1994.
Reduced crime	Jacobs, 1961; Elkin et al, 1991; Petherick, 1991.
Lower level of social segregation	CEC, 1990; Hamnett, 1991; Fox, 1993; Van Kempen, 1994.
Increased job opportunities for the less skilled	Porter, 1991; Des Rossiers, 1992; Castells &Hall, 1994.
Less affordable housing	Town and County Planning Association, UK, 1994
Increased wealth	Minnery, 1992.

Source: Williams *et al* (2000, p 20)

However, in a study to determine the impacts of intensification, Williams (2000) carries out research over a ten-year period in three London boroughs. The purpose was to assess whether compact city policies are meeting their objectives. In that study she argues that sometimes intensification was associated with overcrowding, reduction in amenities, increased air pollution and bad neighbour effects. However, she also notes that intensification policies were most successful where their objectives were related directly to land use. Her overall conclusion is that intensification policies are necessary for sustainability but not sufficient.

Figure 4.1 - Advantages and Disadvantages of High Vs Low Density



Source: Acioly and Davidson (1996)

Another argument against the claimed social benefits of intensification is provided by Masnavi (2000). In his study, results related to the quality of the living environment showed that low-density areas, through aspects such as their greenery, open spaces and parks, provided a higher quality. But, again he confirms the importance of high density in residential areas, in the case of single use high density (Masnavi, 2000).

4.3 Economic Benefits

A study carried out by Smoluk and Andrews (2005) suggests that states with high population density and low tax burdenz tend to have high labor productivity. Further analysis shows that differences in population density account for the largest share of the differences in labor productivity across states. Because population density is not

generally considered a policy variable for most states, more meaningful state economic performance comparisons can be made by taking into consideration differences in state population densities. These findings should be of interest to economic development organizations and policy makers because, in the long run, labor productivity is the primary source of increased wages.

City size and its productive efficiency have, also, received significant attention in the urban–regional literature at both theoretical and empirical levels (Seitz, 1995). Urban economic theory posits that firms located in intensified cities are more efficient than firms in small towns because productive resources tend to be utilized more efficiently in large cities thanks to the external economies of scale, i.e. agglomeration economies (ibid). Some economists argue that the productivity-city size relationship is an inverted U-shape rather than a linear relationship. Due to the negative external economies, however, in very large cities productive efficiency increases up to a certain city size but then decreases in cities over that size.

A system of innovation can be thought of as consisting of a set of actors or entities such as firms, organizations and institutions that interact in the generation, use and diffusion of new —and economically useful— knowledge: thus innovation and intensification are seen linked in industrial development.. The regional focus is concerned with the importance of proximity and density for learning and for the dissemination of knowledge, which is important for the capacity to innovate (Anderson and Karlsson, 2004). A functional region consists of actors: researchers, business people and people from the political sector, etc, who create this density. This definition implies that the borders of a region are composed of the intensity of economic interaction, consisting of nodes, such as municipalities, connected by economic networks and networks of infrastructure. Local labor market regions are synonymous with functional regions (ibid, p 14).

Firms locating in close spatial proximity benefit from lower transportation and transaction costs, as well as access to a skilled labor force. Agglomeration economies can also spur competition, which encourages information, knowledge and technology transfer among related firms. The transfer of knowledge and technology among firms can lead to new industry growth, and therefore helps drive the overall growth of the cluster.

Porter (1990) argues that competition is a driving force behind cluster development. Clustering is a dynamic process, and, as one competitive firm grows, it generates demand for other related industries. As the cluster develops it becomes a mutually reinforcing system where benefits flow backwards and forwards throughout the industries in the cluster.

4.4 Relevancy of Compaction in Developing Countries

The economic and industrial benefits of compaction is less controversial than the social and environmental claims. The following discussion reviews the arguments against intensification in developing countries

From an international perspective regarding urban intensification and sustainable cities, Williams (2004) arrives at many conclusions against intensification in developing countries. However if we examine these conclusions along with the outcomes of Chapter 1-3 of this study, different results would emerge:

Williams's first conclusion is that urban compaction is wholly inappropriate for cities in developing countries. She builds this conclusion on the ground that these cities are: 'rapidly urbanising anyway; have high proportions of informal development; and, lack the infrastructure and urban management structures to make the model work'. Hence, Williams suggests the 'polycentric city', or the 'linear, transport-oriented' model as an alternative urban form.

I think Williams's perception on the compact form as 'a process whereby new buildings in cities are built at higher densities, vacant land in urban areas is developed, and high-density redevelopment takes place' is relevant for the both sets of countries —without exceptions— provided that economies of scale still obtain. Her idea that 'urban intensification is usually associated with increases in the amount of economic and social activities within cities' is also relevant. However, I do not agree with her argument that the lack of infrastructure and urban management structure prevents functioning of the compact form. Instead, from the discussions in Chapter 2, I think it is the compact form that can improve urban infrastructure provision, provided that configuration between work places and residential areas is maintained.

Williams's second conclusion is that cities in developing countries already have the requisite density standards to make the compact city work. In Williams' opinion, they now need high levels of investment in infrastructure and urban management to make the model function sustainably. However, she also argues that the implementation problems seem impossible in the short or medium term.

I think a large proportion of developing countries, for example in sub-Saharan Africa, do not meet those density standards and therefore, investments in infrastructure will not be feasible because of high cost per capita in those cases. This highlights the importance of cost recovery and economic viability.

Williams' third conclusion is that concentrating on the physical form of cities as a solution to un-sustainability has little relevance at all as a high priority in the range of sustainable solutions for developing country cities. She suggests the social development, technological improvements, environmental resource management or political processes as alternative 'pathways' forward.

As an argument against this point, I think both 'sustainable' social development and 'better' environmental resource management could only be induced through improvements of cities' competitiveness, which in turn can only be attained through

the sustainable provision of urban infrastructure (see Chapter 1 in this study: Brundtland Report, 1987; UNCED, 1992; Blackwell et al, 1991; Seitz, 1995; Radetzki, 1992).

It is interesting to mention that Williams' overall conclusion in 2000 confirms my arguments that intensification is not sufficient to introduce sustainable development even in developed countries.

4.5 Concluding Remarks

Definitely, not all types of compaction are acceptable and benefit the communities involved. For example, large scale, non-residential development, and the loss of amenity land, are viewed negatively (Jenks, 2000). Also, intensification tends to be unpopular when it is poorly designed, out of keeping, or if redevelopment involves the loss of historic or traditional buildings (ibid). Generally, it is found that increases in population tend to be more negatively received than increases in households in high status and suburban residential areas. However, in city centres mixed land-use areas and inner urban intensification is more likely acceptable and welcome.

Summary of Chapter 4

The main ideas in this chapter may be summarized follows:

- There are many perceived benefits of the intensified form over urban sprawl.
- Some researchers argue against the relevancy of these benefits in developing countries and some are doubtful even about its benefits for developed countries.
- These benefits include: increased overall accessibility; improved infrastructure provision and previously developed land; a regeneration of existing urban areas and urban vitality; a higher quality of life; the preservation of green space; and, the creation of a milieu for enhanced business and trading activities.

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- Chapter 5 -

Influential Factors and Successful Practices of Intensification in Developing countries

Chapters 2-4 concern problems, challenges and opportunities attached to sustainability issues in developing countries in general, and in Africa in particular. They argue for the growing importance of city reform as an urban design approach to handle the complexity involved in infrastructure provision in large cities. But the practice of urban design is itself faced with increasing complexity. An investigation of the complexity should address not only site-scale design issues but also the broader processes that shape urban spaces, experiences and discourses. The effects of globalization, demographic change, economic and social processes are widely understandable in shaping land-use decisions, collective consumption and urban landscapes. The following section discusses the effects of globalization on large cities in Africa.

5.1 Africa and Globalization

This section consists of three sub sections and provides a background to the effect of globalization on city transformations and to the nature of large cities in Africa. It further provides an example for one of globalization's effects in the economic sector.

5.1.1 Globalization and the transformation of cities

The world today is witnessing global problems such as poverty, war and conflict, human rights violations and environmental degradation. No one country can close its borders against the effects of these problems. For this reason the international

community, through its organizations, is working together on these issues. Intervention of the international community to address these problems has resulted in new trends. Examples of such trends are: economic interdependence; shift to market mechanisms and democracy; restructuring of organizations; advances in science and technology; rising environmental awareness; and a changing multicultural lifestyle. These factors, in turn, have a large effect on the physical structure of cities.

A review of the historical development of urban form is presented in an attempt to identify the important factors affecting the physical structure of cities and region. As previously noted, it is important to remember that 19th century industrial cities were formed with business activities concentrated in the center. Cost effectiveness in transportation is mainly responsible for the appearance of these core dominant cities (Lim, 2005). During the 20th century, the core dominant cities have transformed to spreading metropolises. That process was expected to produce new cities of super size in industrialized countries. However, from about the middle of the 1960s, rather different trends were observed: for example some large metropolitan areas in advanced industrialized countries stopped growing or began declining in population (ibid).

No convincing theoretical or rigorous empirical studies have been provided to explain these trends with consistency (ibid) even though many efforts have been made to find an explanation. Anderson (2000, p 16), for example, argues for the effect of locational advantage as a main factor for the sustainability of large industrialized regions, beside economies of scale and accessibility advantages, even if other regions will rise to become continental. Putnam (2000), as another example of research efforts, argues for the role of social interaction as a determent factor in sustainable regional development. However, the foregoing review, at least, provides us with a background to identify important factors that may affect the spatial allocation of resources. Examples of such factors include energy costs, communication technologies; changing

comparative advantages of cities, the political landscape of urban areas and environmental constrains.

Against this background and thanks to the rapid development in communication technologies and its manifold effects, it is clear that the impacts of globalization on large cities in Africa are rather complicated.

5.1.2 Unique characteristics of Africa's large cities

The mega-cities of Africa may not be considered 'primate' on the basis of population alone. However, their dominant positions with their complex urban systems become clear when one considers their shares of the formal socio-economic activities such as industry, finance, international trade, communications, transportation and social infrastructure (Rakodi, 1997). The privileged quality of life in such cities – like personal income, education, levels of services, shares of decision-making power and political control are also examples of their primacy. Such dominant positions have inadvertently been further bolstered by the introduction of Structural Adjustment Programs (SAPs). SAPs and poverty in Africa is explained below.

African mega-cities have acquired major industries and commercial activities and a large informal sector, which continue to make them attractive destinations. Their real (or perceived) employment opportunities and superior quality of life continue to attract rural migrants and migrants from small urban settlements. These cities support large informal sectors of small-scale enterprises, particularly in the commercial and trade sectors (ibid).

Increasing concentration and dominance, however, are inevitably accompanied by mounting problems, diseconomies and disparities. The resulting dissatisfactions as well as opportunities have spurred efforts by both the governments and private sector and towards processes of decentralization and counter-primacy measures (ibid). These have taken a variety of forms, ranging from administrative, legal and fiscal

decentralization and strengthening local governments to radical measures such as the building of a new capital in Nigeria or the new desert cities in Egypt. As these processes gain momentum, the real or perceived advantages of primate cities may tend to become less and less compelling, and smaller and medium-sized cities may become more and more attractive to migrants and to capital.

It is interesting to note that concerns about the future of the large or mega-cities in Africa are unique in three respects. Firstly, most of the cities are generally young and represent new frontiers of urban development in their systems. Secondly, they are expected to grow rapidly for some time to come as they are in the midst of urbanization processes that are in their early stages. (Africa is one of the fastest-growing regions in the world in terms of both total population and urbanization.) Thirdly, they embody major tribal, ethnic and regional diversities that characterize their political systems.

5.1.3 Globalization and the structural adjustment programs

Structural Adjustment Programs (SAPs) were economic policies which countries must follow to qualify for new World Bank and International Monetary Fund (IMF) loans and to help them make debt repayments on the older debts owed to commercial banks, governments and the World Bank. SAPs are designed for individual countries but have common guiding principles and features, which include needs for: export-led growth; privatization and liberalization; and, the efficiency of the free market (The World Bank Group, 2003).

The impact of SAPs on the performance of Sub-Saharan Africa has been intensively investigated in the literature (Elbadawi, 1992; Lipumba, 1995 and 1994; Mosley 1994). As early as 1987, however, the macroeconomic emphasis of the programs was shown to have been inconsistent with the long-term development interests of the region (Ali, 2002).

A report produced by the World Bank with the title 'Taking action for poverty reduction in sub-Saharan Africa', outlines conditions for successful poverty reduction (World Bank, 1995, p 429). The required appropriate actions in this report cover areas such as political stability, good governance and sound institutions, sound macroeconomic policy and income growth, investment; resource mobilization and debt reduction along with sound natural resource management and the provision of social services for the disadvantaged. Under sound economic management, the report notes that there is no empirical evidence to show that the urban and rural disadvantaged suffered a decline in welfare as a result of adjustment programs. The World Bank conducts most of the research on which this conclusion is based. Possible SAPs-poverty causation is thus contradictory to the report's own generalizations about growth and inequality in Sub–Sahara Africa. Moreover, the report also notes that there is growing evidence '…that sound macroeconomic policy and growth will reduce poverty, and that there is no systematic evidence that the poor lose either directly or indirectly from policies which promote aggregate growth.' (World Bank, 1995, p 17).

Ali (2004) notes that nobody in his or her right senses would argue that 'sound macroeconomic policies' and 'sound economic growth' would not reduce poverty. To paraphrase him, however, surely reasonable persons can disagree on the definition of the adjective 'sound' as it applies both to policies and growth. An unreasonable Sub Saharan Africa development economist will be entitled to enquire as to why 'reasonable' economists from outside the continent feel obliged to differentiate 'poverty-reducing growth paths' from other growth paths (World Bank, 1995). Depending on the poverty nature of the growth path, it stands to reason that the disadvantaged could stand to lose directly or indirectly from 'policies which promote aggregate growth' (ibid).

5.2 Influential Factors at National Levels

Section 5.1, above, concerns the effect of globalization as an influential factor. This section concerns the influential factors at the national level. Due to its major impacts, this section presents the effects of climate, government policies and developmental attitudes on urban design (building size and design) and urban forms.

5.2.1 Urban form: climate, building size and design

All cities produce significant changes in the local climate, including those found in equatorial, tropical and subtropical city microclimates. However, the degree of change and its impact may be more severe than in cooler climates at higher latitudes. Global warming may produce a slight rise in the average annual temperature of about 0.5 °c in the next half century. But it is already possible to measure an increase in evening temperatures within urban areas, which can exceed 3°c in large dense cities compared with the surrounding rural area. This temperature increase is clearly related to city size and urban density (WMO, 1994).

High buildings and narrower streets tend to trap larger quantities of solar heat and cool down more slowly as they are less exposed to the cooler night sky. Increasingly high-density urban development will, therefore, increase the heat island in the evening, especially in summer (Jenks and Burges, 2000, pp 117-24). Strategies to improve thermal comfort at the urban scale have a favorable impact on both air-conditioned and naturally conditioned buildings. The avoidance or reduction of air conditioning has important environmental, economic and social benefits, if appropriate measures are taken to promote thermal comfort in indoor spaces. The economic advantages include the reduction in the capital cost of buildings, in addition to lower energy bills. The environmental benefits include reduced thermal and air pollution, as well as greater occupant satisfaction in naturally conditioned buildings.

For this reason, policies to promote natural conditioning are needed at the urban, architectural and building scale.

In hot, dry climates, provision of shade and evaporation are effective strategies, though preferably in partially enclosed spaces such as patios and walled gardens where the cool air can be 'trapped'. Closely clustered, low development, using patios and courtyards, is found in most hot dry climates, allowing high-density, low-rise, urban development. Night cooling is most effective in spaces open to the night sky. Flat roofs and open squares are the most comfortable spaces in the evenings. The cool air that forms on the flat surfaces exposed to the clear sky can descend into patios and courtyards, as well as urban squares, conserving the cool air in a protected and shaded space till the next day (ibid).

In European cities, different levels of efficiency are generally associated with the typology of buildings. Building design (e.g. layout and orientation), density and materials are important factors influencing, for example, the capacity to save energy for space heating and cooling. Detached dwelling houses have a greater heat loss compared with blocks of flats because of their greater surface/volume ratio. Smaller housing units, both terraced housing and low-rise flats, have the advantage of maximizing passive solar gains. In addition, attention to microclimate in building design can save at least 5 % in energy requirements (OECD, 1993).

5.2.2 National policies and government intervention

National policies and legislation relative to land, property and built environments result in diversities in the roles and the impact levels of various actors in the land development process (Dieterich, Dransfeld, Larrson, 1997; Needham and Verhage, 1998). Despite this diversity in the roles and the impact levels of actors in different countries, for all cases the intervention of the state in land development processes is

inevitable. An understanding of the impact of state intervention is an essential element towards the understanding of the entire process.

The aim of the intervention of the state to the land development processes is related to concepts of efficiency and equity (Racodi, 1996). With its intervention, the state acts to reduce the inefficiencies and inequities that may arise in urban land markets due to the monopolistic nature of land regulation. Typically, the state at both central and local levels directly or indirectly intervenes with respect to: property rights (tenure); the arrangement of land uses (planning and regulation); land as a potential source of revenue (taxation); and, the property process - infrastructure provision, and, public sector participation in land supply, development, and renewal (ibid, p 1153). These intervention points constitute the frame of the policy related to the residential land development.

Real Estate taxation, public finance and the relationships between them have constituted only partial elements of the sustainable development debate, although the issue of urban management has included these matters in the context of development promotion (UNCED, 1992, pp 54-6). The capacity of local governments, however, to generate revenue by property taxation on the one hand, and their requirements for infrastructure investments on the other, dictate local development patterns and thus the quality of urban environments in which people live. It follows that any examination of local government processes and development decision-making should include public finance issues to evaluate the extent to which they constrain or support the achievements of sustainable urban development in a wider sense.

5.2.3 Attitudes of the entrepreneurs and inhabitants

Two types of attitudes towards intensification could be observed as psychologically influential factors. One is the entrepreneurial attitude that benefits from intensification and the other is the acceptability of local communities to intensification.

In their attempt to empirically test if certain societal characteristics are related to regional economic growth, Beugelsdijk and Noorderhaven (2004) test if regions with a culture that can be characterized as 'entrepreneurial' grow faster than regions that score lower on entrepreneurial characteristics. They described the entrepreneurs as those who are more inclined to risk-taking behavior, and have a stronger belief that people can take their fate in their own hands. Based on these entrepreneurial characteristics, they construct a regional aggregate of 'entrepreneurial attitude'. They studied 54 regions in Europe and show that regions that score higher on these entrepreneurial characteristics tend to grow faster.

Beugelsdijk and Noorderhaven have support from other studies on rural-urban migration where there are external economies of scale. Basu (2004), for example, has analyzed the implications of rural-urban migration in the presence of external economies of scale and endogenously created unemployment in the urban sector. His analysis suggests that inter-sectoral labor-mobility actually increases employment in the economy when the urban wage is endogenously determined according to the efficiency wage theory. He suggests also that the interaction between endogenous wage distortion and external economies of scale produces a bigger urban growth compared to that with exogenous wage distortion or with exogenous wage distortion and external economies of scale. The most interesting suggestion is that the models of internal economies of scale with differentiated products create a wage effect that helps urban concentration.

Concerning the attitude of local communities towards intensification, Jenks (2000) presents evidence on the acceptability of intensification gathered from research into the perception of urban users. The attitudes of local people including factors affecting acceptability are discussed, and the concept of social capacity is introduced. A national survey of all local planning authorities in UK was undertaken. This was followed by 12 case studies investigating the type and form of intensification and the

impacts this had on different stakeholders-residents, visitors and urban professionals. He examines the local acceptability according to type of intensification, type of area and social characteristics. The research shows that the impacts of intensification varied from place to place and between the different groups involved, and that acceptability was dependent on a range of local factors. It confirms that intensification is not a homogeneous phenomenon - every intensified area manifests a unique combination of different qualities and socio-economic characteristics. Jenks states that various combinations of the characteristics of an area, its socio-economic make-up and the type of intensification could lead to either negative or positive impacts and that predicting the impacts was context specific. Concerning the type of intensification, the research argues that well-designed and predominantly residential urban development will generally be viewed positively. According to research findings, it is clear that small-scale and incremental intensification is also seen as acceptable. Small extensions in back gardens are hardly noticed at all by the respondents. Conversely, large scale, non-residential development and the loss of amenity land are viewed negatively. It is found that intensification tends to be unpopular when it is badly designed, out of keeping, or if redevelopment involves the loss of historic or traditional buildings. Generally, as an overall conclusion, it is found that any increases in population tends to be more negatively received by the inhabitants than increases in households. Also, it is found that in high status and suburban residential areas, intensification is generally less favourably received, because residents have more to lose from changes. Not surprisingly, it is found that, in the city centre, mixed land-use areas and inner-urban intensification is more likely to be acceptable and welcome.

5.3 Intensification Practices in Developing Countries

A study on urban densities in developing countries conducted for the 1996 United Nations Conference on Human Settlements, (Acioly and Davidson, 1996) concludes

that there is no universal recipe for urban densities in terms of an ideal or most appropriate density, and this is particularly the case for residential densities. Several case studies have shown that what is regarded as a high or a low density, and what is an acceptable density, differ between continents and countries, and even within cities and neighbourhoods. However, there is evidence that a general process of change was leading to more compact cities, though often in the face of considerable resistance. The study reveals that costs of low-density solutions are increasingly recognised. Case studies in Brazil and India show that government policies, plans and development control instruments can shape cities and densities in a way which optimises infrastructure, municipal services, land and public resources (ibid).

