REPÚBLICA DE ANGOLA
Ministro do Urbanismo e Habitação

Final Report

National System of Territorial Information (Sistema Nacional de Informação Territorial (SNIT)

Presented by:
Development Workshop Angola

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1   Executive Summary

Within the Angolan Government's stated goal to eliminate slums and to provide adequate, affordable and dignified housing, the Sistema Nacional de Informação Territorial (SNIT) provides an excellent monitoring framework to measure the achievement of these goals. Adoption of the MDG indicators allows Angola to measure its progress toward these objectives using internationally accepted norms and also gauge its performance against other countries in the region.

The current project was conceived by MINUAH within the Sistema Nacional de Informação Territorial, in order to create a base line, and develop appropriate tools for monitoring the MDG urban poverty indicators. The National Institute for Territorial and Urban Planning was designated as the principal Government coordinating institution and Development Workshop was engaged to develop the monitoring tools and assist INOTU in building a baseline of information for launching SNIT in Luanda and Huambo.

The project built a methodological framework for monitoring the five MDG indicators designated by UN Habitat to measure the alleviation of urban poverty by 2015 and a reduction of populations living in "slum" (musseque) conditions by 2010. These indicators are monitored internationally using locally developed tools to measure:
1. Overcrowding
2. Secure tenure
3. Durable structures
4. Access to safe water
5. Access to improved sanitation

Angola has a weak tradition of social science research and the years of war prevented the collection of demographic and household economic data. The last national census data was published in colonial times in 1973 and only a partial census was carried out in Luanda and Malanje in 1983. The current project therefore has developed a set of information collection and analytical tools involving 'remote sensing' employing recent satellite imagery and 'rapid urban diagnostic' techniques in order to build a robust and locally geographically referenced information system. The system allows for the production of maps at provincial, municipal and local scales demonstrating the five indicators specified.

The current SNIT project has qualified each of the five indicators into three levels of compliance.
Adequate (complying to internationally or locally accepted norms of services provision and affordability);
Intermediate (when services may exist but are irregularly functioning or have the potential to be upgradeable with limited investment to an adequate level);
Inadequate or Non-Existent (when services are not accessible, un-sustainable or do not achieve minimum standards of hygiene or affordability).

The maps and data sets produced by the SNIT are excellent tools for physical and economic planners to help assess the needs and potential impacts of investments in urban investments and infrastructure projects. The SNIT indicators and the mapping of data collected are tools that can be used by civil society organizations involved in engagement with Government in the CACS (Municipal Consultative Councils) and Municipal Forums.

Recommendations are made for developing the SNIT further, employing the results in planning and extending the programme at a national level.

2 Introduction

2.1 Background

The Habitat Agenda was developed during the City Summit in Istanbul in 1996, and in the World Urban Forums in Barcelona in 2004, Vancouver in 2006 and in Nanjing in 2008. The Angolan Government, represented by the Minister of Urbanism and Housing Urbanismo e Habitação (MINUHA) and with the assistance of UN Habitat, is dedicated to reconstruct settlements in Angola after several decades of devastating war. The Habitat Agenda has provided a useful framework for developing policies in this sector. MINUHA has demonstrated its leadership in this process through the publication of important legislation in this domain, notably with the Land Law and the Territorial Planning Law and respective regulations. MINUHA aims to continue its advances in the implementation of the Habitat Agenda, particularly through pilot-projects, regulations on upgrading rights to land and the implementation of a National System of Territorial Information (Sistema Nacional de Informação Territorial (SNIT)).

Development Workshop-Angola (DW-Angola) has collaborated with MINUHA on the issue of human settlements for many years. MINUAH requested Development Workshop Angola's support in developing several programmes within the context of the Agenda Habitat, including:
1) Research on situation of informal land settlement in peri-urban Luanda, Huambo, Benguela and Namibe;
2) Proposal on peri-urban land regulation;
3) Implementation of pilot demonstration projects on participatory land titling in Huambo and Cabinda;
4) Support for INOTU in piloting the Sistema Nacional de Informação Territoria (SNIT) in Luanda and Huambo.

DW-Angola has developed a strong research, monitoring and implementation capacity and uses Geogrphic Information Systems (GIS) as a tool in its programmes. DW worked with MINUHA on an Extended Research Programme on Access to and Tenure of Land in Peri-Urban Areas in Angola and collaborated with MINUHA and UN Habitat on GIS capacity building at MINUHA, INOTU, and IGCA. DW-Angola has also piloted projects on upgradeable land titles and micro-credit housing loans.