Jenks and Burgess (2000) have examined and evaluated the merits and defects of compact city approaches in the context of developing countries around the world. They present a wide-range analysis and debate on an issue that has been shown to be of the utmost complexity. In their book, the cities of the developing world are shown to be extremely diverse; culturally, historically, economically and formally. This denies the possibility of the 'quick-fix'. Yet, the case study of managed densification and urban intensification of Curitiba, Brazil, might be adopted and applied in very different context in the Sudan as will be explained below.

As a reply to the main question 'can urban management deliver the sustainable city', Jenks and Burgess (2000) offer a comparison between guided densification in Brazil and informal compactness in Egypt. In this regard, the case of Egypt has special value for the Sudan since intensification policies work in the same manner as will also be elaborated below.

The following sub-sections facilitate a comparison between intensification policies in Cairo, Egypt and Curitiba, Brazil. The main objectives are to analyse the different modes of densification; to highlight the advantages and disadvantages of

densely occupied urban environments, and to assess their outcomes from the point of view of sustainable urban development.

5.3.1 The case of South East Asia

Slums and squatter settlements grew and were driven by the high urban growth rates in Asia in the 1960s. For example, during the 1960s, the population of Bombay increased by some 900 new households each week while Jakarta and Manila were each adding close to a quarter of a million people a year. By the end of the decade, more than half the population of many cities in South East Asia was living in illegal structures on land to which they had no title (Jenks and Burgess, 2000). That rapid growth has led to the appearance of low-income shelters of small size plots (UNESCAP, 1998).

The basic ingredients of slum upgrading projects were the provision of access to safe water and waste disposal. Such programs often went hand in hand with sites and services projects in order to provide new land for those households who had to be moved to clear space for public amenities and use and safe access. However, to reach the lower income groups with minimal subsidies, the smallest plot sizes were as small as 33m^2. The Delhi Development Authority has designed plot sizes of 20.4m^2 (Jenks and Burgess, 2000). That plot size made any future development virtually impossible.

5.3.2 The case of Cairo, Egypt

The overall density in Cairo ranged between 20,000 and 23,000 persons/km^2 between 1966 and 1970. Overall densities rose steadily to reach 32,000 persons/km^2 in 1994, ranging from 109,000 persons/km^2 in the most densely populated districts, to under 15,000 persons/km^2 in the least (Jenks and Burgess, 2000). There are many reasons for this rise in densities. On the demand side, the majority of the population preferred to reside as near as possible to the city centre, where employment opportunities and

services are available but where high housing prices led many families to share their units with others. On the supply side, the government was unable, because of financial and managerial limitations, to service sufficient urban land to keep pace with population growth. In addition, rent control laws led to slow growth of the housing stock (ibid).

Informal housing, in the form of illegal subdivisions for low and middle-income earners, is usually developed on the fringes of the built-up area in Cairo. Such informal housing is built mostly on privately owned land - generally agricultural land - that is subdivided into small parcels without informing the local authorities, and then sold to buyers without any legal deeds. Consequently, no building or planning approval has been granted and no permits are issued. The magnitude of this process is far greater than the capacity of government authorities to organize or control it. The result is usually unplanned high-density and low-quality developments without basic services and infrastructure (ibid). However, when such areas reach a population size large enough to exert political pressure, the government is forced to provide them with water, electricity, and sometimes sewerage networks.

Rural-urban migration has been the major driving force behind urbanization in Egypt. It has resulted from the deterioration of rural areas as well as from the concentration of economic activities - and hence employment opportunities - services, political power and wealth in the major urban centers. In addition to this, since the British colonization of Egypt in 1882, government policies have favored urban areas and particularly large centers. It was argued then that it is more efficient to develop urban centers because of the availability of services, infrastructure, power and skilled labor. Moreover, the favored strategy, for political as well as developmental reasons, was industrialization concentrated in urban centers (ibid).

5.3.3 The case of Curitiba, Brazil

Over the recent past decades, political leaders and community activists in different parts of the world have curtailed car-centered urban development. Examples of such places are Copenhagen, Portland, and Curitiba, where political leaders have made difficult choices to give precedence to pedestrians and cyclists, steer new development to locations easily reached by public transportation, and maintain population densities that make public transportation and cycling possible (Sheehan, 2001). These decisions have helped to revitalize central city locations, improve environmental health, and make streets safer for children.

Curitiba, the capital of Parana state in south-eastern Brazil, is one of the fastest-growing cities in a region of urban boots (Rabinovitch and Leitman, 2004). Its metropolitan area mushroomed from 300,000 citizens in 1950 to 2.1 million in 1990 (ibid). The consequences of such rapid growth are similar to those in developing countries: unemployment, squatter settlements and environmental degradation. But Curitiba did not end up like many of its sister cities. Instead, although its poverty and income profile is typical of the region, it has significantly less pollution and slightly lower crime rates. These achievements were realized because the city managers have learned that good systems and incentives are as important as good plans. The city's master plan helped to form a vision and strategic principles to guide future developments. The vision was transformed into reality by reliance on the appropriate systems and incentives, not on unquestioned implementation of a static document. Within this concern, the local governments are actively engaged in policies of guided urban intensification that has lead to more compact urban environments (Jenks and Burgess, 2000).

Curitiba proceeded to guide intensification through zoning laws, which encouraged high-density buildings along the main roads (Sheehan, 2001). Zoning laws have enabled the planners not only to improve traffic but also to secure housing

locations for poor families (ibid). Before the buildings along the transportation corridors were fully developed, the city purchased strategic land and set it aside for affordable housing for urban disadvantaged. The purpose was to integrate rather than isolate low-income households into the economy and culture of the larger city (ibid).

This was attained through the transfer of development rights to and from parcels situated in the existing built-up area, via shifts in land use zoning and floor area ratio, based on the principles of enablement and public-private negotiations. At times the transfer of development rights is used to preserve and reuse buildings with a recognised heritage importance. The densification policies are also used to generate public revenues targeted on infrastructure improvement programmes in low-income areas and social housing programmes. Physical compactness measures are also mechanisms for social justice. Jenks and Burgess (2000) show how this approach is becoming increasingly popular as a source of revenue generation and as a tool for redistribution, since it produces a financial surplus available for investment in needy areas of the city. Jenks and Burgess further suggest that an encouragement of compact city environments can provide an impulse to a different path of urban development than that of the dominant urban sprawl model.

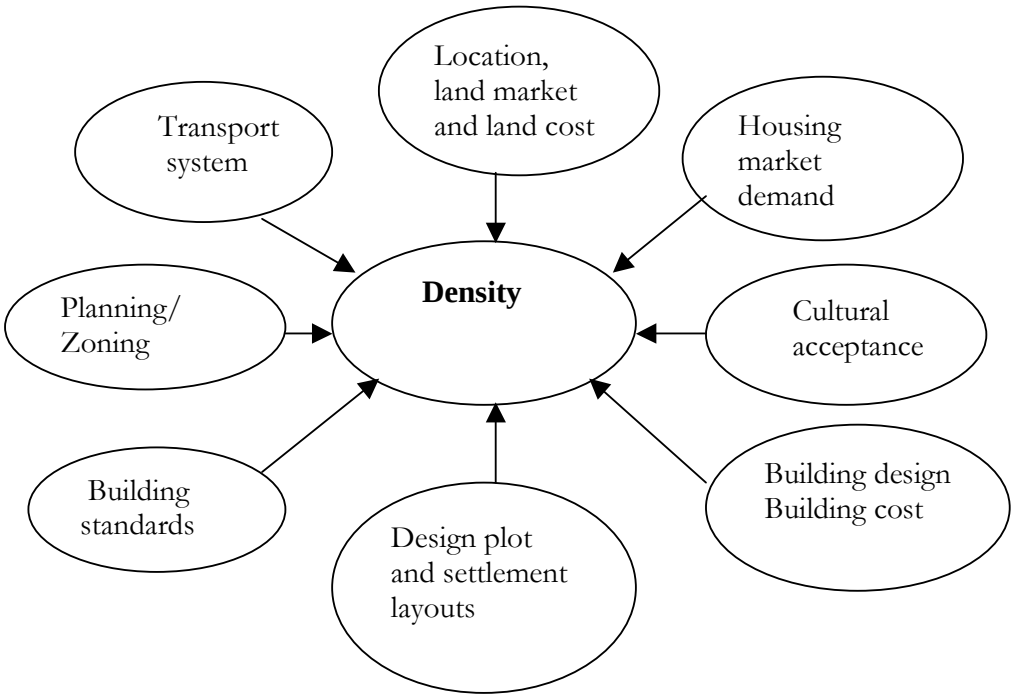
However, from the literature reviewed in this chapter and from the case study of South East Asia, Cairo and Curitiba, a comparison may be done between the three cases (Table 5.1).

Table 5.1 - Cairo, Curitiba and Cities of Southern East Asian in Comparison

Item of Comparison	Cities of South East Asia	Cairo	Curitiba
Population Density, Housing Demand and Land Cost	High	High	High
Government Control on Intensification	High	Weak	High
Policy Adopted to Manage and Implement Intensification	Governmental housing projects. Reduction in plot sizes to reach the lower income groups with minimal subsidies.	Central governments are forced to meet the growing demand of infrastructure services in intensified areas.	Interaction between the public and private sector and a shared vision both inside and outside the municipal buildings.
Actors Involved in Policy Adopted	Central governments And the financial institutions.	Central government.	Governments, inhabitants and the private sector.
Resulted Urban Development	High population densities turned into in-house crowding of high cost reversible damage.	Low - quality developments, loss of agricultural land, illegal settlements and loss of possible revenues.	Good provision of infrastructure, good quality developments and good flow of revenues to the local authorities.

It is thus clear that the interaction between central governments and the associated societies is vital. This point is well explained by Jenks (2000). He argues that there are certain types of factors that are both acceptable to, and positively valued by, residents. He explains that these factors relate to the type of intensification, the type of the area within which it takes place and the social characteristics of the people exercising it (ibid, p 245). All of these factors are explained in Figure 5.1.

Figure 5.1 - Factors of Success in Urban Intensification



Source: Acioly and Davidson (1996)

Against the arguments provided in this Chapter, it is worth to mention that globalization has an increasing role to play in the future as a dominant factor in the physical structure of cities.

Summary of Chapter 5

The main ideas in this chapter may be summarized as:

1. Government policies, plans and development control instruments can shape cities and densities in a way, which optimises infrastructure, municipal services, and land and public resources.
2. The sustainable benefits of a compact city environment cannot be attained in the absence of guiding policies, urban management tools, capable local governments and local acceptability.

3. The effect of demographic change, economic and social processes are widely understandable in shaping land-use decisions, collective consumption and urban landscapes.
4. National policies and legislation relative to land, property and built environments result in diversities in the roles and the impact levels of various actors in the land development process.
5. The state, at both central and local levels, directly or indirectly intervenes with respect: to property rights; the arrangement of land uses; land as a potential source of revenue; and the property process that includes infrastructure provision and public sector participation in land supply, development, and renewal.
6. The impacts of intensification vary from place to place and between the different groups involved. Therefore, acceptability is dependent on a range of local factors.
7. Increases in population tend to be more negatively received than increases in households; and,
8. In the city centres, mixed land-use areas and inner urban, intensification is more likely to be acceptable and welcome.

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PART III

- Chapter 6 -

Sudan - Population, Geography and Economy

The previous parts of this study explain the theoretical framework within which the research problem is framed. This part details the type of the area within which the research question takes place and the social characteristics of the people who inhabit the area. This chapter, in particular, deals with the socio-economic dimensions and local environment in Sudan. Chapter 6 is devoted to the relation between people, environment and sustainable development in Sudan in an effort to better understanding the reasons behind urban sprawl. Chapter 7 focuses on housing conditions in Sudan in general and Chapter 8 deals with city form and infrastructure services in Metropolitan Khartoum. Chapter 9 is devoted to the main findings of empirical research carried out in Metropolitan Khartoum, as part of this study, to explain the inhabitants' attitudes towards the housing category of multi-family, multi-floor, development that facilitates higher population density.

6.1 Population and Population Development

Sudan is the largest country in Africa. It occupies a total area of 2,505,813 square kilometers. At the beginning of the twentieth century, Sudan had only about 2 million inhabitants. In 1956 the figure had reached 10.3 million, rising to a total of 14.1 million in 1973 to arrive at 20.6 million in 1983. In the later census of 1993 it had reached 25.6 million (Table 6.1) and was estimated to be at 33.6 in 2003 (UNDP, 2003). The annual growth rate is between 2.8 and 3.1 %, with half of the population under eighteen years of age. About 30 percent of the population is urban,

concentrated chiefly in three cities - Khartoum, Omdurman and Khartoum North - constituting Metropolitan Khartoum, i.e. the national capital area.

In addition, the Sudan currently provides shelter to about 1.3 million refugees from Ethiopia, Eritrea, Chad and Uganda. The average population density is low (FAO, 1997)**,** 10 persons per square kilometers, but the geographical distribution is very uneven since half of the population is concentrated along the Nile (Map 6.1).

Table 6.1 - Population Levels in Sudan (by regions)

Regions	1973 (000)	1983 (000)	1993 (000)	2003** (000)
Awsat	3623	4026	5433	7251
Kordofan	2077	3111	4638	3895
Darfur	2098	3091	3323	6360
Shargi	1497	2208	3067	3937
Bahr Elghazal*	1322	2271	1913	2491
Khartoum	1096	1802	3512	5352
Shamalia	918	1083	1294	1568
Upper Nile*	761	1594	1258	1494
Equatoria *	73	1408	1150	1300
Sudan	14114	20594	25588	33648

Source: Collected by the author from different sources

***** States at Southern Sudan

** Estimated figures

NB. Sudan today comprises 26 States

Figure 6.1 - A comparison of Population Levels Among Sudan States

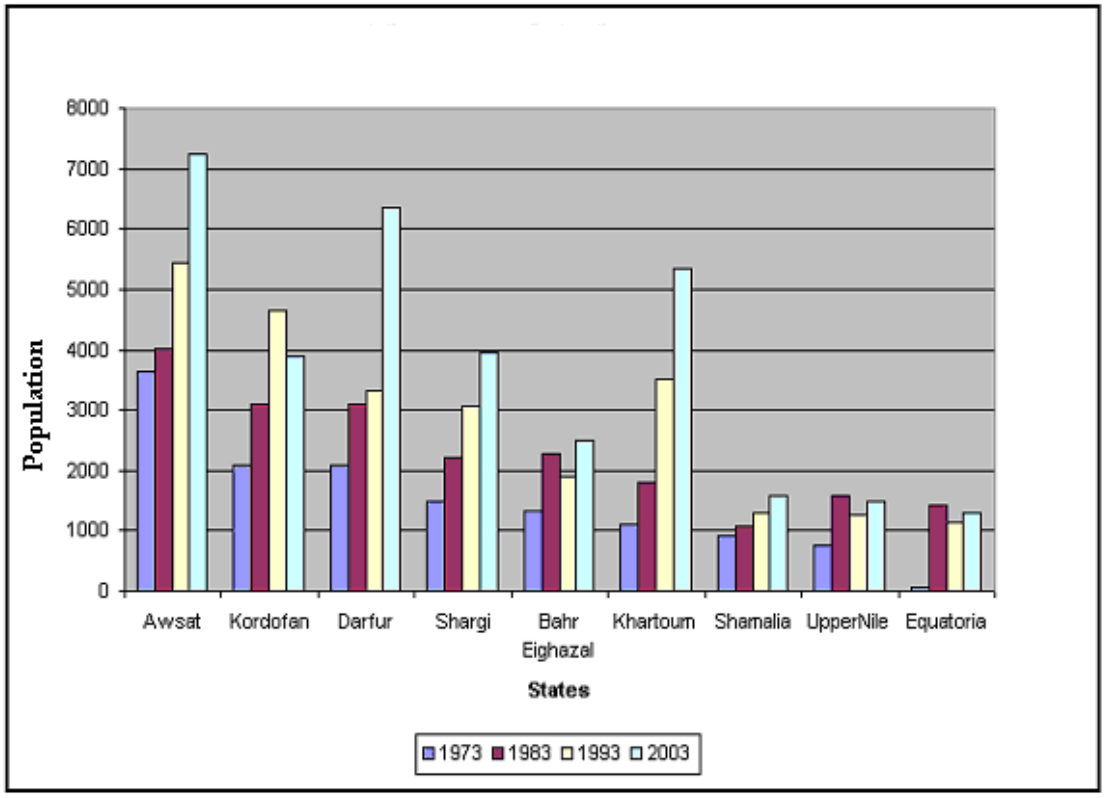
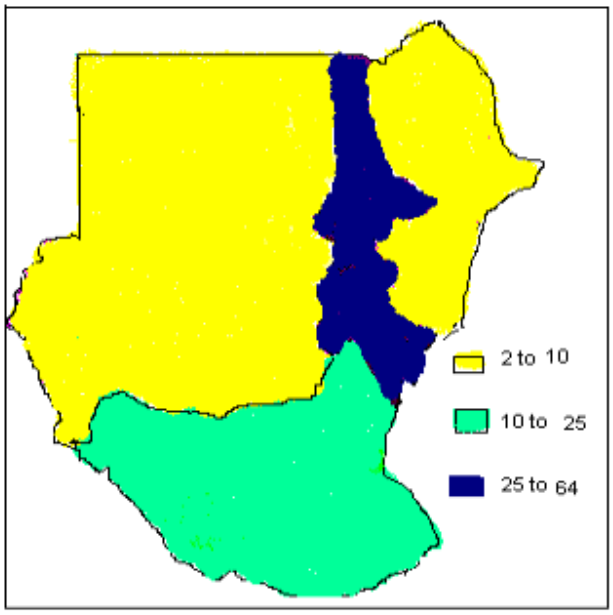


Figure 6.1 shows that Khartoum population growth is the highest among the Sudanese states during the period 1973 - 2003.

6.2 Climate

Sudan has a tropical climate. The greater part of the country falls under the influence of the trade winds; hence, the country has generally hot, rainy summers and warm, dry winters. Because of its huge area, there is a great variation in rain. Whereas it scarcely rains in the north (the average rainfall is 25 mm), in the south at Gabal Marra it reaches up to 1500 mm (EoSiL, 2004).

Map 6.1 – Population Density in Sudan (inhab./km2)



Source: modified by the author from FAO (1997).

The amount of rainfall decreases from about 1500 mm in the south to less than 25 mm in the northern extremity. The duration of the rainy season and rainfall and its reliability increases from North to South. Rainfall exhibits a wide range of variability from 20 % in the South to 100 % in the North. The main rainy season is July to September but occasional showers fall in May–June, particularly in the higher rainfall areas in the South. The Red Sea Hills receive Monsoon rains during the months of October and November. There is little rain in the far north and central regions, occurring mostly in July and August. Between April and October, severe sandstorms blow frequently in the northern part of the country. In the south, the rainy season is much heavier and lasts from May through October. March through June is characterized by high temperatures, reaching up to 42 degrees Centigrade at daytime and 27 degrees Centigrade during the night. July through October is mild and benign, with the commencement of the rainy season. November through February is

temperate with short cold breezy spells, bringing the temperature to 30 degrees Centigrade at daytime and to less than 16 degrees Centigrade at night (ibid).

6.3 The Federal System

Sudan became a federal state in 1992, when a three-tier system of government was created - the federal government, states and local communities. There are currently 26 states, 16 states in the northern parts and 10 in the south. Each state is headed by a governor and organized as decentralized governments with state assemblies and state ministers. States are divided into localities, headed by commissioners (CEM, 2003, p 63).

5.4 Economy in General

This section describes the macro-economic policies, which have affected on the socio-economic structure in Sudan, and have caused disruption to the urban fabric in Metropolitan Khartoum.

6.4.1 Background

The Sudan is classified by the United Nations as one of the Least Developed Countries. These countries are characterized by structural and supply side constraints that impede their development efforts.

Since the late 1970s the Sudan economy has experienced continued deterioration characterized by: weakness in production and productivity; disequilibrium in internal and external trade balances; rapid increases in the rate of inflation and a low standard of living; devaluation of the national currency; heavy external debts; and, mal-distribution of income and wealth among individuals and regions (GoS, 1999, p 1).

In the early 1990s, the Sudan adopted and implemented liberal economic policy reforms within the context of the Three Years National Economic Salvation Program

(1991 - 1993) and the Comprehensive National Strategy (CNS) for the years 1992-2002. During the implementation of the Program, emphasis was placed on tightening monetary and fiscal policies to arrest and reverse the deterioration characterizing Sudan's economy since the late 1980s (ibid, pp 1-3).

The main objective of the CNS was to liberalize the economy to enable economic activities to be mainly determined by market forces. Consequently, prices have been liberalized, and import/export restrictions have been abolished. Moreover, more liberal laws encouraging investment have been promulgated, an extensive privatization and restructuring program for public enterprises has been implemented, and the multiple and overvalued exchange rate has been replaced by a floating rate. In its endeavor to liberalize trade, the Government has taken numerous measures including the removal of quantitative restrictions on imports and simplifying tariff procedures and structures (ibid).

The CNS has encouraged the production of export items, particularly non-traditional exports, to reduce the heavy dependence on primary commodities and to encourage processing and manufacturing agricultural products. As a result of these reforms, the economic performance has improved in real terms. Exports have increased by about 10 % as well as being diversified. In addition, the private sector has started to play a more active role in economic activities (ibid).

These comprehensive economic reforms and the trade liberalization measures undertaken by the Government are to a large extent compatible with the rules and objectives of the WTO.

6.4.2 Sudan structural adjustment program

This program was neither negotiated with nor backed by the World Bank and the IMF. By contrast, this program is almost typical to the standard Structural Adjustment Program (SAP) agreements concluded with other African countries. Sudan's SAP is

part and parcel of the policies of the Three Years Economic Salvation Program for the period 1990-1993, which was reiterated in the Comprehensive National Strategy (CNS) of 1992-2002. The following are the major applications of the SAP.

a) Financial Sector Reforms

Traditionally, the financial sector has been characterized by heavy government intervention and regulations. The central bank imposed detailed requirements for lending, dividing the economy into priority sectors and sub-sectors for which the banks were required to extend credit. Credit for agriculture was a priority. Other sectors were less prioritized, and some were prohibited from bank financing. The central bank prescribed different prices for credit depending on priority status and geographical allocation. Large loans had to be approved by the central bank. Credit to public enterprises was extended directly by the Bank of Sudan. Banking supervision was lax, there was no unified accounting system, and the banks accumulated portfolios of non-performing loans (CEM, 2003, p 56).

Since 1997, the Bank of Sudan has been dismantling restrictions and liberalizing the financial system. As credit allocation requirements to priority sectors were abolished, certain sectors found themselves in a difficult position to acquire finance. New methods for meeting the financing needs of the public-owned irrigation schemes were introduced. In 1999, the government started to provide direct lending and guarantees for agricultural loans within a consortium of commercial banks. The size of the government lending and the contingent liabilities in the form of government guarantees are constraints for further development of the financial sector (ibid).

The financial sector is continuously under pressure to become more efficient. Bank supervision is being strengthened. A unifying bank accounting system as well as regulations on capital adequacy ratios according to Basle standards has been introduced. A program for the central bank to monitor non-performing loans monthly

was established in 1999. A banking sector restructuring strategy was initiated in 2000 with the aim of strengthening the capital base of the banks. This will include restructuring and privatizing public banks; merging, liquidizing or recapitalizing small banks; reducing non-performing loans; and improving loan evaluation. The share of non-performing loans is still high, and most banks did not fulfill the Basle requirements for capital adequacy by the end of 2001. One way of handling non-performing loans has been to establish Band of Sudan committees that negotiate directly with the banks' boards and directors about how to decrease the share of non-performing loans (ibid).

b) Public Enterprise Reform

The public sector began to expand at independence, when some previously privately managed schemes in irrigation, water and electricity supply were handed over for direct state management and control. The expansion accelerated with the nationalization, confiscation, and Sudanization program of the 1970s. The enlarged public sector strained the capacity of the government and became a financing burden through budgetary subsidies and loans from the Bank of Sudan, which were guaranteed by the government.

The Public Sector Enterprises Disposition Bill (1990) and the State Corporation Act (1992) provided legal backing to the implementation of the privatization program. A number of technical committees and a High Council for the Disposition of Public Enterprises were set up to be responsible for implementing the privatization policy. The High Council for the Disposition of Public Enterprises recommended that some 107 state-owned enterprises should be included in the privatization program. The method of privatization varied, including direct sales to the private sector, partnership, lease, management contract, free transfer to state governments, employee associations

and NGOs, creation of holding companies, debt swap arrangements, and liquidation (ibid).

Some 72 enterprises were disposed of using these methods. Only a small number (fewer than 20 enterprises) have so far been sold to the private sector (ibid).

6.4.3 Public sector budgets

Budget management in Sudan is centralized (ibid, p 65). States effectively control the budgets of localities, and the federal government issues guidelines for state budgets. Local revenue sources are small - other than in the larger municipalities - and local communities are dependent on the state government to fund all of the wage bill and part of their local development budget. States, in turn, are subject to scrutiny in budgeting and personnel management by the federal government. On a national basis, there are attempts to consolidate the budgets for the three levels into a general government budget - summarizing the federal government, states, and local communities. However, not all 26 states and local communities have prepared formal budgets, especially not in the war affected areas outside of government control (ibid).

The federal government budget includes both revenue and expenditure relations with the state budgets. Local community budgets are fully integrated into the states' budgets. The total resource envelope for all three levels of government accounted for about 13 % of GDP in 2001. The federal government dominates both revenue and expenditure assignments. About 87 % of aggregate public revenues were allocated to the federal budget. But almost all revenue, about 98 %, was collected by the federal government.

Local own tax bases and revenue sources are small, because all major revenue sources and tax bases are concentrated within the federal domain. For example, 100 % of all oil revenue, the single largest source of public revenue, is collected by the federal

government. However, through a revenue-sharing system, 15 % of oil revenue (and most taxes) is distributed to the states (ibid).

The federal government also dominates on the expenditure side. In 2001, it spent about 77 % of total expenditure. The total public deficit for all three levels deteriorated from about 0.2 % of GDP in 1998 to 3.6 % of GDP in 2001. This was mainly attributed to the state budgets, where revenues decreased and expenditure increased with about one percentage point of GDP each. Although there is some uncertainty about the amounts of states revenue, the decrease in states' revenue is likely to reflect diminishing collection and fiscal authority for own resources. Part of the decrease in own revenue could reflect the abolition of states' sales taxes - replaced by a VAT in 2000 - and agricultural taxes that were replaced by a federal transfer to the states in 2001 (ibid). States are required to balance their budgets, and have, in practice, no access to finance from the banking system since the states are not considered legal entities. Localities, however, are considered legal entities and may in some cases have assisted the states in covering deficits (ibid).

6.5 Economic Specializations

The agricultural sector is the backbone of the economy, accounting on average for about 46 % of the GDP and providing employment for more than 53 % of the labor force (Table 6.2). The importance of this sector is even greater when we consider that agricultural products represent over 70 % of exports and provide the raw materials for most domestic industries. The main agricultural commodities are sorghum, wheat, groundnuts, cotton, sesame, gum Arabic, fruits and vegetables.

Table 6.2 - Employment Power in Different Sectors

Economical Sector	Employment Involved (%)
Agriculture	53.3
Industry	6.3
Electricity, gas and water	0.4
Construction	2.7
Trade	9.7
Transport and communication	4.9
Finance, insurance and estate	1.1
Government services	19.4
Not adequacy qualified	2.1

Source: MoFaNE (2003)

Animal wealth in the Sudan is estimated in 1997 to be 103 million head of cattle, sheep, goats and camels. In addition, there are a considerable number of equines, poultry and wild faunae. The contribution of livestock to the national economy is significant and accounts for 21 % the GDP. The country is considered self-sufficient in meat, but only to a limited extent in milk due to lack of collection facilities. Large quantities of powdered milk are imported.

Industries and mining account for 32 % of the GDP. The main industries are sugar, cement, tires, textiles, food processing, leather products, chemicals and pharmaceutical materials (Table 6.3). The major exports are cotton, gum Arabic, oilseeds, livestock and meat.

Table 6.3 - Share of the Economical Sectors in GDP (1998-2002)

Economic sector	Share in GDP/year (%)				
	1998	**1999**	**2000**	**2001**	**2002**
Agricultural	**48.7**	**49.8**	**46**	**45.6**	**46.0**
Irrigated Grops	14.3	12.8	13	13.4	12.7
Rainfed Mechanized Grops	1.9	2.7	1	1.1	1.3
Rainfed Traditional Grops	7.4	8.7	8	6.3	8.1
Livestock	21.7	22.3	22	21.7	20.9
Forest, Fisher & others	3.3	3.3	3	3.1	3.0
Industrial	**15.0**	**15.8**	**21**	**22.8**	**23.1**
Mining	0.9	1.9	8	8.7	9.1
Transitional Industries	7.2	7.2	7	7.9	7.9
Water and Electricity	1.8	1.8	2	1.7	1.7
Construction	5.1	4.9	5	4.5	4.4
Services	**36.6**	**34.4**	**32**	**31.6**	**30.9**
Government services	6.5	6.2	6	6.0	5.9
Other services	29.7	28.2	26	25.6	25.0
Total	**100**	**100**	**100**	**100**	**100**

Source: MoFaNE (2003)

The Sudan has numerous mineral deposits and reserves - mostly unexploited or under-exploited - such as oil, natural gas, gypsum, iron ore, mica, lead, chrome and gold. Exports of gold and chrome have increased during recent years. The service sector accounts for 30.9 % of GDP. Its main sub-sectors are financial, transportation, insurance, commerce and government services.

Table 6.3 shows that the share of water and electricity plus construction sectors represents 6.1 % of the GDP, and this percentage is in decline. Table 6.4 shows that actual spending on water is less than budgeted for several years.

6.5.1 Government revenue and spending priorities

The government's domestic revenue ratio to GDP has been weak during the 1990s. With low collection of public revenue, no oil income before 1999, and limited access to external financing, the government's macro stabilization efforts were mainly concentrated on cuts in public expenditures. Relative to GDP, federal expenditure declined from an average of 18.4 % during 1986-90 (peaking at more than 25 % in 1992) to 9.4 % during 1996-2000. As a result of the drastic downsizing of the public sector, financing for social and infrastructure services was sharply reduced (World Bank, 2003a). Defence and security expenditures, however, remained high. Defence and security expenditure was estimated to account for about 3 % of GDP, whereas development expenditures stood at about 1.5 % of GDP - and were biased toward capital-intensive investments in energy and subsidies for large-scale irrigation (Table 6.4). As a result of the downsizing of public sector expenditures, formal salaries to civil servants have eroded and are far below the level needed to operate an effective public administration (ibid).

Table 6.4 shows that regional expenditures have remained a low priority. By 1998, the states and local communities received a total budget of 2.4 % of GDP, which was supposed to finance all basic services and development. By 2001, when net oil revenues - equivalent to 5 % of GDP - were added to the government's budget, regional expenditures had risen to only 4 % of GDP, still inadequate to deliver on their mandate. This reflected an inadequate financial response, and low priority for states' expenditures. Up to the present time, the decentralized public administration introduced under a federal structure in the mid-1990s has been unable to deliver sufficient social services for sustainable social and economic development (World Bank, 2003b)

Table 6.4 - Spending on Development Projects (2000-2003) (millions of SDD)

Sector	2000			200 2			2003		
	Planned	Actual	%	Planned	Actual	%	Planned	Actual	%
Power and Mining	11331.0	5490.9	48.5	14478.4	10458.4	72.2	17500	19348.6	110.6
Agriculture	11586.9	12982.2	112	19853.1	11501.9	58	23900	11350.9	47.5
Manufacturing	4137.1	6625.1	160	11550.0	9762	84.5	10620	14075.7	132.5
Transport and communication	5179.0	4666.8	90	11987.8	4035.6	33.7	13400	3820.3	28.5
Social development	6801.0	2769.6	40.7	11574.9	7303.4	63	19600	1336.4	6.8
Water	3728.0	1882.6	50.5	3714.9	1527.1	41	4080	1049.3	25.7
Peace	4500.0	2216.0	49	7000.0	2172.4	31	7500	3585.7	47.8
Development reserve	500.0	282.3	56.5	800.0	624.8	81	800	238.5	42.3
Gross total	47763	36942.6	77.4	80959.1	47386.6	58.5	97400	54905.4	56.4

Source: MoFaNE (2003)

As is clear in the above subsection, there is one important point in budget preparation that has a large impact on infrastructure finance. In budget preparation, gross income is estimated to meet gross expenditures, i.e. what is collected as use charges, fees and taxes are all put together to meet gross expenditures that are subject to the priorities that come up from time to time.

The effect of this point in budget preparation could be noticed in the fluctuations between the planned and actual spending in Table 6.4.

6.5.2 Pricing and privatization policies

The economy in the Sudan is mixed. The State-owned sector includes: water supply; electricity; enterprises; railways; airways; industries including sugar, textiles and tanneries; agricultural schemes; banks, and; other financial institutions. More than 85

enterprises including commercial banks and companies, factories, agricultural projects, tourism, insurance, hotels and communication were privatised in the period 1990-1998 through direct sales, public share holding, rent, and restructuring.

The Technical Committee for the Disposition of Public Enterprises (TCDE) was assigned the responsibility of executing privatization according to the Public Enterprises Disposition Act 1990. Opportunities to buy privatised enterprises are opened to both foreign and local investors.

At present, prices of goods and services have been liberalized and are freely determined by market forces. Subsides to consumer goods have been eliminated. The supply of water and electricity is subject to cross subsidization as an intermediate step towards full liberalization.

6.5.3 Fiscal policies

The Ministry of Finance and National Economy is in charge of fiscal policy. The aim of the current fiscal policy is to gradually balance the budget by controlling public spending and increasing revenue through more effective tax collection and expanding the tax base. The control of public expenditure involves the elimination of subsides and the implementation of privatization of State-owned enterprises.

The Taxation Chamber and the Ministry of Finance and National Economy are responsible for administering tax laws and adopting and enforcing regulations. The prevailing tax law is the 1986 Income Tax Act (Amended 1998), which includes Personal income tax and Real Estate income tax. Other tax laws are Capital Gains Tax Act 1986, Stamp Duty Act 1986, Sales Tax Act 1990, National Contribution for Sudanese Nationals Working Abroad Act 1991, Development Tax Act 1995, Land Rent Income Tax Act 1964, and Business Profit Tax.

The share of the direct tax revenue in the total government revenue is approximately 30 %, with its ratio to the GDP about 2 % in 1996. The maximum

present income tax is 30 %. Business profit tax is 40 % while for the financial and insurance sector it is 45 %. The capital gains tax is 5 % for real estate and 2.5 % for automobiles.

Real Estate Income Taxes (REIT) is a tax on the annual rental value of the built-up land whether it is residential, industrial, or commercial. Owners have to pay as REIT 1/12 of their annual rental value. The valuation is the current annual market rental value of the buildings including the site. The rates at the residential areas are fixed according to the area 'class' and to the buildings' conditions. No taxes are imposed on empty plots at all classes, and there is tax exemption for damaged uninhabited plots.

Concerning Customs tariffs, there are there are five different rates of customs tariffs: 6 %, 15 %, 30 %, 50 % and 80 %. For Buildings materials four rates of them are applied as in Figure 6.5.

Table 6.5 - Customs Tariffs on Building Materials

Rates of tariffs %	Materials
15	Plastic and metal raw materials, articles of base metal, tools and equipment, explosives and cement.
30	Wood and wood articles, articles of stone and plaster, and ceramic products.
50	Plastic articles, rubber articles, domestic household, electrical equipment and appliances, and glass & glassware.
80	Textiles and textiles articles, carpets and other textile floor coverings, paints and varnishes, furniture, and bedding mattresses.

Source: Collected by the author from unpublished resources

6.6 Investment Climate

The government promulgated an Investment Promotion Act in 1990. Amendments to it in 1993 and 1996 were designed to rationalize the cumbersome investment procedures and to provide incentives to private investors. In 1999 a new Act was issued, The Investment Encouragement Act 1999, and amended in 2003.

The new Act provides some exemptions and concessions for investors which include: complete exemption from customs fees for capital projects; freedom of capital transfer; simplified procedures through a single outlet 'One Stop Shop'; grant exemptions from profit taxes of 5 to 10 years for investment projects; grant customs exemptions for strategic projects and non-strategic capital goods; strategic projects are given the necessary land free-of-charge; non-strategic projects are given land at an encouragement price, and; that the investor has the right to operate without a Sudanese partner.

In addition to the above exemptions and concessions the investment law has provided the following fundamental guarantees: no confiscation of property will occur except through the legal system and after payment of reasonable compensation; the investor has the right to re-transfer the capital in case the project is not executed or is liquidated, and; transfer of profits and costs of finance will be executed in the currency of import and on the date due.

To promote an investment climate the Sudan government has established a number of regional agreements aimed at encouraging investment and creating trade opportunities with other nations.

Efforts to rationalize fiscal exemptions have not materialized. The existing Investment Encouragement Act provides discretionary powers for the administration of fiscal exemptions for investors. Discretionary tax exemption authority is spread among various federal and state departments, and its administration varies, depending

on the sector of investment and whether or not the investment is considered strategic (IEA, 2003).

The main impact of the investment reforms has been to provide consistent assurances about government support for private sector development. The investment reform combined with the privatization program has provided some impetus to private sector investments in various sectors, especially oil and oil-related investments. In addition, there are investments in transportation, pharmaceuticals, and agro-processing. Progress in the peace process remains critical for attracting investments to the non-extractive industries.

Investment inflows to Sudan have increased substantially since 1996. A large part of these investments have targeted urban areas. First and foremost, growth has been very strong in Khartoum and Port Sudan.

After the recently signed peace agreements, investments and international aid are expected to improve the economic situation in Sudan. The following section relates to the peace agreement and its promises.

6.7 The Future Under the Recent Peace Agreement

The signing of the Peace Agreement in January 2005 (Appendix I) is an historic moment for the future of Sudan. It represents a formal end to Africa's longest running civil war that has killed two million people and driven five million more from their homes. It sets the stage for the possibility of bringing lasting peace to Sudan. However, both parties to the agreement must follow through on their commitment in the agreement to greater regional development if the peace is to be sustained.

Peace will allow the country to take advantage of its many assets since it is rich in its agricultural and livestock resource base. Furthermore, Sudan has considerable export potential, sound medium-term prospects for the oil industry, a dynamic private sector, and the goodwill of a number of donors to support the peace process. There is

a keen interest among a number of donors and international investors in supporting investment projects. Unleashing this potential will require complementary investments in infrastructure, strengthening of institutions, reforms and technical assistance for improving governance, transparency and accountability in public affairs, and a renewed focus on poverty reduction.

Summary of Chapter 6

The main ideas in this chapter may be summarized in the following points:

1. Population is growing with annual growth rate of 3 %. About 30 % of the population is in urban areas. Most of them are in Metropolitan Khartoum.
2. Early 1990s, the Sudan adopted liberal economic policy reforms.
3. Although Sudan is a federal State, budget management is centralized.
4. The agricultural sector is the backbone of the economy, accounting on average for about 46 % of the GDP and providing employment for more than 53 % of the labor force.
5. The share of water, electricity and construction in the GDP is minor and the rregional development has remained a low priority.
6. In budget preparation, gross income is estimated to meet gross expenditures i.e. what is collected as use charges, fees and taxes are all put together to meet gross expenditures that are subject to the priorities that come up from time to time.
7. The share of the direct tax revenue in the total government revenue is approximately 30 %, with its ratio to the GDP about 4%.
8. Households have to pay as Real Estate Income Tax about 8% of their annual rental value. No taxes are imposed on empty plots, and there is tax exemption for damaged uninhabited plots.
9. Customs tariffs rates for buildings materials are the highest amongst the rates imposed on imported goods.
10. The investment reform combined with the privatization program has provided some impetus to private sector investments in various sectors.
11. The recent peace agreement is expected to allow the country to take advantage of its many assets since it is rich in its agricultural and livestock resource base.

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- Chapter 7 -

Environment and Development in Sudan

Background

The Sudan suffers from serious economic, social and political problems that occurred since the 1970s. These problems became aggravated in the beginning of the 1980s; ofter the wave of drought and famines that struck some parts of the country. This was followed by thriving tribal and regional conflicts and a change in the distribution of population.

As has been detailed in the previous chapter, Sudan has taken steps to improve its economic performance. These are represented by the economic liberalization policy, the amendment of the investment laws to attract foreign investments and the encouragement of local investments. There is also the policy of increasing the participation of the private sector in development projects, the application of the federal system and empowering the states to achieve economic growth and stability. Yet, despite these steps, challenges still persist. The problem of non-balancing distribution of the population still remains. The deterioration of services, environmental degradation and the rise of the rates of poverty still continue. This means that there is a need for comprehensive treatment and the introduction of new basic concepts that can deal with environmental, political and economic challenges in view of the existing cyclical relationship amongst them, and further work toward a long run solution.

7.1 Environmental Degradation in Sudan

The relation between population, environment and development in Sudan poses several questions related to the causes of population transformation and their relation to environmental degradation.

It is clear that Sudan is an agricultural country with more than 85 % of the population working in these activities. In this context, the style of living in traditional agricultural societies, their cultivation system, social stability and the type of animals they breed, depend upon surrounding environmental factors. Several researchers deal with the balanced economic activity, with the surrounding environment in the Sudan, which was dominant for long periods and reflected in biological balance. They provide several examples of those activities such as the former traditional activity of Abyei farmers, the farmers of the Zande tribe and the former traditional pastoral activity of Zaghawa (Tubiana and Tubiana, 1977).

In the following sections, the agricultural and pastoral policies which damaged the environmental balance will be reviewed. This Chapter also includes a review of the economic impacts resulting from the environmental degradation.

7.2 Displacement and Migration

This phenomenon is old in Sudan. Migration to Khartoum is attributed to two main reasons. The first is the serious lack of academic education in the Northern provinces (states) during the period 1900 to 1956. During this period the purpose of education was to supply the colonial administration with book–keepers, technicians and telegraph operators. The second reason is population growth that does not match the stock of cultivation lands in rural areas.

It is observed that the rates of larger migration have surpassed natural rates. This movement can only be explained by disasters. Natural disasters have pushed the movement of migration from rural to the urban areas.

There are a number of issues related to the suitability and cohesiveness of population movement and economic activity. Abu Sin (1984) offers several factors, some of which are related to the plain nature of the country, its location as a cultural bridge between Africa south of the Sahara and the Arab Islamic World and the environmental diversity and its reflection on the distribution of the basics of the activation of emigration and its tributaries, of the basic resources and the link with the difference in norms of living. These are considered the basics of the activation of emigration and movement. Meanwhile, the existence of the Nile and its tributaries, as the most important natural phenomenon, has its impact on settlement and stability in the major development projects. This has made towns and cities the means of transport and their location in the centre of the Sudan, aspects of concentration. The last of these factors is the size of the nomadic sector of population, which depends on movement as a fundamental part of their life.

Regarding in-coming, internal, migration one study (ESRI, 1978) found that the population of the North–Western provinces, which is agriculturally poor and 'less civilized', continued to move to the rich agricultural lands and the developed regions in the East and North–East. The study indicates that the main cause of migration relates to economic factors, which are represented by population pressure, better opportunities for work, deficiency of rains and what follows in the reduction of productivity and incomes. Migration, then, was made to fertile regions with permanent irrigation. The study further deals with the causes of migration to Khartoum, because of the ample higher educational, hospitals, etc, and the plentiful commercial and industrial work opportunities.