In September 2000, during the United Nations Summit in New York, leaders of 191 nations (including Angola), adopted the Millennium Declaration, committing themselves to increase their efforts in the reduction of poverty, improvement of health conditions, and the promotion of peace, human rights and environmental sustainability. The Millennium Goals which emerged from this Declaration and comprise specific quantifiable goals to be reached within a certain time-frame, make it possible to systematically monitor the progress of each country in the realization of the commitment taken on by the Millennium Declaration. These goals should be reached in the year 2015, in relation to the base-line situation which existed in 1990.

In Luanda, like in many cities of the world, national and local governments lack information and detailed knowledge of the demographic, economic, territorial, cultural and environmental reality, which impedes and weakens the capacity to develop healthy policies and provide basic services to their residents. Many urban planners and political decision-makers operate in an environment

of uncertainties, allocating resources to solve immediate pressing issues instead of investing in progressive long-term development projects.

Reliable and up to date information on a considerable array of indicators[1] and on the means and methods of transforming information into good policies and sustainable urban plans are the solution to the above mentioned information crisis. Political decision-makers and citizens need to increase and consolidate local capacities to collect, evaluate and apply urban data in order to be able to facilitate decision-making.

In Angola, recent studies have revealed a lack of previous research and comparative information on urban issues. Responding to this lack of research, the present project aims to establish a National Territorial Information System (Sistema Nacional de Informação Territorial (SNIT)) within the framework articulated by UN Habitat, as an important contribution for a more sustainable development of urban areas in Angola. SNIT can enable the Angolan Government to accomplish its commitment to incorporate the millennium development goals (MDGs) into their national plans in several key sectors.

2.2 Objectives

The purpose of this project is to build a national monitoring system of urban indicators using the MDGs identified by UN Habitat. The present study focuses on geo-referencing data in two Angolan cities (Luanda and Huambo) for each indicator as well as developing a method for the monitoring of these same indicators in order to be able to measure the progress towards attaining the MDGs. The goal is to develop an easily accessible data base that will be compatible for international comparisons. This project also aims to build national capacity of government, civil society and academic institutions to contribute to, manage and draw lessons from the information system produced.

The following five indicators monitored and presented in this report have been used by the UN to define precarious settlements and are all included in MDG no 7: Ensure environmental sustainability (targets 10: Halve, by 2015 the proportion of people without sustainable access to safe drinking water; and 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers)[2]:
   1. Overcrowding
   2. Secure tenure
   3. Durable structures
   4. Access to safe water
   5. Access to improved sanitation

2.3 Cities under Study: Luanda and Huambo

The cities of Luanda, the capital of Angola, and Huambo, which is Angola's second largest city, were chosen for this study since they are considered to include a vast variety of urban

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[1]

   Measurable attributes of local conditions, such as the proportion of the population with access to basic services or the cost of housing in different parts of the country.

[2] United Nations Human Settlements Programme (2004) *Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals.*
http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

typologies and thus being representative of many Angolan urban areas and even of cities throughout sub-Saharan Africa.

Luanda was founded in 1576 and is one of the oldest cities in Africa south of the Sahara. Luanda as the capital represents, to an extent, the classic 'mega-city', which hyper urbanized setting has been the focus of most urban poverty and planning research in Angola and more broadly throughout Africa. However, Luanda's urbanisation has been accelerated by the flight of war affected populations and internally displaced people because of its relative safety during the war. Thus, the city has expanded to peri-urban areas where a large proportion of the population lives in self-built musseques without any kind of infrastructure.

Huambo is the capital of the province of Huambo and was the centre of major conflict during the recent war. The city of Huambo was designated in 1912 to become the capital of Angola, even though at the time no building existed. A large area was reserved for the city, within which the construction of huts or other informal construction type was banned. Informal housing grew up around these wide limits so the division between the urbanized city and peri-urban areas is much clearer than in Luanda. The growth of the city was never as rapid as in Luanda and rarely led to contact between these two spaces.[3] Huambo is an example of a second tier city that has hitherto been largely neglected, but shares the socio-economic characteristics of many Angolan and African urban areas.

2.4   Roles of Programme Partners

Ministry of Urbanism and Housing (Ministro do Urbanismo e Habitação (MINUHA))
MINUHA with the assistance of UN Habitat has been making an effort to modernize informal settlements in Angola after several decades of devastating war. The Habitat Agenda has provided a very useful frame of reference for the development of policies in this sector. MINUHA has a responsibility of monitoring the progress of pre-determined poverty and development indicators derived from the UN Millennium Goals in order to demonstrate long-term changes. The National Territorial Information System was developed in order to monitor these indicators and create an important tool for decision-making and the prioritizing of future urban development projects. MINUHA's development of SNIT is extremely important in order to ensure that the information produced by this project will be used to inform policies.