In a further (1987), nine years after the first study regarding internal migration in Sudan - the results of a questionnaire show that more than 60 % of the respondents who came to Khartoum in the 1980s were pulled by employment opportunities, working conditions and income rates. The basic services 'pull factor' in terms of health

care and education represents 30 %. The same report states that migration from the Northern, Central and Western regions is 36.6 %, 34 % and 23 %, respectively, of the total displaced people in Metropolitan Khartoum. It also indicates that 31 % of the displaced persons were originally farmers. Most of the displaced people attribute the reasons of their migration to the increase of population pressure on agricultural lands and to the reduction of land productivity.

7.3 The Consequences of Displacement and Migration

There is a notable relationship between rural-urban migration and development: when environmental degradation occurs, migration movements start towards central villages and cities. This causes re–distribution of the population and a tendency to concentrate in specific axes. The result in rural areas is the rise in the rates of pressure on resource-use. Where pressure on resources is higher than the capacity of the resources, it leads to a deterioration in the standard of living. Thus the seasonal and permanent rates of movements rise in an accelerating manner. The marginal sector emerges as a result of the migration processes and displacement operation to the urban areas.

The rural area in Western Sudan is suffering from a non-stable and fluctuating environment. Under the impact of internal and external factors, the environmental balance has became distorted. This has been accompanied by a reduction in per capita income and the standard of living. The result was the creation of large marginalized group of rural people who moved into towns and cities, and live in their peripheries in squatter houses. They work for very low wages which are not enough to satisfy their basic needs.

7.4 Policy Change that Seems to Work

It has been noted that all of the policies that work to conserve the environment or to combat environmental degradation in developed countries encourage investment in

natural resources and effect human behavior which is cohesive with the environment. A number of effective policies have been developed in developed countries for these purposes. Turner *et al* (1994) show more than 85 effective economic policies in six developed countries, namely Italy, Sweden, USA, France, Germany and Holland. User-charges represent 50 % of the instruments which are used to combat environmental degradation. Another 30 % of the total instruments are deposit-refund and trading environmental permits policies. Successful examples of these policies are water pollution charges in Germany, the trading of the smoke permits in the USA and the deposit–refund in Sweden. It should be mentioned that the choice between the policies and the instruments varies from one country to another according to certain sustainability criteria.

According to Young (Turner *et al*, 1994), the chosen instrument or policy must be economically effective, require low information and administration cost, and be fair and effective in achieving its objectives. The developed instruments or policies must be environmentally acceptable, adaptable to the new technology and climatic conditions, have dynamic incentives to encourage environmental and technical improvements, and, of course, be politically acceptable.

From a case study of sustainable rural development projects of some African countries, a number of factors of sustainability were recognized (Veit *et al*, 1995). The study includes Gambia, Ghana, Kenya, Liberia, Nigeria, Sierra Leone, Sudan, Tanzania and Uganda. The major factors of sustainability in those sustainable projects are the efficient management of natural resources, adoption of decentralization in development planning, the use of environmental impact assessment studies in decision–making processes and the adoption of public participation resource management.

In Sudan many researchers write about policy changes. Abu sin (1984) confirms that the degradation that is observed in Sudan has occurred as a result of several

factors, with the most important factor being the absence of environmental planning. The protection of the environment and properly maintaining it requires the proper understanding of its elements. It also requires serious collective work for environmental protection to guarantee its continuity. Thus, he finds that there is a necessary balance amongst the economic and material considerations and each must be provided at the necessary rate. There is also the comprehensive nature of planning to fulfill all the needs of the community, plus the coordination, cooperation and interaction amongst all the apparatuses operating in the field of development. He adds that environmental considerations must aim at the protection of the environment and rationalize its utilization, the development of resources and increasing their productivity so that they satisfy the needs of the rural population and the diffusion of the environmental awareness to create the correct understanding of the interrelated environmental elements. He concludes that rural development must participate in improving the ecological system and the achievement of population equilibrium between rural and urban areas. Meanwhile, it should be remembered that the ecological style necessitates the viewing of the giving of the environment and its scientific assessment so as to determine the optimum and safe use, in the long run, without any distortion of the ecological system (Abu sin, 1984).

Abu Sin (1984) recommends that the contemporary priorities of development must be reviewed concerning rural areas. Reform is required in its path and objectives, adoption of a rationale for the optimum utilization of the natural resources in a way which may guarantee their continuity and benefits. He also recommends direct action for integrated development through the linkage of modern schemes with traditional sectors and regions'

Summary of Chapter 7

The main ideas in this chapter may be summarized in the following points:

1. The relation between population, environment and development in Sudan, poses several questions. These questions concern the causes of population transformation and their relation to environmental degradation.
2. Environmental degradation occurred in Sudan as a result of the policy and market failure.
3. As a cure for the environmental degradation, studies refer to the importance of regional planning as the only way for the sustainable development.

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- Chapter 8 -

Housing Conditions, Poverty and Planning Environment in Sudan

The natural resource base of Sudan's economy was disrupted by the occurrence of environmental degradation that has affected urban forms in Sudan was detailed in the previous chapter in this part of the study. This chapter describes the effect of the urbanization process on the housing sector in Sudan supported, in general, by issues of land tenure, real estate leasing policies, building-regulations and efforts concerning housing problems.

8.1 Poverty Trends in Sudan

Recent research and surveys indicate that poverty in Sudan is widespread and perhaps even growing during the period preceding the introduction of the federal administration system. A widely quoted estimate comes from a recent study by the Ministry of Manpower and ILO - utilizing data from two comparable labor surveys conducted in Northern states - which shows that the proportion of Sudanese living in absolute poverty increased from 76 % in 1990 to 88 % in 1996.

Standard basic social indicators have shown moderate improvement over the last three decades and a comparison of basic social and human resource indicators in neighboring low income African countries indicate that standards are still among the lowest in the world and arguably low even for a country of Sudan's level of income. A variety of factors have led to the prevalence of poverty and poor social indicators. The combination of prolonged civil war, natural disasters and a heavy debt burden have

contributed to both rising poverty and erosion in the level and quality of social service delivery in recent years in Sudan.

There is also a clear regional dimension to poverty in Sudan. Most accounts highlight that the poorest Northern states are those that are periodically hit by draughts, namely the Darfour and Kordofan states and the Eastern regions. Limited data on the Southern states, which are the most directly affected by the civil war, indicate that the problems there are much more acute, even when compared to the high levels of poverty in the North.

8.2 Poverty Indicators in the Housing Sector

This section shows poverty indicators in the housing sector in terms of: building materials, in-house level of construction, and water and sanitation services.

8.2.1 Floor building-materials

Housing conditions generally serve as an indicator of poverty (MICS2, 2000) as it is a major component of the quality of life.. A wealth index includes many indicators of housing conditions. Of all families in Sudan, 6.2 % have a floor of wood, tile or concrete, 89.1 % dirt/straw, and 3.1 % 'dafra' i.e. brick cover. None of the poor families has a floor wood, tile or concrete, or dafra; as all households have dirt/straw. Among the rich families, 22 % have wood, tile or concrete; 10 % dafra, and 67 % dirt/straw (ibid).

8.2.2 Average number of rooms of households

Although the average household consists of more than 6 persons, 72.9 % of families have one or two rooms in the house, about 24 % have 3-4 rooms, and only 3 % have 5 or more rooms. The poor constitute 54 % of those who have one or two rooms, while the rich constitute 25 % (ibid).

There is a significant variation between the poor and the rich. Among the poor, 84 % of the households have 1 or 2 rooms, whereas among the rich it is 56 %. Only 1 % of the poor has 5 or more rooms and 6 % of the rich have 5 or more rooms (ibid).

8.2.3 Provision of hygienic sanitation and potable water

Slightly less than one quarter of the population uses drinking water piped into their dwelling, and 28 % use water piped into their yard or plot (deep/well pump). Rainwater collection and rivers and streams are also important sources of drinking water. The source of drinking water for the population varies strongly by the standard of living. About 63 % of rich families have piped water into dwelling, while only 1% of the poor has that advantage. About 72 % of the poor use river/canal/rain water as a source of drinking water, only 4 % of the rich use this source (ibid).

58 % of the population in Sudan is living in a household with sanitary means of excreta disposal. 95 % of the well off households, and only 19 % of the poor has sanitary means of excreta disposal. Most of the poor population (79%) uses rivers, bush, fields, or has no facilities. In contrast, the most common facilities in the well off households are the traditional pit latrines (72 %) (ibid).

Table 8.1 - Water Source 1999-2000

Northern Sudan		**Southern Sudan**		
Water Source	**During the year %**	**Water source**	**Dry Season %**	**Cultivation Season %**
Piped into dwelling	29	**Pump**	36	26
Public tap	8	**Protected spring**	3	4
deep well/pump	26	**Open well/spring**	32	19
Rainwater	6	**Open water**	29	46
Dug well/bucket	17			
River/canal	8			
Others	5			

Source: World Bank (2003a)

Tables 8.1-2 offer comparative data about water sources and sanitation techniques in Northern and Southern Sudan. The data concerning Southern Sudan reveals the impact of war.

Table 8.2 - Sanitation Techniques 1999-2000 (% of population)

Northern Sudan		Southern Sudan	
Flush to sewage	0	Improved pit latrine	2
Flush to septic tank	8	Traditional pit latrine	27
Traditional pit latrine	52	None	71
Soak away pit	2		

Source: World Bank (2003a)

8.3 Land Tenure

An outstanding fact that must be mentioned here is that almost all of the urban land in Sudan is owned by the State. Any action concerning the land will not take place if the land is not demarcated and does not belong to the state. This law was enforced in 1975 after reforming the Land Registration Laws of 1970. These laws made way for the integration of the 'Site and Services' method as the dominating housing strategy, which represents about 98 % of the allocated housing stock (Osman, 1996).

The efficiency of the land market is indicated by the degree and satisfaction of housing at all levels of income groups. Maximum efficiency of the housing market cannot be achieved if the land market is mediocre. Moreover if the efficiency of the land market is considered as an indicator of the success of housing strategies, the mechanisms of demand and supply, the value and pricing of land and real estate must be continuously reviewed and upgraded. Deficiencies and shortcomings in any housing strategy could be due to incompetent administrative bodies and service sectors. Another factor affecting the success of a housing strategy in Sudan is the discrepancy between third and first class areas in terms of services and plot area (ibid).

The popularity of the Site and Services method in Sudan as opposed to other methods in housing strategies is that the economic burden imposed on the state is far less. It is 1.5 times lower than other methods experimented in the 1970s, where the state had to provide and finance all housing and infrastructure projects (ibid).

In Sudan, any citizen entitled to a plot of land is categorized according to his/her income and profession. Plots are distributed into three classes; first, second and third. First class plots are outstanding in plot area, services and location and are allocated to the high-income elite of society. Second class plots are allocated to middle-income groups and third class plots are allocated to low income generating groups (Ahmed, 1974).

8.4 Real Estate Leasing Policies

Leasing policies and legislation both favor the lessees. According to the Buildings Rent Law of 1991 (MoJ, 2003), owners have difficulty changing the historic renst, and disputes around rent values can extend for years in the courts. For this reason, owners in most cases do not prefer to let their properties to others.

In legal disputes, in theory of 'fair rent' is estimated according to the building cost, land value, and the average payable rent - within the area at which the property under consideration is located. Because building costs and land valuation systems are still poor in Sudan, the major concern relates to the average payable rent.

Insurance for the receivable rent does not exist. Insurance companies are working in different production and service activities but insurance in Real Estate markets is not recognized and local communities usually constitute social pressures on real estate owners to keep 'Rents' affordable to the disadvantaged. However, the main successful reasons for owners to terminate a rent contract, according to the law of 1991 are as follows:

- If the owner proved the existence of strong necessity for the property to be inhabited by him, his parents, or children.
- If the owner managed to prove that the lessee did not occupy the property for more than continued six months, without reasonable reasons.
- If the property used in illegal activities.
- If the lessee out let the property without permission from the owner.
- If the tenant failed to pay the rent.

8.5 Low-cost Housing Projects

In Sudan there are many ongoing efforts aimed at improving housing conditions for the urban disadvantaged and the increasing poor. One of these efforts is the Sites and Services approach that was adopted in Sudan since the 1960s. It entails a division of responsibility whereby government provides those components that could not easily be found or assembled by individual from low-income families such as land (sites) and basic infrastructure (services). For their part, each household assumes responsibility for building the superstructure of their dwelling.

Another distinctive example of the efforts being made to alleviate poverty is the national project on Shelter and Habitat in Sudan in 1998, launched by the National Center for Research. The main objective of that research project was to reduce housing cost for urban disadvantaged. The project has resulted in several alternatives for low-cost houses. All of the alternatives use local low-cost building material (mud mainly). The project has studied different low-cost techniques in infrastructure provision, and adopted some of them.

8.6 Town and Building Regulation

The Town and Village Act of 1956 established basic planning laws. It has been repealed and re-enacted several times but modifications have been limited to an

adaptation of procedure and a further specification of responsibilities (Post, 1996). A new planning Act was presented in 1993 to cope with the federal system in Sudan.

The recent buildings Law is the 'Town and Building Regulations', issued in 1997. It specifies the process through which a person can build any property, including building permits and the professional supervision and safety measures to be followed during the course of building.

Khartoum State is a leading authority in Building Regulations. A Building Regulations Ordinance for Khartoum State was issued in 1999. It enforces more regulations on map design, official supervision for under-establishing buildings, and specific standards in the commercial as well as in the industrial and residential areas.

Nothing is specified in Building Regulations Laws with regard to the sustainability criteria in terms of building material, room size and climate comfort, equity or gender issues.

Table 8.3 shows the State bodies, professional associations and councils that have authority related to urban infrastructure services. Table 8.4 shows service monopolies.

Table 8.3 - The Authorized Bodies for Urban Infrastructure Provision

Type of Activity Requiring License	Responsible Licensing Authority
Sewerage services	State Ministries of Engineering Affairs
Refuse disposal services	Local Councils
Sanitation and similar services	Local Councils
Internal waterway transport services	Ministry of Transport
Rail transport services	Ministry of Transport
Roads transport services	Ministry of Communication and State Ministries of Engineering Affairs

Source: Collected by the author from unpublished reports

Table 8.4 - Services Monopolies

Type of Services	Name of the Monopoly
Electric power generation and distribution	The National Corporation for Electric Power
Railway transportation	Sudan Railways Corporation
Tap water services	Urban Water Corporation

Source: Collected by the author from unpublished reports

8.7 Planning in Sudan

8.7.1 Housing Conditions

The latest national statistics of 1993 indicate that 49.8 % of households live in separate house, 0.3% live in villas, 42.7% in huts and 6.2% in other types of shelter. 55.6% of urban inhabitants do not have on-site water facilities, 27.6% do not have sewage and garbage disposal facilities, 60.3% are not connected to the national electricity grid and 90.2 of the urban households still depend on charcoal and wood for fuel (Ahmed *et al,* 1998). The total amount of housing needed to bridge the gap between 1992 and 2000 was 747,000 units.

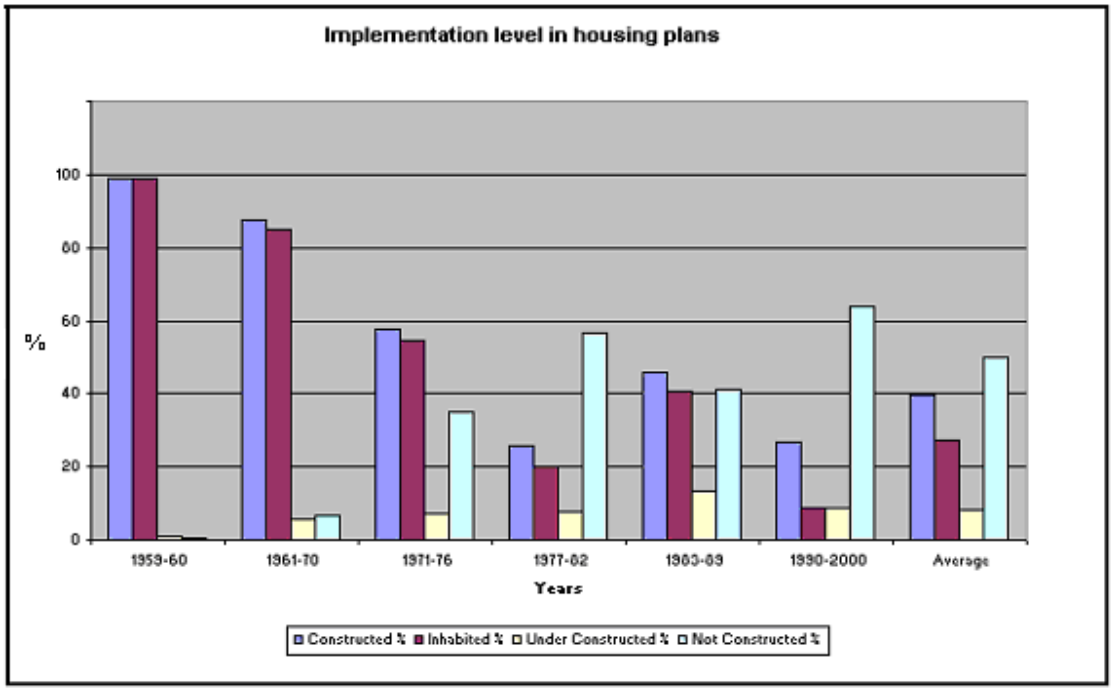
Table 8.5 shows implementation levels in housing plans for the period 1956 to 2000. From the table it is clear that both construction and occupation levels are not coping with housing demand. This is attributed mainly to the high cost of building materials and weak real estate income tax policies.

Table 8.5 - Implementation Levels in Housing Plans (1956-2000)

Housing Plans	Average no. of Plots distributed per year	Constructed %	Inhabited %	Under construction %	Not constructed %
1959-60	2330	98.7	98.7	1.0	0.3
1961-70	2443	87.4	85.2	5.8	6.8
1971-76	908	57.9	54.5	7.1	35.0
1977-82	2555	25.8	19.9	7.6	56.5
1983-89	509	45.8	40.9	13.2	41.0
1990-2000	12000	27.0	8.9	9.0	64.0
Average	**5372**	**39.5**	**27.5**	**8.0**	**50.1**

Source: Osman (2001)

Figure 8.1 - Implementation Levels in Visual Comparison (1956-2000)



8.7.2 Planning Authorities in Sudan

The National Council for Strategic Planning is the highest authority of planning in Sudan. It is located at the Ministry of the Council of Ministers. The chairperson of this council is the President of Sudan. Sudan federal ministers and State governors are all members in this council. The function of the council is to set up Comprehensive National Plans (CNP). The previous CNP was for the period 1992-2002. The ongoing CNP was set for the period 2003-2028. Implementation of such plans is the responsibility of the concerned federal ministers and State governors. Physical planning at the nation level is the function of the Ministry of Environment and Physical Development.

Concerning physical planning issues, the Urban Planning and Land Disposal Act, 1994, has initiated a federal council, known as the 'Federal Urban Planning and Land Disposal Council' (FUPLDC).

Table 8.6 - Membership of the Federal Council of Urban Planning and Land Disposal

The Federal Urban Planning and Land Disposal Council consists of the following persons:

1. Chairperson of the Council, appointment, and the terms of service of whom, is specified by the President of the Republic, upon a recommendation therefore, by the Council of Ministers;
2. The Ministers of Housing, in each state, or whoever the Council may authorize; provided that the grade of his post is not less than I Grade;
3. The Director-General, Department of Survey;
4. The First Under-Secretary of:
    - Agriculture, Natural Resources and Animal Wealth;
    - Finance and Economic planning;
    - The Federal Government Chambers; and,
    - A representative of the Investment Public Corporation.
5. Five persons of those possessed of efficiency, experience and interest, in the field of urban planning and housing, to be appointed by the Council of Ministers.

Source: MoJ (1994)

This council has corporate personality and is subject to the supervision of the Council of Ministers. The Council is constituted by a decision from the Council of Ministers. Membership in the council, functions and power were all designed to guarantee consistent design and implementation of plans (Tables 8.6-7).

Table 8.7 - Functions and Powers of the Federal Council of Planning

The Federal Urban Planning and Land Disposal Council has the following functions:

1. Lay down, upon the approval of the Council of Ministers, the national urban strategies, and whatever may be connected therewith of policies, as may secure the rationalization of land use, in all the fields; provided that such strategies shall be compatible with the national policies of comprehensive and balanced development, subject to the necessity of balance between the various states and the urban and suburban areas, with respect to municipal services and public utilities, and such as may be present therein of natural resources and human capabilities;
2. Develop such systems and styles, as may lead to participation and coordination, between the planning organs, at all the federal levels, in the states;
3. Conduct studies and researches, in cooperation with the organs and institutions of planning, in the states, in the field, connected with urban planning, in particular in the field of land use for housing, housing, transport, municipal and rural services purposes;
4. Revise the schemes of the maps directing the urban development, in the states, as may have been prepared, on the part of the states' organs, preparatory for submitting the same, to the Council of Ministers, for approval thereof;
5. Approve the urban structures of settlements and residential complexes in the major development schemes, or such as may be joint between a number of states;
6. Approve the change of field of land use, in such maps, as may have been approved, on the part of the Council of Ministers, with the exception of public spaces and squares;
7. Monitor the performance of planning organs, in the states, and follow up the execution of the national urban maps;
8. Prepare such bills, as may achieve implementing the policies concerning urban planning and te approved residential maps, and coordination the safeguards and laws, in the states;
9. Lay down the plans of training the engineers and planners working, in the states, and hold conferences and study courses, to raise the efficiency thereof.

The Council may delegate any of the functions and powers thereof, to the Minister.