National Institute for Territorial Planning and Urban Development (Instituto National de Ordenamento do Territorio e Urbanismo (INOTU))
INOTU was designated by the Minister of MINUHA to be the lead Government partner in developing the Sistema Nacional de Informação Territorial (SNIT). The current project aims to build the capacity of INOTU's technical staff to expand and maintain the SNIT at a national level.

Development Workshop Angola (DW-Angola)
DW-Angola has collaborated with MINUHA and the government of Angola on the subject of human settlements for more than 15 years when DW was invited to join the Grupo-Ad-Hoc de Habitat in 1995 to prepare Angola's contribution to the World Urban Urban Conference in Istabbul. DW-Angola has developed strong research, monitoring and implementation capacities and employs Geographic Information Systems (GIS) as a tool for its programs. DW was responsible for overseeing the development of SNIT and used the opportunity to build research capacity with the National Institute for Territorial Planning and Urban Development (Instituto National de Ordenamento do Territorio e Urbanismo (INOTU)), municipal administration staff and members of civil society as well as training INOTU interns in GIS.

Other Programme Partners

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[3] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

Field work for the development of SNIT, which was supervised by DW, was performed by members of INOTU, municipal administration staff and local civil society organizations along with DW. The participatory research aimed at enhancing networking between different stakeholders and building capacity for future monitoring and projects.

The development of SNIT and analysis and presentation of GIS data was done in collaboration with INOTU interns which received GIS training during the process. This participatory approach provides a privileged opportunity for policy influencing since the ownership of findings belongs to the partners.

The findings of this project were presented at a workshop at INOTU in February 2009 and twice presented at the Catholic University in Luanda: At a conference on economic, social and cultural rights (1ª Conferencia Nacional sobre os Direitos Económicos, Sociais e Culturais) on April 13-15, 2009, and at the launching of the 2008 Angola Economic Report (Relatório Económico de Angola 2008) by the Centre of Scientific Studies and Research (Centro de estudos e investigação científica) in June 2009.

2.5   Potential Use of SNIT Data

SNIT involves the mapping of various indicators on living standards in the two cities under study. The data base can be extended to include any other indicators that are considered important and which might affect living standards in these cities, for example infrastructure availability, land use, environmental impact and more socio-economic data. The relationship between different indicators could be measured in order to further strengthen the methodological significance of the data produced.

In order to measure the reduction of poverty in Angolan urban areas, DW has developed a "poverty score-card" of 13 questions based on an inquiry on living standards that has been adapted to the Angolan context by IBEP (Inquerito de bem estar das populacões) funded by the Angolan government, the World Bank and UNICEF **(see annex?)**, which it intends to use for all future research. The SNIT data base already includes data related to questions 1, 3 and 10 of the poverty score-card. The application of the poverty score-card in various areas of the two cities and mapping of its results will further enrich the SNIT data base and enable an objective assessment of vulnerable zones in need of specific interventions.

The population data collected by SNIT can be used to reveal discrepancies between the supply of any services for people living close to those services, for example schools, health facilities, water supplies, electricity, roads, sewage, waste removal, banking, and shops selling staple foods and other commodities used on a daily basis. What is needed for these analyses is to obtain mapped information on where the services are now provided, and then to make assumptions about service catchment areas and the populations they should be supplying.

The analyses will immediately indicate areas where the services are not available. The analyses can then be refined to show areas where the greatest number of people would benefit if new services were provided. Likewise, the analyses will show where new services are likely to be most effective in reaching the greatest number of residents who now lack close access to the services.

This would greatly facilitate decision-making, prioritisation of projects, planning of basic services and public investment budgeting at the local and municipal level. SNIT data could also be used to determine appropriate location and methods for urban upgrading, housing project planning and land reserves.

Besides influencing public policies, SNIT data is useful for other researchers, stakeholders and relevant institutions. Therefore, it is important to provide public access to the data on the internet. Reports that have already been published by DW on issues related to the five indicators have already been uploaded to DW's Land Library website (http://www.bibliotecaterra.angonet.org/) and further data, such as the main findings of this project may be added after being published.