Source: MoJ (1994)

Although it is a well-structured Council, it is not active. In reality, it is political pressure that directs the housing policy from the local communities for more houses within the large urban areas and from the local and international NGOs against removal of illegal holdings.

Summary of Chapter 8

The main ideas in this chapter may be summarized in the following points:

1. Recent research and surveys indicate that poverty in Sudan is widespread, and perhaps even growing during the period preceding the introduction of the federal administration system.
2. All of the urban land in Sudan is owned by the State. Any citizen is entitled to a plot of land and is categorized according to his/her income.
3. Leasing policies and legislations are both favor the lessees. Owners can hardly change the historic rent, and disputes around rent values can extend for years in front of courts. In addition to that, commercial insurance for the receivable rent does not exist.
4. Building Regulations lack sustainability criteria in their articles, with regards to the use of building material, room size and climate comfort, equity or gender issues.
5. The latest national statistics indicate that 49.8 % of households live in single ground-floor house and that 42.7 % of Sudan population live in huts. Of the total households, 55.6 % of urban inhabitants do not have on-site sanitation.
6. Within the residential areas, construction and occupation levels are not coping with housing demand. This may be attributed mainly to the high cost of building materials and week real estate income tax policies.
7. Although there are well-structured institutions for planning, planning in housing sector could be characterized as an ad hoc. In reality, it is the political pressure that directs the housing policy.

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- Chapter 9 -

Planning Environment and the Challenge for Sustainability in Metropolitan Khartoum

9.1 Demographic Development

Founded in 1821 as a military outpost of the country that was conquered by Egypt in 1820/21, Khartoum went through a rapid development in the subsequent decades. On the one hand, this was caused by the relocation of the seat of the government in 1823 from Wad Medani, located farther upriver on the Blue Nile, to Khartoum. On the other hand, various caravan routes crossed in this place, and from here many European explorers embarked on their expeditions of discovery into the heart of Africa. These developments supported a population growth to approximately 50,000 in 1870, which made Khartoum the largest settlement in eastern Sudan within a very short period of time, although European travellers often spoke negatively about the unhealthy region and the destitute furnishings of huts mostly built of clay.

The settlement experienced a first turning point in 1885, when it was captured by the religiously motivated state of Mahdi, and lost both its function as the capital and all of its surviving inhabitants to the adjoining Omdurman. But in 1898, after the collapse of the Mahdist centre in Omdurman, Khartoum was reconstructed with square residential areas traversed by straight diagonal streets and became once again the capital of the rebuilt Anglo-Egyptian province.

Very soon, there was a considerable population growth, and in 1900 approximately 23,000 people lived again in Metropolitan Khartoum, including Omdurman, Khartoum North and Khartoum city. During the Anglo-Egyptian rule, the city experienced a genuine growth boom. Uninfluenced by the two World Wars,

this boom led to a more than tenfold increase of the population to 253,000 inhabitants by 1956, the year of independence of Sudan from Britain.

In the following three and a half decades, the growth quickened appreciably, and at the so far latest census in 1993, Khartoum had almost 925,000 inhabitants and North Khartoum approximately 880,000. Omdurman, with more than 1,267,000 residents, has become the first city of the Sudan.

9.2 'Metropolitan Khartoum' City Form

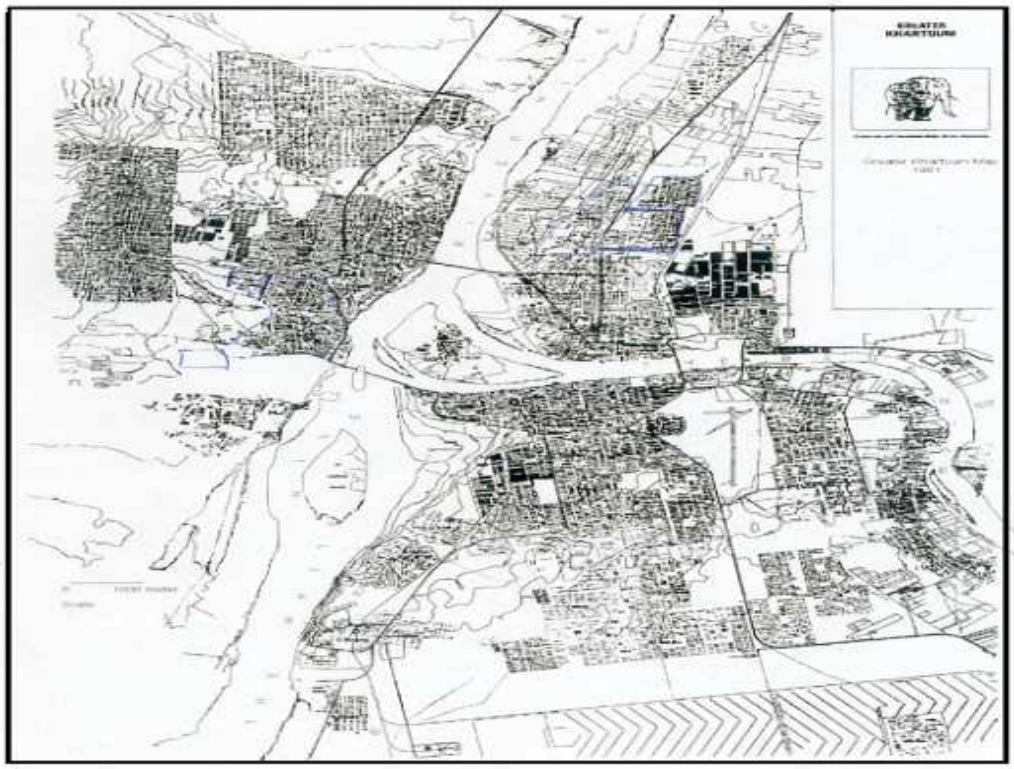
Metropolitan Khartoum, which comprises Khartoum, Khartoum North and Omdurman, has an area of 22,000 sq. kilometers. It is located at the point where the White Nile, flowing north from Uganda, meets the Blue Nile, flowing west from Ethiopia at 15°35'17" North, 32°32'3" East (Map 9.1). Low scale one-storied houses stretch out for miles in all direction from the river junction that has given the capital its name. The population of Metropolitan Khartoum had grown from 1.8 million in 1983 to 3.5 millions in 1993, amounting to an average annual growth rate of 6.56 % (Population Census, 1993). In 2005, Metropolitan Khartoum had an estimated population of more than 6 million inhabitants.

The Metropolitan Khartoum city form has changed completely in the period 1981-1993. Before 1980 it was, comparatively, a well-configured city form (Map 9.2). The population change that took place after the 1980s has affected much of city shape and has turned it into a sprawl (Map 9.3).

Map 9.1 - Sudan Map with Khartoum

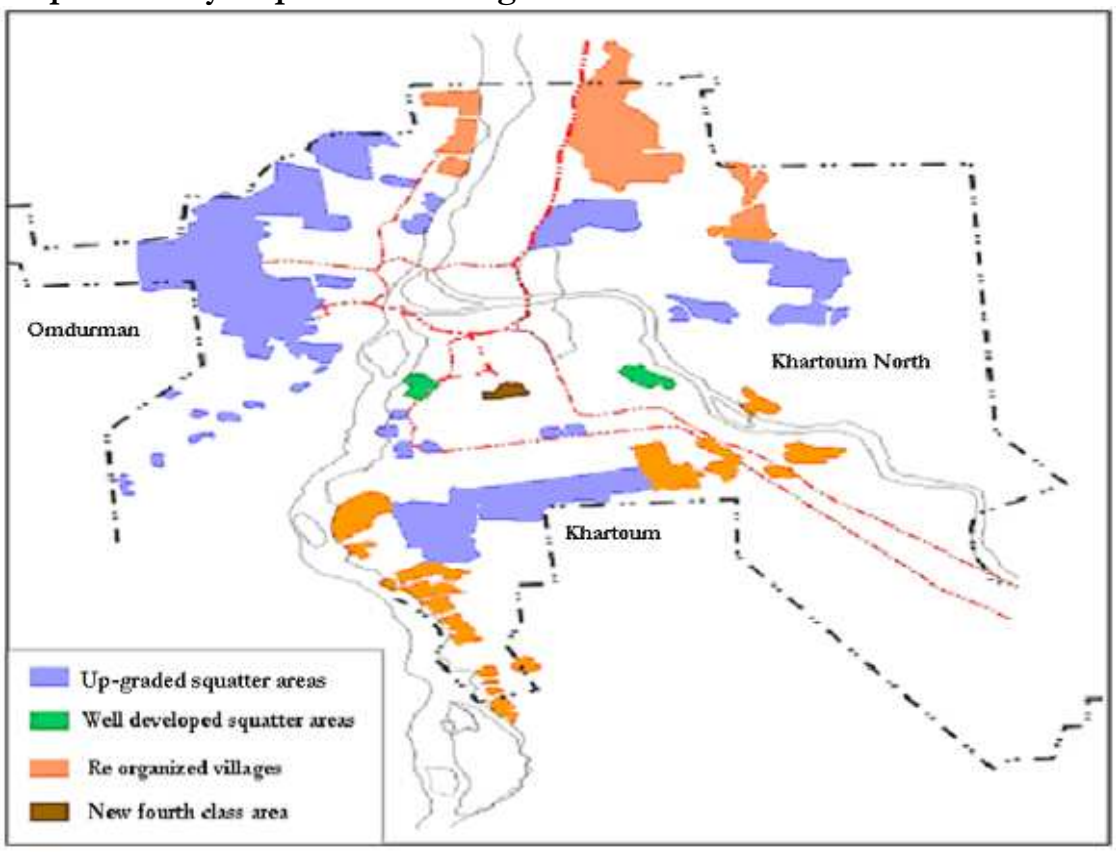
Source: Wikipedia (2006)

Map 9.2 - Metropolitan Khartoum City Form in 1981



Source: Ministry of Physical Planning and Public Utilities, Khartoum State

Map 9.3 – City Expansion During the 1990s



Source: Provided by Suzan Khir, MPPPU, Khartoum State

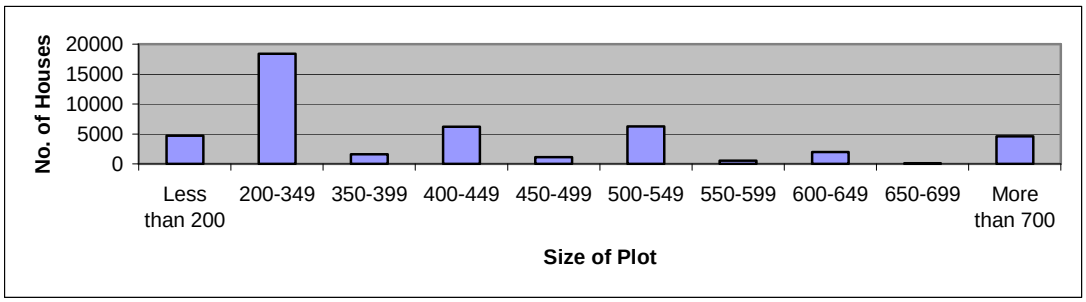
The overall density of Metropolitan Khartoum is 53 persons per hectare in 1993. This situation is the result of the existence of large open areas within the city limits such as the national airport and military areas. The practice of utilizing large residential plots with considerable open spaces has also contributed to low-density development (Bushra, 1997).

Gross urban density in Metropolitan Khartoum in 1993, obtained by eliminating from the calculations all non-urban land uses, was estimated at around 115 persons per hectare (Population Census, 1995). Net residential density, that is counting only areas used for residential purposes, may then be assumed to be around 220 persons per hectare or 6.1 persons per household.

The population density in Metropolitan Khartoum was estimated in 2004 at about 163 persons/km². When compared to international rates these densities are very low (Ahmed, 1998).

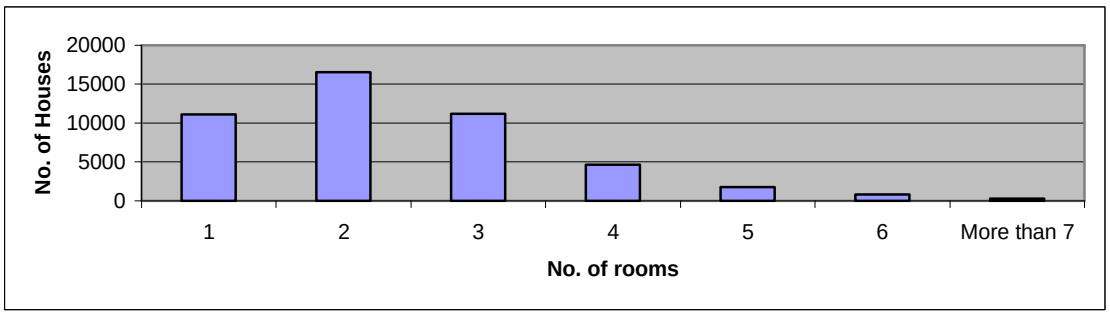
Statistics concerning housing conditions in Metropolitan Khartoum reflect that in-house density is high within 3rd class residential areas, in relation to plot size and number of rooms (Figures 9.1-2) (Pictures 9.1-2).

Figure 9.1 - Households Size of Plot (in sq. meter)



Source: Estimated by the author according to census in Omdurman Locality in 2003

Figure 9.2 - Household Buildings' Density in Residential Areas



Source: Estimated by the author according to census in Omdurman Locality in 2003

Picture 9.1 – Low-density Sub-urban Form in a 3rd Class Residential Area

Source: Photo by Omer Algeli

This situation of visual in-rooms crowding refers back to the existence of limited number of rooms within every housing plot border. Within 1st class residential areas population density is relatively low (Picture 9.2).

Picture 9.2 - Low-density Inner City Form in 1st Class Residential Area

Source: Photo by Omer Algeli

The number of multi-floor, multi family buildings is limited. Most of the flats in the existing compact form are relatively small in size, where cooling instruments could not be avoided. But the compact form for commercial activities is common (Picture 9.3).

Picture 9.3 - Buildings Design in Metropolitan Khartoum (October, 2005)

a) A compound of new multi-families, multi-floors

b) Units for commercial usage in the new extensions

Prior to 2003, the state was divided into 25 localities (a mixture of municipal, town and rural councils). In 2003, the 25 localities were amalgamated to form seven localities: 3 localities in Omdurman city; 2 localities in Khartoum, and; 2 localities in Khartoum North.

The climate of Metropolitan Khartoum is hot and dry with very high peak daytime temperatures, low humidity, large daily temperature swings, low cloud cover and low rainfall. The difference between summer and winter can be marked, with cooler conditions and some rainfall in the winter season. The traditional measures for comfort in this climate include protection from hot dusty winds and heavyweight building materials that delay and reduce the transmission of temperature peaks to the interior of buildings. Enclosed patios with vegetation also provide natural cooling, using water evaporation, and providing shade, and conserving the cooled air within controlled and enclosed outdoor spaces.

9.3 The Economic Situation and the Informal Sector

Metropolitan Khartoum, with 26% of national population (1993 census) and a growth rate that is triple the national growth rate of 2.6 % is the largest city in Sudan. The national migration and labor survey in 1996 shows that about 4 million people move seasonally in search of work. Government reports (unpublished) estimate the percentage of the informal sector in Khartoum to be around 65 % of the Metropolitan Khartoum labor force.

The situation of the urban economy, being in a shrinking situation, coupled with over employment has compelled policymakers to maintain salaries at a fixed level, thus compelling even formal employees to seek jobs in the informal sector, especially benefiting from the fast growing commercial sector. This is because the liberalization policies that have recently been adopted have led to the congestion of markets by

goods and commodities far beyond the capacity of the local market distribution network.

Due to the absence of manufacturing industries and the stagnation of public sector employment, an explosive growth has occurred in the small–scale enterprise sector. This sector comprises a wide variety of small enterprises such as grocery shops, textile shops, tailors, blacksmiths and carpenters. Most of these activities are small in terms of the number of people employed.

The position of women is typical to that in most cities in sub-Saharan Africa, which implies that a significant proportion of the total economic activity takes place within households. Women, because of their responsibilities for running the household and taking care of the children, are strongly oriented to their own neighborhood. Consequently, they place specific demands on the arrangement of their house and their district as well as on the infrastructure and social services available at the local level (Moser and Peak, 1987; Muller and Plantenga, 1990).

Whereas affluent households can rely on money for the satisfaction of their needs, disadvantaged households depend heavily on non-market relationships for the securing of their livelihood. As in most cities in sub-Saharan Africa, mainstream development thinking tends to ignore these non-market relationships – i.e. the domestic work performed by women, non-waged family workers and the mutual aid between friends, kin or neighbors (Folbre, 1986). However, market activities cannot be abstracted from other forces that shape a household's destiny. This is especially true in situations of poverty and economic decline when people are increasingly forced to take refuge in non-monetary methods of coping with contingencies.

9.4 Internally Displaced Persons

The rapid assessment of health and the nutrition situation in Internally Displaced Persons (IDP) settlements and peripheral settlements in Metropolitan Khartoum in

2005 has estimated that there are 325,000 IDP living in four official camps with an additional 1.5 million distributed in different squatter and peripheral areas. The first IDP arrived in the mid eighties from Kordofan and in the late eighties from the South (Rapid Assessment, 2005).

Two years ago, the situation in the IDP camps was stabilized. The majority of international NGOs decided to withdraw, and handed over their activities to local NGOs. This situation could create a destabilisation of the health status during the period necessary to recreate correct sanitary conditions and an acceptable coverage of the population by health facilities. With the peace agreement between the North and South, the return process could be envisaged and must be prepared for in the IDP settlements (ibid).

9.5 Land Prices and Construction Costs

Within the residential areas, land prices and construction cost vary between 1st class, 2nd class, and 3rd class residential areas[2]. The government is responsible for the spatial planning and provision of basic facilities. Every plot is priced according to its residential class. After purchasing the plot, people themselves have to construct their own homes, which must satisfy certain minimum standards.

Land brokers estimate land prices within Metropolitan Khartoum between 4000[3] Sudanese Dinars (SDD) and 100,000 SDD on average per sq. meter. These estimates are based on market value as of April 2005[4]. Construction costs are estimated at between SDD 4,500 and 50,000 on average per sq. meter, within the residential areas,

[2] The first, second and third class residential areas differ from each other in terms of plot size, construction standards and level of services.

[3] 1 USA Dollar = 250 SDD in April Prices of 2005.

[4] In Governmental Housing Projects, plot's nominal prices are less than SDD. 400 000.

1st – 3rd class. A great deal of this cost is attributed to national and local taxes on building materials. Table 8.1 shows the cost of some building materials.

In low-cost housing projects of site and service housing plans that are implemented by Metropolitan Khartoum for the urban disadvantaged, the average price of a house in 2003 (SAHA, 1994) is 2,500,000 SDD in the 1st class residential areas, 1,500,000 SDD in the 2nd class, and 8000 SDD in the 3rd class residential areas.

Table 9.1 - The Cost of Building Materials (prices of April 2005)

Item	Unit of measurement	Average Price SDD	Average Price USD
Cement	Ton	90, 000	360
Construction metal	Ton	250, 000	1000
Ceramic	Sq. meter	3, 000	12
Bricks: Size (10 x 25x 5 cm.)	1000 bricks	90, 000	360
Mud	Cubic meter	1, 500	6
Straw	Sq. meter	750	3

Source: Collected by the author

9.6 Urban Infrastructure in Khartoum

Located in the centre of 1,750 km of navigable water streets on the junction of the two rivers of the Nile, Khartoum is the most important inland port of the country, but only for regional purposes. International shipping connection is provided by the two deepwater ports of Suakin and Port Sudan on the Red Sea. Khartoum is connected to the latter both by a 850 km long oil pipeline and by one of the currently three long-distance asphalt routes of the country. One of the two other asphalt roads goes northwards along the Nile to Atbara, and the other one traverses the steppe to the west, to el-Obeid.

The railway and the inter-urban buses, which lose more and more in importance, provide for an additional connection of the province with the capital and there is hardly any private transport yet. The only international connection of Khartoum is the airport, which was built at the beginning of the 1940s.

Since the 1990s, there has been increased investment in modern communication technology in an effort to connect successfully to the industrialised world. In this connection, the Sudanese company for Communication was founded in 1994. Its primary task is to offer various communication services.

9.6.1 Water supply

Khartoum State Water Corporation (KSWC) is fully responsible for providing a supply of drinking water throughout the state – including informal settlements. The Khartoum water supply system consists of 6 water treatment plants, 884 boreholes and water yards, 612 hand pumps, 2 small dams, 127 local water reservoirs and over 200 open wells.

Table 9.2 - Water Supply in Khartoum in 2004

Locality	Population	Demand Cubic meter	Supply Cubic meter	Deficit Cubic meter
Khartoum	900,000	206,800	157,150	49,650
Gebal Awlia	1,490,000	145,115	54,222	90,893
Ombada	1,302,586	128,260	51,086	77,184
Omdurman	39,300	112,425	89,400	23,025
Karary	520,320	133,460	104,250	29,210
Bahry	593,800	138,809	114,750	24,059
Sheriq Anil	1,184,000	220,500	142,050	78,450
Total	6,383,706	1,085,369	713,898	373,471

Source: Unpublished reports, Khartoum State, 2004

Demand for water is estimated at 1,085,369 cubic meters whereas supply capacity of Metropolitan Khartoum is 713,898 cubic meters (Table 9.2).

In the informal settlements the main water supply is a water yards system. In this system, borehole water is pumped from an underground aquifer 300-500 feet deep. An electric or mechanical pump is used for pumping water into an elevated tank, which is connected to stand pipes from which people can collect water.

The monthly expenditure on water of 3,650 SDD was found to represents 9.2 % of the total household monthly income. In case of water shortages due to breakdown of facilities, water prices increase by 150 % while household consumption drastically decreases to 54 % of the normal consumption. Consumers also include small business owners like restaurants, tea sellers, local alcohol brewers and small dairy farm owners.

Government strategy to improve water supply

As a short-term strategy, the government of Sudan has put the following programs to improve water finance capabilities to meet the increasing demand in drinking water:

- To ensure secure and sustainable water supply services, water charges to be based on full cost recovery at least for urban areas and based on proper metering of consumption to ensure equity.
- Encourage private sector to invest in water supply projects.
- Encourage beneficiaries and communities to participate in the implementation, operation and management of water resources.
- Enact water laws and regulations to protect and regulate water resource utilization.
- To extend the use of recycled and raw water for watering trees, gardens and public parks.

- Support research in efficient management and conservation of water resources and carry out assessment and protection of both ground and surface water resources.
- Decentralization of water authorities to lower administrative levels
- Engage donors and UN agencies in capacity building, planning and funding of various water supply programs.
- Create a separate and competent authority for sanitation with connections to similar authorities at State, Locality and village levels.

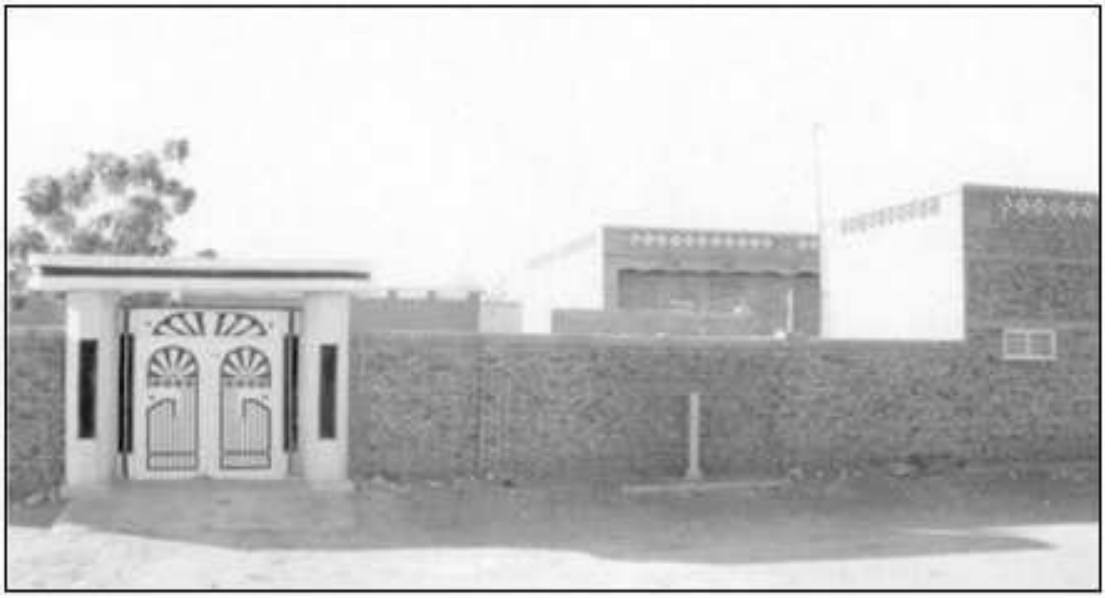
9.6.2 Sanitation services

Sanitation services were established in Khartoum in 1953-54 with a total network of 146 kilometers and with assistance of 13 pumping stations to serve 80,000 people. Since then, no major development has ever been implemented to meet population growth. For this reason, almost all households depend on in site projects (Picture 9.4). Technologies used by the households vary from one place to another according to their income.

9.7 Planning Authority in Khartoum

Physical planning in Metropolitan Khartoum is the responsibility of the Ministry of Physical Planning and Public Utilities (Figure 9.3). It is exercised by the Khartoum State Physical Planning Committee. This Committee is constituted by a decision of the State's Governor, upon a recommendation therefore, by the Minister of Physical Planning and Public Utilities at Khartoum State; provided that regards, in the same, is representing the bodies having connection, and there is included therein, a number of members of those possessed of experience in the field of urban planning (MoJ, 1994).

Picture 9.4 - On Site Sanitation Project



A common scene for a house using on - site sewage system

Photo by Omer Algeli

Figure 9.3 - Administrative Structures for the MPPPU

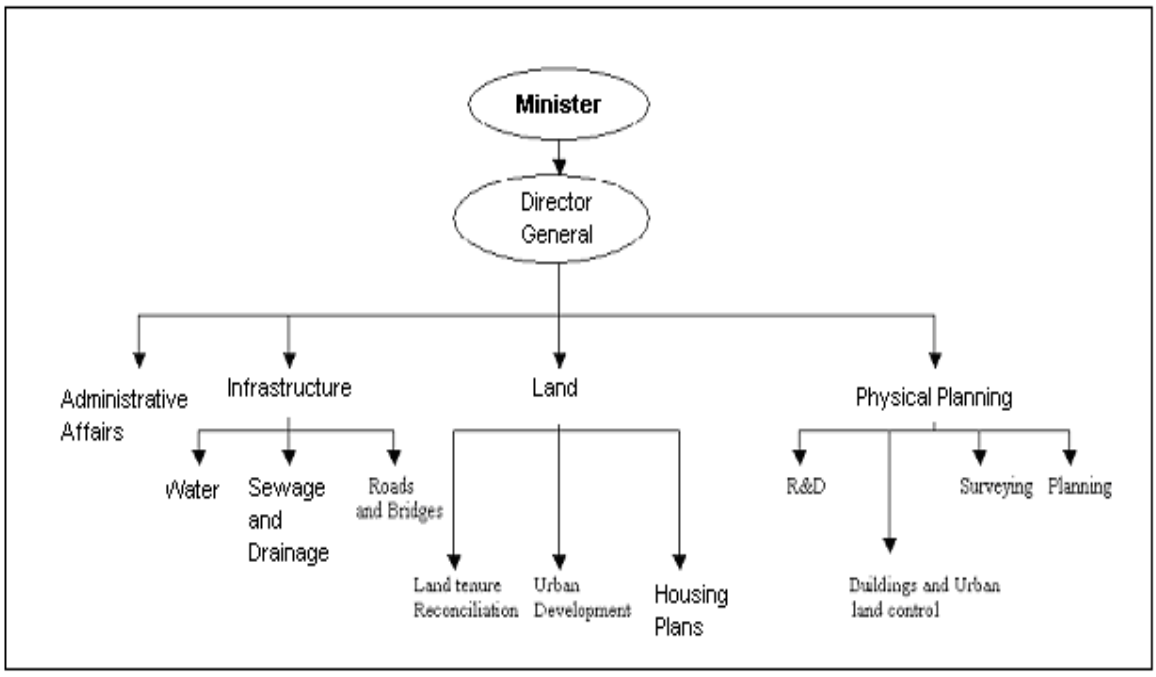


Table 9.3 - Membership of Khartoum State's Planning Committee

The committee is chaired by the Director-General of the MPPlPU and consists of the following:
1) Directors of the following departments at the ministry:
Physical planning
Land tenure
Surveying
Roads and Bridges
Building and urban development control
Director of the structural plan office
2) Two qualified persons (Academic career)
3) Consultant
4) General Registrar of land (from the judiciary)
5) Director general of state ministry of agriculture
6) Representative for traffic police force
7) The legal Advisor (from attorney general)

Source: MoJ (1994)

9.8 Planning Projects in Metropolitan Khartoum

Four large-scale planning projects have been implemented in Khartoum during the twentieth century. They are: Mc Clean Plan, 1912; Doxiadis Plan, 1960-80; MEFIT Plan, 1975-90; and, Doxiadis Associates and AM Mustafa, 1990-2000 (KPP-05).

The Mc Clean Plan, 1912, was the fist plan for Khartoum. It was fully implemented despite difficulties with qualified and skilled manpower and financial resources. The Doxiadis Plan, the second plan, was officially approved in 1960 and consequently implemented by constructing new roads and two bridges with enlargement of the old bridge over the White Nile (Map 9.4). A few villages were incorporated into the urban fabric as demand for residential land and other land uses grew.

Table 9.4 - Function of Khartoum State Physical Planning Committee

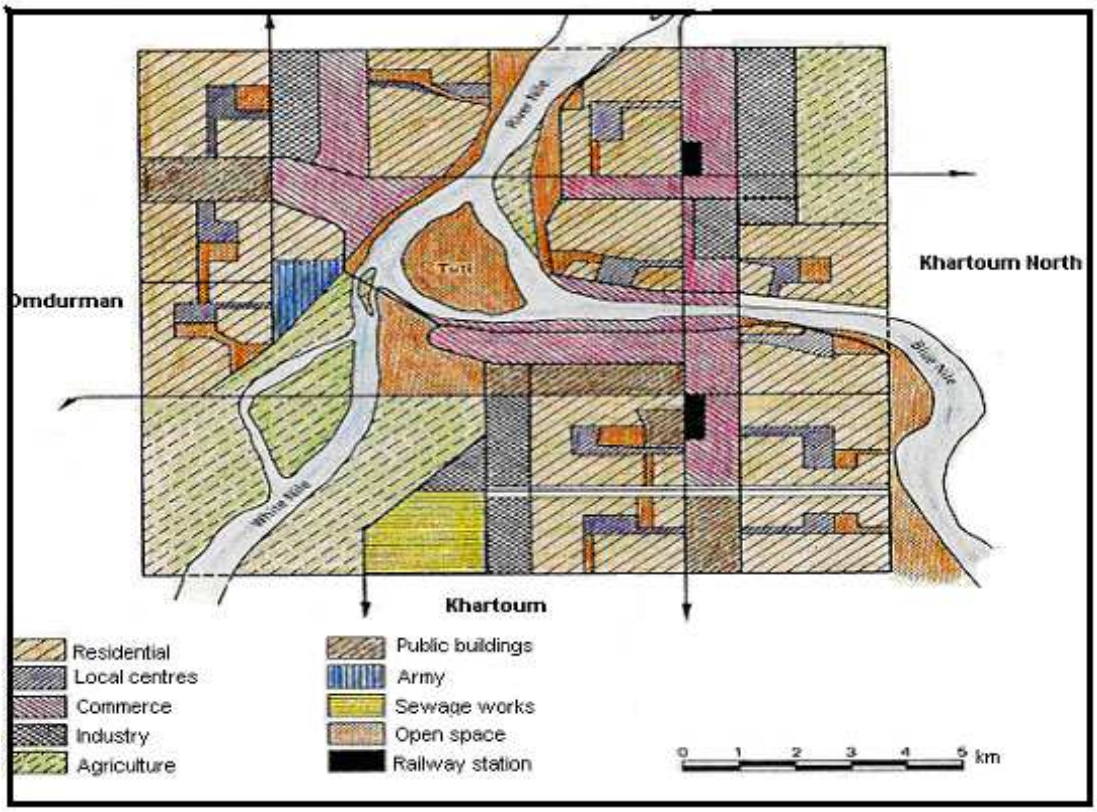
The Committee has the following functions and powers:

1. Prepare the general policy of urban planning and housing, and the bases of land allotment and use, in the state, in integration and harmony with the national economic and cultural development plans;
2. Approve the plans of urban schemes, maps and structures directing the development of towns and villages, at the state level, upon the approval of the Minister;
3. Approve the elaborate planning for use of vacant and constructed land, within the framework of the approved directive maps;
4. Prepare the residential schemes, in the state;
5. Approve the urban structure and elaborate planning of settlements and residential groups connected with the major development schemes in the state;
6. Approve the structures of the schemes of re-planning and enhancement of the environment and maps and budget thereof, with respect to urban planning in urbanized areas and monitor execution thereof;
7. Grant the construction permit, and specify such areas, as in which buildings of multi-floors may be allowed, and specify the number of floors and the various purposes thereof, and the safeguards accompanying such permit;
8. Allot, upon the approval of the Minister, the site and purpose of land use, in planned and non-planned areas;
9. Approve the basic changes of land use, for the various purposes, and change of purpose in urbanized and planned areas;
10. Approve the change of use of public spaces and squares, for any purpose, where necessity requires the same;
11. Specify the class of any land, the class of which has not been previously specified, and amend the class of any land, the of which has previously been specified;
12. Determine the applications presented by persos, public institutions and corporations and government departments with respect to the fields of urban planning;
13. Approve the maps of transport schemes, which are prepared by the competent bodies, and specify the parks of public transport in towns;
14. Lay down the safeguards:
15. For protecting the buildings and areas having architectural and historical importance;
16. Concerning permitting the establishment of commercial and occupational sites, in newly, or old urbanized residential quarters, whether owned by leasehold, or freehold, in the various residential quarters and classes thereof;
17. Constitute subsidiary planning committees, and specify the functions and powers thereof, in accordance with the regulations made thereby, upon the approval of the Minister.

Source: MoJ (1994)

It is estimated that the overall performance of the plan did not go beyond 40 % as the plan has failed to anticipate growing waves of population. Also, the decision of the Central Town Planning Board of doubling and tripling plot sizes and numbers caused a critical failure in meeting service and infrastructure supply. Further, failure to implement the major relocation proposals of the railway station, the airport and the army barracks has exacerbated planning deficiencies, and, coupled with financial and administrative decisions, left possibilities for the government for a fresh planning exercise for Metropolitan Khartoum.

Map 9.4 - Doxadis Master Plan, 1959

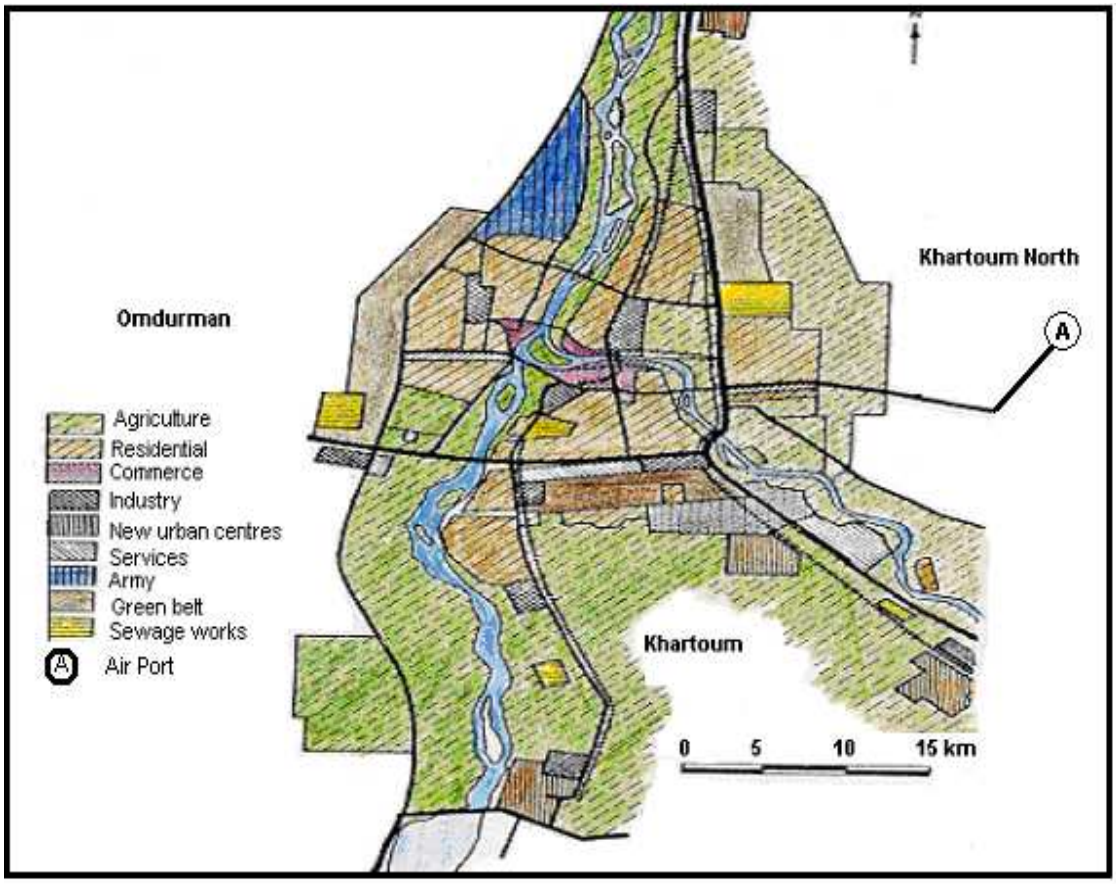


Source: Ministry of Physical Planning and Public Utilities, Khartoum State

The MEFIT Plan was the third plan and although the plan was not approved officially (mainly due to administrative shortcomings) its orientation and recommendations

continued to guide the planning of Khartoum for two decades (Map 9.5). It is estimated that the plan's overall performance is only 20 %. The main obstacle that hampered the performance includes the general weakness of the executive planning institutes, lack of project finances, political instability and the conflagration of squatter settlements in an un-preceded wave of rural urban migration.

Map 9.5 - Mefit Master Plan, 1977



Source: Ministry of Physical Planning and Public Utilities, Khartoum State.

Doxiadis Associates and AM Mustafa, the fourth plan, was presented to the Council of Ministers and it is estimated that the plan performance was only 15%. It is somewhat paradoxical that the plan remains un-implemented, yet more actions and projects than in the structure plan have actually been executed. Perhaps the reasoning

behind having a 'Structure Plan' rather than a rigid Master or a set Development Plan is after all what was needed (KPP-05).

All of the above plans have suggested the removal of the large scale governmentally owned holdings from the city center. The large holdings include: the airport, the military areas and the military camps.

9.9 Khartoum Planning Project-05

This is a new plan and an invitation for tender was issued during 2005 for local and international consultants to propose their capacity to carry out this task.

According to the invitation book the plan is expected to consider demographic changes for a horizon of 20 years. The structural plan will be for 10 years and subject to monitoring and evaluation programs. Monitoring and evaluation will be effective every 5 years during the implementation phase, and can suggest changes in local plans. Table 9.5 shows the ToR for this plan.

From Table 9.5, it can be seen that planning work was left completely to the consultants who are going to formulate the plan. According to the ToR, the consultants have to establish the measures against which they are going to design Khartoum Plan 5. The new plan is expected to include parts related to: city form, urban infrastructure techniques, transportation systems and monitoring programs.

The governor of Khartoum State, the Ministry of Physical Planning and Public Utilities, and local research institutes are all working together on this plan. The UN-HABITAT office in Khartoum is expected to provide some assistance for this project.

Table 9.5 - Terms of Reference (ToR) for Khartoum Planning Project-5

The ToR for the Khartoum Planning Project-05 (KPP-5) are envisaged as follows:

1. Structuring and/or restructuring, streamlining and balancing the space- activity-infrastructure systems of Khartoum at the regional, sub-regional and urban levels, to provide for and guarantee a balanced and sustainable urban and regional processes targeting human welfare and social development ramified in land-use, infrastructure, services and economic affordability.
2. To combine scientific, professional and IT techniques with developmental insight to put forward practicable, manageable and affordable scenarios, propositions and proposals for quantification, predication, allocation, designation and location of the various components of the space-activity-infrastructure systems of Khartoum.
3. To formulate and designate coordinated and ordered project packages as logical derivations of the structuring/restructuring streamlining/balancing process of the space-activity-infrastructure systems of Khartoum. Such packages are to be studied and described up to their basic technical and financial strategies and implementation procedures in overall coordinated and systematic approach. Actual designs and detailed programs will later be based on these, but not included herewith.
4. To formulate and set out a carefully and judiciously worked out implementation program for KPP in which the project packages are temporally, financially and institutionally allocated and coordinated.
5. To propose, formulate and establish a system and related procedures for: a) Plan performance monitoring; and, Plan updating and review.
6. The KPP, in setting out the overall terms of reference, envisages the Project components in the subsequent key-word formulation. While the Project components areas are here below listed it should not be construed as a minimum or a maximum content but rather as indicative to the extent that any given component may include. The consultant is advised that the significance of including a component and its elements as well as the depth and extent of treatment will be judged by its interactive capacity with other components, its contribution to the overall balance of the plan and the subsequent projects derivation.

Source: KPP-5

Summary of Chapter 9

The main ideas in this chapter may be summarized in the following points:

1. Khartoum has a population of approximately 5,250,000 persons, with a population density of about 163 persons per square kilometre.
2. Statistics concerning housing condition in Metropolitan Khartoum reflects that in-house density in poor areas is high in relation to plot size and number of rooms.

3. The Climate of Metropolitan Khartoum – in general - is a hot dry climate with very high peak daytime temperatures, low humidity, large daily temperature swings, low cloud cover and low rainfall.
4. Due to the absence of the manufacturing industries and the stagnation of public sector employment, an explosive growth has occurred in the small–scale enterprise sector.
5. Land prices within Metropolitan Khartoum are around 300 USD per square meter on average. While construction cost is estimated around 4000 USD per square meter on average.
6. A great deal of the construction cost is attributed to national and local taxes on building materials.
7. Deficit in water supply is estimated at more than 30%. Personal spending on drinking water represents 9 % of the personal income.
8. In case of water shortages, water prices increase by 150 % while household consumption drastically decreases to 54 % of the normal consumption.
9. Almost all of Khartoum households depend on on-site sanitation systems.
10. All of the master plans after independence have suggested the removal of the large scale governmentally owned holdings from the city center.
11. A new plan for Metropolitan Khartoum is under process.

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- Chapter 10 -

Acceptability of the Compact Form in Metropolitan Khartoum

Background

This chapter consists of two parts. The first concerns the attitudes of Metropolitan Khartoum inhabitants and is based on an empirical study conducted by the author for the Ministry of Physical Planning and Public Utilities in Khartoum State in 2001. The second part, concerning the attitudes of investors/contractors and decision–makers about the compact form, is based on recent interviews and group discussions by the author with local investors and decision makers.

10.1 The Attitudes of The Inhabitants

The Metropolitan Khartoum built-up area, with a relatively low aggregate population density, has extended to challenge the existing land use pattern of the city. The cost of urban infrastructure is high, which makes it unaffordable when related to current income levels. Optimal population density, within a sustainable city reform, is targeted in the empirical study with the objective to improve Metropolitan Khartoum land use and to reduce infrastructure cost per capita. To plan for a compact housing form of high population density, decision makers need to know about the feasibility and acceptability of the compact form as a preliminary step before going further into implementation.

The main objectives of the empirical study were to: measure inhabitants' acceptance of the compact form of living; collect the views of the different income-

earning households about their visions to resolve the problem of infrastructure supply, and; calculate the actual cost of physical infrastructure in terms of the inhabitants' willingness to pay for water and sanitation.

The material used is based on interviews with key informants from the Ministry of Physical Planning and Public Utilities and private consulting companies working with the ministry. A pre-constructed questionnaire for 500 households was also distributed among different income categories of the city (Appendix II). A general discussion through two seminars was organized about the research problem and empirical study outcomes.

The primary data has been collected through a pre-structured questionnaire with 500 households. It provides information from different income earning households from the old city on: the acceptance of the compact form of living, their willingness to pay for urban services of water and sanitation and, the different income-earning households' possible solutions to resolve the problem of infrastructure supply. The old city consists of some parts of Omdurman, Khartoum and Khartoum North.

A cluster sample from Metropolitan Khartoum neighbourhoods has been selected, taking into account the difference in economic and social conditions among/between the different parts and categories of the city. The selection of the best representative areas has been done in collaboration with key informants at the Ministry Physical Planning and Public Utilities (MPPPU). The key informants are: private consultants; the previous chief planner at (MPPPU); the Director of Housing and Construction Department; the Director of the Surveying Department, and; the Director of the Department of Planning. They worked through a committee appointed by the general director of MPPPU for the purpose of this report (Bushra, 2001).

The pre-structured questionnaire was distributed among the different parts of the old city proportionally according to current estimates of the population. The various

categories of houses were classified as ground floor or multi-floor whereas families were classified as single family, extended family or multi-family.

The questionnaire consisted of open-ended questions to allow for obtaining new and creative ideas from the inhabitants. Later on, their answers were classified into groups for analysis. The Statistical Package for Social Sciences software program (SPSS) has been used in data analyses.

The study provides the following results:

- Although personal incomes level for most of the households is high, 55 % of the sample, rates payable by them to the local authorities were found within the lower level, 53% of the sample (Table 10.1-2)
- Although infrastructure use prices for water and sanitation were considered high, the inhabitants were found willing to pay more than what they were actually paying to improve the quality of services. Their willingness was attributed mainly to the cost of the economic consequences of poor provision of urban services (Appendix III).
- Due to the inhabitant's perceived idea of the current conditions of the compact form, most of those, 78 %, who live in other typologies stated that they prefer their current forms (Table 10.3).
- The inhabitants' attribute their reluctance to the prevailing compact form to technical problems related to typologies (Tale 10.4). 44.8 % of the inhabitants attribute the problems of the compact form to the flat size and design (Table 10.5).
- The inhabitants were found willing to accept the compact form in the future if the problems associated with it would have been dealt with and solved (Table 10.6).

Table 10.1 – Distribution of Interviewed Households' Personal Income/Residential Class

Area			Households' Personal Income/month (000) SDD			Total
			<25	**25 - 50**	**50<**	
1st class	Khartoum	count	1	4	47	52
		%	0.2%	0.8%	9.4%	10.4%
	Omdurman	count	0	11	29	40
		%	0%	2.2%	5.8%	8.0%
	Bahry	count	5	12	28	45
		%	1.0%	2.4%	5.6%	9.0%
2nd class	Khartoum	count	0	16	37	53
		%	0%	3.2%	7.4%	10.6%
	Omdurman	count	8	19	21	48
		%	1.6%	3.8%	4.2%	9.6%
	Bahry	count	12	17	34	63
		%	2.4%	3.4%	6.8%	12.6%
3rd class	Khartoum	count	13	23	31	67
		%	2.6%	4.6%	6.2%	13.4%
	Omdurman	count	10	33	29	72
		%	2.0%	6.6%	5.8%	14.4%
	Bahry	count	7	35	18	60
		%	1.4%	7.0%	3.6%	12.0%
TOTAL		count	56	170	274	500
		%	11.2%	34.0%	54.8%	100.0%

NB. 1\ The personal income for a household includes: direct salary/ies plus additional money receivable from private investments or as assistance.

2\ Khartoum North city is also known as Bahry city.

Table 10.2 - Rates Payable to Local Authorities/Residential Class

Area			Rates Payable (000) SDD				Total
			0 - 2	2,1 - 5	5,1 - 10	10,1 and more	
1st class	Khartoum	count	19	4	12	17	52
		%	3.8 %	0.8 %	2.4%	3.4 %	10.4 %
	Omdurman	count	15	8	7	10	40
		%	3.8%	1.6	1.4	2.0 %	8.0 %
	Bahry	count	16	17	3	9	45
		%	3,2%	3,4%	0,6%	1,8%	9,0%
2nd class	Khartoum	count	23	9	4	17	53
		%	4,6%	1,8%	0,8%	3,4%	10,6%
	Omdurman	count	29	9	6	4	48
		%	5,8%	1,8%	1,2%	0,8%	9,6%
	Bahry	count	30	23	3	7	63
		%	6,0%	4,6%	0,6%	1,4%	12,6%
3rd class	Khartoum	count	46	16	3	2	67
		%	9,2%	3,2%	0,6%	0,4%	13,4%
	Omdurman	count	50	17	3	2	72
		%	10,0%	3,4%	0,6%	0,4%	14,4%
	Bahry	count	38	8	8	6	60
		%	7,6%	1,6%	1,6%	1,2%	12,0%
TOTAL		count	266	111	49	74	500
		%	53,2%	22,2%	9,8%	14,8%	100,0%

Table 10.3 - Inhabitants' Preferences: Current Vs. Compact form

		Area									Total
		Krt. 1st cls	**Omd. 1st cls**	**Bahri 1st cls**	**Krt. 2nd cls**	**Omd. 2nd cls**	**Bahri 2nd cls**	**Krt. 3rd cls**	**Omd. 3rd cls**	**Bahri 3rd cls**	
Not Valid*	Count	23	7	7	15	3	2	3	3	7	**70**
	%	4.6 %	1.4 %	1.4 %	3.0 %	.6 %	.4 %	.6 %	.6 %	1.4 %	**14.0 %**
Better	Count	29	36	36	31	39	60	58	63	47	**391**
	%	5.8 %	7.2 %	7.2 %	6.2 %	7.8 %	12.0 %	11.6 %	12.6 %	9.4 %	**78.2 %**
Not Better	Count	0	2	2	7	6	1	6	6	6	**39**
	%	0	.4 %	.4 %	1.4 %	1.2 %	.2 %	1.2 %	1.2 %	1.2 %	**7.8 %**
Total	Count	52	45	45	53	48	63	67	72	60	**500**
	%	10.4 %	9.0 %	9.0 %	10.6 %	9.6 %	12.6 %	13.4 %	14.4 %	12.0	**100 %**

NB:

* This question about the inhabitants' preferences is not valid for those who live in compact forms. Counts and percentages appears in this row represent those whose answers are no longer valid.

From the above schedule, 78.2 % of the inhabitants responding say that their current form of living is better than the compact form.

Table 10.4 - Inhabitants attitudes toward the compact form of living

Attitudes		Krt. 1st cls	Omder. 1st cls	Bahri 1st cls	Krt. 2nd cls	Omder. 2nd cls	Bahri 2nd cls	Krt. 3rd cls	Omder. 3rd cls	Bahri 3rd cls	Total
Safe	Count	6	4	3	4	8	1	4	5	9	44
	%	1.2 %	.8%	.6%	.8%	1.6%	.2%	.8%	1.0%	1.8%	8.8%
Size not enough	Count	13	7	9	9	10	17	13	13	13	104
	%	2.6%	1.4%	1.8%	1.8%	2.0%	3.4%	2.6%	2.6%	2.6%	20.8%
Solve housing problem	Count	14	16	5	25	2	25	27	28	19	161
	%	2.8%	3.2%	1.0%	5.0%	04%	5.0%	5.4%	5.6%	3.8%	32.2%
Low privacy	Count	6	3	0	2	1	1	1	3	0	17
	%	1.2 %	.6%	0%	.4%	.2%	.2%	.2%	.6%	0%	3.4%
Modern	Count	7	2	14	9	9	9	13	11	9	83
	%	1.4%	.4%	2.8%	1.8%	1.8%	1.8%	2.6%	2.2%	1.8%	16.6%
Lack of elevators	Count	3	3	6	1	1	0	0	1	2	17
	%	.6%	6.%	1.2%	.2%	.2%	0%	0%	.2%	.4%	3.4%
Poor services	Count	2	4	3	3	6	5	3	4	4	34
	%	.4%	.8%	.6%	.6%	1.2%	1.0%	.6%	.8%	.8%	6.8%
Safe + Solution for housing problem	Count	0	0	0	0	0	1	0	1	0	2
	%	0%	0%	0%	0%	0%	.2%	0%	.2%	0%	%4.
Low privacy + Size not enough	Count	0	0	0	0	0	0	1	1	2	4
	%	0%	0%	0%	0%	0%	0%	.2%	.2%	.4%	.8%
Safe, modern+ Solution for housing problem	Count	0	1	4	0	1	1	3	4	0	14
	%	0%	.2%	.8%	0%	.2%	.2%	.6%	.8%	0%	2.8%
Size not enough + Poor services	Count	0	0	1	0	10	2	0	1	2	16
	%	0%	0%	.2%	0%	2.0%	.4%	0%	.2%	.4%	3.2%
Poor services, Lack of elevators + Low privacy	Count	1	0	0	0	0	1	2	0	0	4
	%,	.2%	0%	0%	0%	0%	.2%	.4%	0%	0%	.8%
TOTAL	Count	52	40	45	53	48	63	67	72	60	500
	%	10.4%	8.0%	9.0%	10.6%	9.6%	12.6%	13.4%	14.4%	12.0%	100%

In the above table, Table 10.4, areas are divided into classes according to the major plot size and type of technology provided within the area for urban infrastructure. For example: the major plot size in the 1st class residential area is more than 500 square meter, 400-500 sq. meter for the 2nd class, and less than 400 sq. meter for the 3rd class.

Table 10.5 - Inhabitants' visions about the factors that can encourage adoption of compact form

	Housing Category							Total
	Nuc. Family ground fl.	**Nuc. family multi-fl.**	**Ext. family ground fl.**	**Ext. family multi-fl.**	**Mult. Family ground fl.**	**Mult. Family multi fl.**	**Singles**	
Improvement in size and design	95 19.0 %	44 8.8 %	53 10.6 %	12 2.4 %	5 1.0 %	15 3.0 %	0 0 %	**224** **44.8 %**
Provision of services needed	55 11.0 %	22 4.4 %	17 3.4 %	8 1.6 %	2 .4 %	4 .8 %	0 0	**108** **21.6 %**
Decrease in flat prices	9 1.8 %	1 .2 %	8 1.6 %	2 .4 %	2 .4 %	2 .4 %	0 0 %	**24** **4.8 %**
Not answered the question*	33 6.6 %	7 1.4 %	16 3.2 %	2 .4 %	0 0 %	0 0 %	0 0 %	**58** **11.6 %**
Improvement in size and design + Provision of services needed	35 7.0 %	7 1.4 %	15 3.0 %	2 04 %	1 .2 %	0 0 %	0 0 %	**60** **12.0 %**
Improvement in size and design + prices	4 .8 %	2 .4 %	7 1.4 %	0 0 %	1 .2 %	0 0 %	1 .2 %	**15** **3.0 %**
Provision of services needed + decrease in flat prices	2 .4 %	0 0 %	2 .4 %	0 0 %	3 .6 %	0 0 %	0 0 %	**7** **1.4 %**
Improvement in size and design + Provision of services needed + Decrease in flat prices	0 0 %	0 0 %	2 .4 %	0 0 %	2 .4 %	0 0 %	0 0 %	**4** **.8 %**
Total **Count** **%**	**233** **46.6 %**	**83** **16.6 %**	**120** **24.0 %**	**26** **5.2 %**	**16** **3.2 %**	**21** **4.2 %**	**1** **.2 %**	**500** **100 %**

* Live in compact form and are satisfied.

Table 10.6 - Inhabitants' vision about their acceptability of the compact form in future (Yes/No)

	Category of housing							Total
	Nuc. Family Ground fl.	**Nuc. Family Multi fl.**	**Ext. family Ground fl.**	**Ext. family Multi fl.**	**Mult. family Ground fl.**	**Multi family Multi fl.**	**Others**	
Yes count	205	76	104	23	14	19	1	442
% of total	41.0 %	15.2 %	20.8 %	4.6 %	2.8 %	3.8 %	.2 %	88.4 %
No count	28	7	16	3	2	2	0	58
% of total	5.6 %	1.4 %	3.2 %	.6 %	.4 %	.4 %		11.6 %
Total Count	233	83	120	26	16	21	1	500
%	46.6 %	16.6 %	24.0 %	5.2 %	3.2 %	4.2 %	.2 %	100 %

Inhabitants' acceptability of the compact form if its problems would be considered and solved.

Tables 10.1 and 10.5 argue that economic factors are important as well as social factors, while tables 10.3-6 confirm the idea that current building designs, applied in prevailing compact forms of living, do not cope with the needs of the inhabitants for services, climate comfort and privacy.

Thus, the study has managed to interview households in Metropolitan Khartoum in an effort to uncover their feelings about the factors of acceptability in intensification policy. However, some criticisms could be raised about the soundness of results drawn from the empirical case study. For example inhabitants' answers might be biased by their immediate problems and their 'wishes' to have a better form of living (i.e. they are not serious answers). Possibly similar case studies from similar regions with similar transformation process could be undertaken (or found in the literature) to further test the results found here.

10.2 The Attitudes of The Investors and Contractors

Interviews with investors and contractors were conducted with 20 persons to represent the employers of the construction industries. Selection for interview was done for those who have advertisements for their business in the media or have personal contacts with the author. The study classifies these as 'investors and contractors' because it is hard to distinguish among them in real life in Sudan. Data gathered from this group includes information on their attitudes on: performance of the construction industry; institutional problems attached with it, and; the possibility of compaction in Metropolitan Khartoum.

The interviews with investors and contractors reveal that the construction industry is one of the fastest growing sectors in Sudan. During the 1990s, large numbers of engineers and businesspersons have started to reverse immigration from abroad, especially from Saudi Arabia, to establish their own businesses. The main reasons behind their decisions are: the attractiveness of the investment climate in Sudan; the deterioration of terms–of-trade that had been prevailing abroad, and; the gradual decline in exchange rates against the Sudanese Dinnars. Some contractors are now employing skilled labor from South East Asia.

The main problems in the construction industry in Sudan were found to be the serious lack in skilled labor, the high cost of building materials and the high rates of taxes imposed. Investors and contractors think that the removal of these constraints could provide major improvements in this sector.

With respect to urban intensification and the concept of compaction, investors and contractors have different opinions. Some of them agree on the idea that the compact form could reduce infrastructure cost of provision. Others argue that it could increase energy and water cost since air-cooling equipments and water pumps could not be avoided. Introduction of a compact form of living under the prevailing economic and social situations, from the viewpoints of the investors and contractors, could increase social segregation. They think that economic improvements should go hand in hand with any compaction policy.

The investors and contractors believe that national policies are more supportive to the sprawl form that depends on local buildings materials and utilizes medium skilled labor. They believe this because national policies are imposing high tariffs and taxes on imported materials and provide no training programs or technical schools for the construction sector. They think that there is no consistency between the national policies and housing needs.

Investors concluded that compaction problems are intimately connected to the construction industry. Therefore, they think that the construction industry can contribute much to the national economy if policy change is fostered to remove the fiscal and legal constrains.

10.3 The Attitudes of the Decision-Makers

Attitudes expressed in this section are those of the decision makers involved in the process at Metropolitan Khartoum. The majority of these are from the Ministry of Physical Planning and Public Utilities (MPPPU) which includes: a consultant for the

government of Khartoum State, the Head of the Planning Department at MPPPU and, in addition, some senior planners at the same ministry. They expressed their attitudes in a seminar held for the purpose of this study in January 2005. The seminar was also attended by academic professionals.

In relation to infrastructure cost of provision, the decision-makers agree largely with the idea that urban form is a determinant factor in infrastructure cost of provision and sustainability. They advance that the construction industry is important for the reconstruction process of Sudan after the recently signed peace agreement. But, conversely to the viewpoints of the investors and contractors, the consultant of Khartoum State government argues that the construction industry is growing very fast and that there are no obstacles in the way. As evidence for his point, he argues that there are many new buildings all over the city.

Senior planners argued about applicability of the compact form. They posit that the cost of building materials is not affordable to the majority of Khartoum inhabitants. They agree, however, that intensification could be realized within a long run plan, through major policy change. At the end of the discussion, they agreed that political stability could help the formulation of better housing plans in the Sudan.

PART IV

- Chapter 11 -

The Study Results

From the literature reviewed and discussed in the previous parts, it becomes increasingly clear that the urban form is necessary for city systems to function. It is also clear that urban sprawl, as a city form, is not supportive to the efficient use of resources and sustainable development. However, intensification of an urban sprawl is not sufficient for a community to draw the claimed benefits of compaction. Therefore, intensification of urban sprawl, in developing countries, should be done within a comprehensive development program. Also, intensification should be well designed, with the live-work configured properly and acceptable by the beneficiaries.

High population growth rates in Metropolitan Khartoum, urban sprawl, the high cost of infrastructure services and the fear of losing environmental quality are all pushing for a new era of city reform. Both knowledge and experience suggest that city reform is possible and that successful practices can lead us along the way through intensification processes.

The following section is introductory and relates to the benefits and opportunities that push-out towards the adoption of an intensified urban form in Metropolitan Khartoum.

11.1 Infrastructure Finance and Management

Low-cost technologies in infrastructure provision are no longer cost-effective solutions to meet the needs and demands of inhabitants in Metropolitan Khartoum. The empirical study carried out in Metropolitan Khartoum in Chapter 10 offers support to the cases of Nigeria and South East Asia, which were studied in Chapter 2.

These results suggest that provision of infrastructure services; especially water and sanitation, for urban disadvantaged should not rely much on low cost solutions if sustainable development is targeted. Neither the newly initiated finance sources nor financing tools can help introduction of sustainable infrastructure if local communities are economically challenged and the cost of provision is not affordable. For this reason intensification is important as a starting point to reduce infrastructure cost per capita, but not sufficient for sustainability because more effort needs to be expended at different households income levels.

Management practices in developing countries suggest that for Khartoum a design with higher densities and well-configured live-work communities are the only way to induce sustainable development. This is because no administrative structure, whatever its power and functions, can secure sustainable flow of services if the cost per capita is high and households are economically challenged.

Furthermore, in economically challenged-countries (as in the case of Sudan), funds for local services are placed at the button of the national list of priorities, after defense and large production projects. This, also, means that provision of services, in the long run, should be based on full cost recovery, not on unsecured flow of transfers from the central governments.

11.2 The Factors that Shaped Metropolitan Khartoum

The socio-economical factors that have shaped Metropolitan Khartoum canbe summarized in the following points:

1. The relation between population, environment and development, in Sudan, is the most effective factor behind the internal migration and displacement. The population transformation that took place for several decades has caused urban sprawl in Metropolitan Khartoum.
2. The employment market is frustrated by economical and political policy failure. These policies have released the central government from its responsibilities toward the inhabitants and therefore disenabled them.

3. Real estate leasing policies and fiscal policies are the major obstacles in the development of the construction industry. They impose no tax on non-occupied plots, impose high customs rates on building material and provide no security on returns from investment in housing sector.
4. Available Building regulations in Sudan lack sustainability criteria in their articles. Lack of climate comfort measures in building design and the ignorance of the cultural heritage; for example, have made Metropolitan Khartoum inhabitants reluctant to accept the compact form of living.
5. The entrepreneurship behavior of the new immigrants to Khartoum has encouraged activity concentration and worked as an accelerator in the process of rural urban migration.

The above socio-economical factors have resulted from market and policy failure. Nevertheless, they are well connected with the subject matter of sustainable development in Sudan.

11.3 Policy Adaptability Towards Intensification Needs

From the literature review provided in part 2 in this study, it can be seen that design of urban forms depends on a number of controllable factors. These factors could be influenced by suitable policy change. Policy change in such cases should aim at influencing inhabitants demand behavior and housing facilitation supply.

The following table (Table 11.1) presents the adaptability of current legislation, regulations and policies to the intensification needs, and suggests actions in policy changes for selected variables.

Policy changes suggested in Table 11.1 above can influence both the inhabitants' demand behavior and housing facilitation supply. This is because market powers (demand and supply) are controllable by governments through the use of economic tools such as taxes, exemptions, penalties, etc.

Table 11.1 - Adaptability of Current Policies to the Intensification Needs

Policy/Regulation	What Is Needed
The Federal System.	More power and responsibilities concerning budgeting and planning issues should be awarded to the lower administrative levels.
Real Estate Leasing Policies	Equity and justice measures should be incorporated for both the leaser and lessee. For equity and justice more institutions should be involved such as insurance companies and social security institutions.
Privatization	Policy change for urban infrastructure services, such as water and sanitation, should be carried out to introduce efficiency and to release some burden from the public sector without ignorance to poor.
Fiscal Policy	Real Estate Income Tax exemptions should be removed from the owners of the damaged and uninhabited plots. Instead, more taxes should be imposed on them to encourage utilization. Customs Tariffs burden on building materials should be released. This is important to encourage investments in housing sector.
Sectoral Policies	Policy failure in both agricultural and nomads & Pastoral sectors is the main source of city sprawl. Environmental Impact Assessments should precede the application of any policy.
Building Regulation Laws	Standards should be enforced to accommodate the environmental needs in settlements and plots design.

11.4 Socio-economical Change and Development

From the information provided in Chapters 6-9, it is clear that Metropolitan Khartoum has managed to absorb the major part of the internal migration in Sudan and has grown quite rapidly in recent decades. Most of the internally displaced persons have re-arranged their lives to adapt to urbanization. This could be explained by the stable growth of the informal sector. Also, the informal sector has become more attractive even for job seekers from the formal sector. For these reasons, the recently signed 'Peace Agreement' is not expected to stop the trend of rural-urban migration or to cause major change in Khartoum demography in the short run. In addition, urbanization has become an international trend, and no major change in this trend is expected, at least not in the case of developing countries.

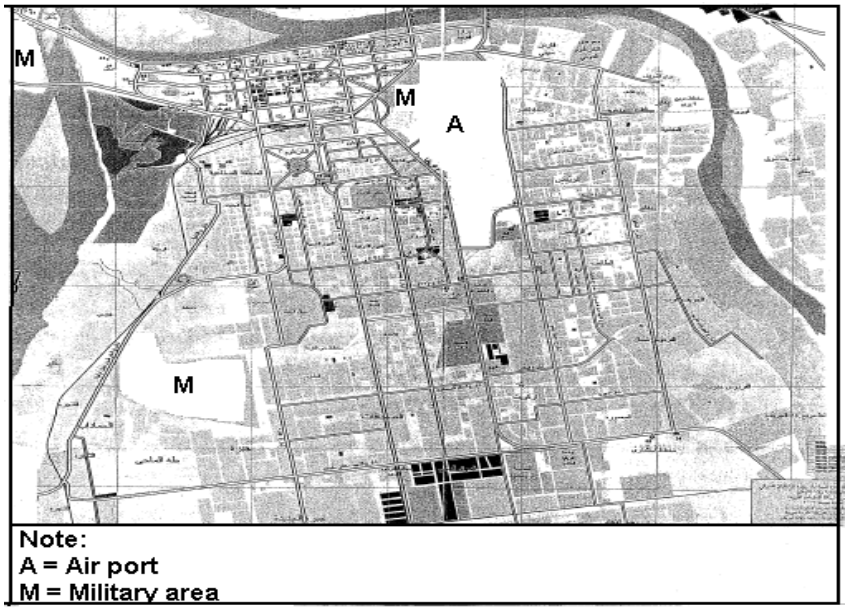
Against this background of the above-mentioned reasons behind urbanization trends in Sudan, urbanization in Khartoum should be controlled in a way that can secure efficient use of resources and sustainable development in the long run. This control of urbanization needs to configure work-live plans within and through active participation from local communities. If compaction is implemented successfully, it is expected to improve housing conditions, improve the economic performance of the inhabitants and pave the way for sustainable development and lasting peace.

11.5 The Physical Application of Intensification in Metropolitan Khartoum

According to the physical characteristics of Metropolitan Khartoum, Khartoum city planners could implement different types of intensification in the old parts of the city, as follows:

1. Well-designed mixed-use compounds to replace the large-scale government-holdings, at Khartoum city center. The large holdings that should be replaced include the Civil Air Port, Military Areas and the Military Camps (Map 11.1).
2. The existent, not efficient land-use development that of the large government residential plots should be redeveloped to inhabit more people.
3. In the long run policy change discussed in section 11.2, above, can help appearance of compact forms of living in the residential areas.

Map 11.1 - Khartoum City Form in 2005



NB. Large-scale governmental holdings are located at Khartoum city center

Last, but not least, it is useful to mention that intensification is not only tolerable but can be desirable when buildings are well designed to insure privacy and provide amenities such as views, natural lighting and ample interior space. It would also be desirable for well configured work-live communities to be maintained leading to environmental benefits and economic advantages. Increased density within a mixed-use framework can also help make housing and shelter costs more affordable for the majority of inhabitants.

PART V

- Chapter 12 -

Discussion

From the literature and discussion provided in the previous parts it is clear that Sudan, as one of the developing countries, is facing complex problems. These problems are concerned with the issues of unsustainable development and its consequences: social segregation, environmental degradation, loss of production and productivity, a non-attractive investment climate, armed conflicts, meager financial resources, etc.

Sustainable provision of urban infrastructure could represent 'a one stroke' solution to all these problems. This is because of the direct effect of sustainable provision of urban infrastructure in the environmental degradation and associated economic development (see Chapter 2 in this study). But the sustainable provision of urban infrastructure could only be attained through the sustainable urban forms, as we explained in Chapter 2 and 3.

Intensification of the urban sprawl in metropolitan Khartoum is possible and leads to the possibility of securing a sustainable provision of infrastructure if adopted within a comprehensive development program. The following sections discuss this issue in detail.

12.1 Relevancy and Acceptability of Compaction in Metropolitan Khartoum

Discussion about the social impacts of intensification differs from one region to another. In the case of Metropolitan Khartoum, for example, the stage of development, the environmental challenges and the perception of the inhabitants

about the quality of life are all different when compared with Europe, Australia or USA. But, the benefits of compaction are still relevant.

Although the issue of the social benefits of intensification is controversial even in the case of developed countries, the economic benefits are widely accepted. Research carried out in relation to the economic benefits, in developed and developing countries, offers similar and strong evidence. However, both the economic and the social benefits that could be achieved in metropolitan Khartoum have only been discussed through the cause and effect of sustainable provision of urban infrastructure in large cities in Africa. But this discussion has been supported by the empirical study from metropolitan Khartoum.

As for the acceptable type of intensification, arguments provided by the literature connect local acceptability, on one hand, and the type of intensification, type of area and social characters, on the other hand. These arguments reflect the complexity of planning and provide support to the importance of local conditions and attitudes in sustainable planning. In addition to that, these arguments reflect the significance of city design as a tool in the sustainable planning process. In the case of metropolitan Khartoum, inhabitants' attitudes were, however, found supportive to the compact form if problems attached to it, from their own visions, have been dealt with and solved.

12.2 Compaction and Urban Intensification practices

There are three issues undermining a compact city approach in Khartoum. They are: the current planning framework; the cultural and climatic context, and; the economic factor of the inhabitants. The main argument is that compact development not only has the potential to improve the quality of the physical environment, but also could serve to promote political stability by reference to an ideal form of living and a sense

of satisfaction. This argument is supportive to the compact reform of living to be adopted in metropolitan Khartoum.

The comparative analysis of the process of compaction in Egyptian cities and the process of densification in the selected Brazilian city has revealed that: in Egypt, informal urbanization and the illegal extension of buildings exacerbate both the positive and negative effects of extreme compaction. This phenomenon is normally the result of a spontaneous process coupled with inadequate housing and urban policies. In contrast, the process in Brazil is steered by active and enabled local government, using a range of urban management instruments that result in physical compactness and the optimal use of infrastructure and land.

Compaction practice in South East Asia is different from that in Egypt and Brazil since it requires large government investments in the housing sector. In addition, it interferes directly in plot sizes and causes house crowding.

With respect to the future of urban growth in Sudan, several questions may arise in relation to the issue of sustainable development. Given that Sudan is agricultural activity based: is it rational for the urban centers to be more attractive than the rural areas? To what extent do the results obtained from the successful practices remain valid for the case of Metropolitan Khartoum? What guarantees can we provide to assure that the resulting intensification would not over-weigh its advantages, or at least be equal with it?

As a reflection on the above questions, it is important to carry out more detailed studies e.g. Policy Impacts Assessments, for each policy in each region in Sudan. These studies should concentrate on sustainability criteria and consider the cost of irreversible damage that could happen in future in case of policy failure.

12.3 Inhabitants Behavior and Government Intervention

Planning encompasses land use arrangements at all scales, from the overall distribution of population and industry within the country as a whole, to matters of detail such as the painting of buildings in historic towns. And because planning involves land use, the question of land values affects, and in turn reflects, every aspect of planning policy.

Although real estate income tax could clearly operate in general in support of conservation, some critics have argued that it would have the opposite effect on the business sector, town centers and sustainable development.

If small businesses in town centers were asked to pay higher rents on their leases, they would not afford the new rent, and might close their business. Even if the landlord cannot immediately find a tenant willing to pay the revised rent, the business rate currently payable is insufficient to provide an effective incentive to bring the vacant premises promptly into use again. Thus we find businesses driven to extinction whilst the premises they previously occupied stand empty, which is against the intention of intensification. Also, with high REIT, owners could not afford the risk of having their property stand empty. Far from killing off small businesses, REIT would in most cases protect and encourage them.

Also, the possibility of intensifying empty speculative plots through the use of punitive taxes is politically constrained under current neo-liberal strategies without economic justification. Some interesting incentive schemes involving land-sharing arrangements, the transfer of development rights and public/private partnership offer some promise. The essential factor is the level of effective demand generated by the population no matter what densities they are living at. To intensify without adequate rates of investment in infrastructure could have a highly deleterious effect on urban sustainability.

Concerning the use of government intervention as a tool to change household demand behavior, many risks arise since no one can anticipate precisely how they are going to react, in future, where there are complicated interacting socio-economic and cultural challenges and opportunities. For this reason, monitoring programs are needed to measure the effect of policies that aim at changing inhabitants' behavior.

12.4 Construction Industry and Compaction

From the literature reviewed, it is clear that the construction industry has an important role to play in socio-economic development and the quality of life. For this reason, sustainability needs to be understood in an integrated and holistic view. In this line, sustainable construction should not be viewed separately from sustainable urbanization and development. It is necessary to consider the natural, social and built up environment as manifested in urbanization and construction processes, and to incorporate the urban and architectural design activities as spatial expressions thereof. In Metropolitan Khartoum, therefore, it is important for Buildings Regulations to be reviewed through an inter-disciplinarily vision so as to include these factors as standards in each construction legislation.

It is clear that sustainable construction processes comprise stages: from the selection of the raw materials to the design and implementation of buildings and infrastructure services. The key point for sustainable construction in Sudan is fulfillment of climatic comfort. It should be the consideration in choice of building materials and internal design to accommodate minimum use of air conditioning equipment. Other factors that shape urban sprawl form, socio-economic and cultural, should also be considered.

12.5 Planning and Compaction in Khartoum

Planning authorities in Sudan are well structured, but isolated from both the politicians and the communities concerned. The implementation level of most of plans is low, mainly due to the lack of awareness about local and regional opportunities and challenges.

The idea of compaction could be noted in previous master plans from 1959, 1977 and 1991, since all these plans suggest removal of the Airport and Military Areas from the city center. Furthermore, the size of residential plots, at the different residential classes, has been reduced gradually during the last decade. The reasons behind those efforts toward compaction were the need to provide more residential areas and to solve transport problems. Other socio-economical factors targeted in compaction theory were neither discussed at the setup nor at the implementation processes of those plans.

Awareness of the socio-economic challenges and opportunities of compaction can help realization of sustainable urban form in Metropolitan Khartoum. In addition, more research is needed on acceptability criteria and policy change beside public awareness programs. Public awareness programs are needed to provide the requisite linkage between local communities and planners.

As a concluding point, I think the issue of good governance is also important in every planning study, at least in sub-Saharan Africa. The reasons behind which plans could not be adopted and implemented precisely should be studied and included as influential factors. Planners can mention some reasons and governors can provide convincing arguments supporting their decisions, but what are the actual and true reasons behind their ad hoc decisions? Studies are also needed to seek and incorporate these reasons.

12.6 Recommendations

To tackle development issues in Sudan, planners and decision makers have to look for long-term solutions for development and housing problems instead of putting all their efforts and resources on ad hoc solutions. This does not mean that they have to neglect the disadvantaged majority, but to stop the partial solutions and to deal with development challenges with more comprehensive development plans.

To induce acceptability for the intensified urban form in Khartoum, housing legislations and regulations should be reviewed to include sustainability measures in terms of real estate leasing regulations, building standards concerning plot size, internal design and provision of services, and public participation. Fiscal policies represented in tariffs and local taxes should also be reviewed to fulfill this purpose. The required policy changes should guarantee:

1. Good collaboration with the private sector;
2. Good governance and political will;
3. Clear and focused policy direction;
4. A shared vision both inside and outside the municipal buildings;
5. A competent and well-staffed public sector;
6. A planning process that is sensitive to cultural, family size, climate, etc and tries to incorporate these as far as possible; and,
7. Successful monitoring programs as parts of any plan.

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List of Abbreviations

CNS	Comprehensive National Strategy
CMPO	Calcutta Metropolitan Planning Organization
FAO	Food and Agriculture Organization
1st cls, 2nd cls, and 3rd cls.	First Class, Second Class and Third Class
GDP	Gross Domestic Production
HHs	Households
Ibid	It is a term used to provide a reference for a source that was cited very recently in the text.
IDPs	Internally Displaces Persons
ILO	International Labor Organization
IMF	International Monetary Fund
Krt.	Khartoum
KSWC	Khartoum State Water Corporation
MPPPU	Ministry of Physical Planning and Public Utilities
Mult., Nuc., and Ext. Famil.	Multi, Nuclear, and Extended Families
NGOs	Non government Organizations
Omd.	Omdurman
REIT	Real Estate Income Tax
SAHA	The national project for Shelter and Habitat in Sudan
SAPs	Structural Adjustment Programs
SCP	Sustainable Cities Program
SD.	Sudanese Dinar (Sudan currency)
SPSS	Statistical Package for Social Sciences
Sq. meter	Square meter
SSA	Sub-Saharan Africa
TCDE	Technical Committee for the Disposition of Public Enterprises
UN	United Nations
UN-HABITAT	United Nations Human Settlements Program
UNDP	United Nations Development Program
USA	United States of America
WTO	World Trade Organization

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Appendices

Appendix I – A Resource Guide to Some Recent Peace Agreements in Sudan

Machakos Protocol

An agreement between the Government of Sudan (GOS) and the SPLM/A to establish a six-year interim period during which, among other things, southern Sudanese will have the right to govern affairs in their region and participate equitably in the national government. Peace implementation is to be conducted in ways that make the unity of Sudan attractive. After the interim period, southern Sudanese will have the right to vote in an internationally monitored referendum to either confirm Sudan's unity or vote for secession.

http://www.sudanembassy.org/default.asp?page=viewstory&id=111 (6 Pages)

Protocol on Power Sharing

This protocol spells out that Sudan will have both a National Government, with representation from both sides of the north-south conflict, and a separate Government of Southern Sudan; the Southern Sudan constitution and state constitutions must comply with the Interim National Constitution; there will be one President and two Vice-Presidents, appointed by the President; a bicameral national legislature will be established, with two representatives from each state in the Council of States; the National Assembly will be comprised of specific percentages of the National Congress Party, the SPLM/A, and miscellaneous northern and southern political forces; the National Government is to be decentralized, granting more powers to individual states; elections will be held by the end of the third year of the interim period; non-Muslims are not subject to Shari'a in Khartoum; quotas are set for job allocations for Southerners; all Sudanese are granted rights, including freedom of religion, assembly, suffrage, and equality.

Source: http://www.splmtoday.com/myInc/downloads/power_sharing.doc (46 Pages)

Agreement on Wealth-Sharing During the Pre-Interim and Interim Period

This agreement covers the division of oil and non-oil revenues, the management of the oil sector, the monetary authority and the reconstruction of the South and other war-torn areas of Sudan. It also establishes a representative and independent National Land Commission and a Southern Sudan Land Commission, differences between which will be resolved by a conference of the two; an independent National Petroleum Commission; net oil revenue will be divided evenly with 50% allocated to the Government of Southern Sudan (GOSS) and 50% allocated to the National Government; the National Government is able to collect revenue from personal income taxes, corporate taxes, and customs taxes; and the GOSS can collect revenue from personal income taxes, luxury taxes, and business taxes in the Southern region. Taxes that can be collected by states are also outlined. A commission to ensure the transparency of collection and use of revenues will be formed; two banking systems will be formed in the two areas, with the Bank of Southern Sudan as a branch of the Central Bank of Sudan; and funds for reconstruction and development will be established.

http://www.splmtoday.com/myInc/downloads/agreement_wealth.doc (20 Pages)

Implementation Modalities of the Protocol on Power Sharing

This agreement, as part of the Comprehensive Peace Agreement (which was signed on January 9, 2005) reaffirms the six main protocols and agreements (described above), discussing in detail the implementation and funding of the accords. In addition, it outlines some of the principal duties of the president and vice president, establishing a concrete timeline for when the implementation of the Comprehensive Peace Agreement will go into effect. Full Protocol:

Source: http://www.splmtoday.com/myInc/downloads/Implementation_Agreement.pdf (101 Pages)

Source: Ross and Courtney (2004)
http://www.csis.org/isp/pcr/050107_sudanagreement.pdf#search='Sudan%20peace%20agreement%20and%20sustainable%20development%202004'

Appendix II - A pre-constructed questionnaire on housing conditions & service-cost of provision

Primary data

State…… Locality ……..city…….. Block no. …….

Category of House:

Nuclear Family/ground floor (……) Nuclear Family/Multi floors (……)

Extended Family/ground floor (……) Extended Family/Multi floors (……)

Multi Families/ground floor (……) Multi Families/Multi floors (……)

Income receivable (direct salary/ies wage/s+ returns from investments, or direct assistance from government/and relatives)

……..

Rates payable to the local authorities ……

Service providers:

Water (government/non-government) Sanitation (Government/ non government)

Waste collection (government/ non-government)

Average payable fees per month:

Water (…….) Sanitation (……..) Waste collection (……)

Additional payable cost (if there is a cut in service provision):

Water (…….) Sanitation (……..) Waste collection (……)

If you do not have the service, how much you are willing to pay to have it?

Water (…….) Sanitation (……..) Waste collection (……)

Indirect costs of medical treatments resulting from bad provision of urban infrastructure services (water borne diseases, diseases transmitted by insects, etc):

Water (…….) Sanitation (……..) Waste collection (……)

Indirect cost of inconvenience resulting from the polluted environment

(existence of insects, bad odor, etc):

Water (…….) Sanitation (……..) Waste collection (……)

Specify the problems attached with your current category of living with respect to the following:

(i) Supply of urban infrastructure services (water, sanitation, waste collect)

……

……

(ii) Its comfort and convenience especially for kids

……

……

Its suitability to the social occasions (where there is gathering of people)

……

……

Do you prefer your current category of living Vs. the compact form?

……

……

What your opinion concerning the compact form of living? Explain.

……

……..……

In your opinion, how can we solve the problems attached with the compact form? (if any)

……

……

Do you think the compact form can solve housing problem in Sudan? Explain

……

……

Appendix III - Statistical Indicators of households for their real spending

1. Statistical Indicators of households (Real spending on water\month)

Household/class	Statistical indicator	SDD
Khartoum 1st class	Average	4843
	Minimum value	00
	Maximum value	45126
Omdurman 1st class	Average	4519
	Minimum value	180
	Maximum value	28640
Khartoum North 1st class	Average	2979
	Minimum value	00
	Maximum value	15100
Khartoum 2nd class	Average	2746
	Minimum value	00
	Maximum value	8000
Omdurman 2nd class	Average	1427
	Minimum value	00
	Maximum value	7000
Khartoum North 2nd class	Average	2817
	Minimum value	600
	Maximum value	15920
Khartoum 3rd class	Average	3960
	Minimum value	400
	Maximum value	39600
Omdurman 3rd class	Average	2857
	Minimum value	00
	Maximum value	13000
Khartoum North 3rd class	Average	3028
	Minimum value	00
	Maximum value	26910

2. Statistical Indicators of households (Real spending on sanitation\month)

Household/class	Statistical indicator	SDD
Khartoum 1st class	Average	5720
	Minimum value	00
	Maximum value	76230
Omdurman 1st class	Average	2860
	Minimum value	00
	Maximum value	25420
Khartoum North 1st class	Average	1533
	Minimum value	00
	Maximum value	14000
Khartoum 2nd class	Average	2584
	Minimum value	00
	Maximum value	15125
Omdurman 2nd class	Average	1994
	Minimum value	00
	Maximum value	15820
Khartoum North 2nd class	Average	1425
	Minimum value	00
	Maximum value	11275
Khartoum 3rd class	Average	2802
	Minimum value	00
	Maximum value	52050
Omdurman 3rd class	Average	3177
	Minimum value	00
	Maximum value	51230
Khartoum North 3rd class	Average	6121
	Minimum value	00
	Maximum value	75820

Appendix IV Interviews with local Investors/Contractors

Interview Questions

Establishment of Construction Business:

- Year of establishment;
- Reasons behind the decision to join construction industry;
- Individual career before construction business;
- Working capital and sources of finance; and,
- Number of employees (classified in permanent/not permanent, skilled/not skilled).
- Future plan (to expand business/to sustain current activities)

2) The main problems in construction industry in Sudan
3) The main obstacles of construction industry development in Sudan
4) Future of construction business from the viewpoint of the investor/contractor.
5) Suggested solutions for the development of the construction industry in Sudan
6) Urban Intensification and the Concept of Compaction
    - In relation to infrastructure cost of provision: do you think urban forms (Sprawl, compact) have any relevance to cost of provision/equity/economic growth/sustainability criteria;
    - To what urban form, in your belief, are national policies more supportive, and why;
    - To What extent is construction industry of importance to Sudan's Economy;
    - Do you think national policies in Sudan are always in harmony with the country's housing policies; and,
    - What do you suggest as needed policy changes in Sudan regarding housing/national policies
7) Suggested Solutions to Encourage Adoption of multi-floors multi-families Buildings (financial policies/legislations/buildings regulations etc) in Khartoum State.