2.6   Definition of Urban Indicators

UN Habitat's Expert Group recommended that the adequate monitoring of Target 11 be undertaken through five components, reflecting conditions that characterize slums. A slum or musseque is a contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services. A slum household is a group of individuals living under the same roof that lack two or more of the five conditions. While accepting the framework of international guidelines to measuring and monitoring the MDGs, these definitions are adapted to the local contexts. Definitions, sources and results should be confirmed via focus groups which can include city planners and city managers, experts in the particular area of water supply, selected key informants in slum and non-slum areas.

2.6.1   Overcrowding

A house is considered to provide a sufficient living area for the household members if not more than three people share the same room. This is a key indicator measuring the adequacy of the basic human need for shelter. Reduced space per person is often associated with certain categories of health risks and therefore considered as key criteria to define the slum.

Overcrowding is associated with a low number of square meters per person and high occupancy rates with large numbers of persons sharing one room used for cooking, sleeping, and other household activities. This indicator can be estimated using National Census data on the number of persons per room. A room is defined as a space in a housing unit or other living quarters enclosed by walls reaching the floor to the ceiling or roof covering, or to a height of at least two meters, of an area large enough to hold a bed for an adult, that is at least four square meters. The total number of types of rooms therefore includes bedrooms, dining rooms, living rooms, studies, habitable attics, servants' rooms, kitchens and other separate spaces intended for dwelling purposes.

2.6.2   Secure Tenure

Secure Tenure is the right of all individuals and groups to effective protection by the State against forced evictions. Women should have full and equal access and rights to inheritance and to ownership of land and other property.

Individuals who have secure tenure have:
1.   Documentation that can be used as proof of secure tenure status, such as:
    - formal title deeds to either one or both of land or residence;
    - enforceable agreements or any document as a proof of a tenure arrangement;
    - formal rental contracts (tenant households);
    - customary tenure;
    - tax payment documents (property tax, municipality tax, etc.);
    - customary tenure who possess utility bills.

2.   Evidence of *de facto* or perceived protection from forced evictions is the proportion of household-heads who believe that they will not be evicted from their present residence within the next five years.

3.	Angolan regulations specify that urban land tenure can only be conceded on the basis of the existence of urban physical plans. Current state policy indicates that settlements that are not urbanized should be "requalified" and tenure is unlikely to be granted before this process of urbanization takes place. Master plans do not exist for all urban areas in Angola at the time of writing this paper. For the purpose of measuring this indicator therefore, housing that is in already existing urbanized zones may be considered to have secure tenure and settlements that can easily be "requalified" or can be "urbanized" without evicting existing residents may also be considered to have an intermediate level of tenure security. Informal settlements that do not demonstrate patterns that can be easily urbanized can be considered to have insecure tenure.

### 2.6.3	Durable Structures

A house is considered as 'durable' if it is built in a non-hazardous location and has a structure permanent and adequate enough to protect its inhabitants from the extremes of climatic conditions such as rain, heat, cold and humidity.

The following locations should be considered as hazardous:
- Housing situated in geologically hazardous zones (landslide/earthquake and flood risk areas);
- Housing situated on garbage-mountains;
- Housing around high-industrial pollution areas;
- Housing around other high-risk zones, e.g. railroads, airports, energy transmission lines.

The following durability factors should be considered when categorizing housing units:
- Quality of construction (e.g. materials used for wall, floor and roof);
- Compliance with local building codes, standards and by-laws.

### 2.6.4	Access to Safe Water

A household is considered to have access to improved water supply if it has sufficient amount of water for family use, at an affordable price, available to household members without being subject to extreme effort, especially to women and children. Affordable: water should not take an undue proportion of the household income, i.e. less than 10%. A sufficient quantity: water should be available at a quantity of at least 20 litres per person per day. Water should be accessible without excessive efforts and should not take an undue proportion of the household's time (less than one hour a day for the minimum sufficient quantity of at least 20 litres per person per day).

The proportion of households with access to improved water supply includes households with:
- Direct connection (piped water) to the dwelling or plot;
- Access to public stand pipe within 100 meters of the household;
- Access to non-piped water from:
  - Protected bore-hole or dug well with pump;
  - Protected spring.

"Not improved" water supply is: an unprotected well, unprotected spring, vendor-provided water, bottled water (based on concerns about the quantity of supplied water, not concerns over the water quality), and tanker truck-provided water.

### 2.6.5	Access to Improved Sanitation

A household is considered to have adequate access to sanitation, if an excreta disposal system, either in the form of a private toilet or a public toilet shared with a reasonable number of people, is available to household members.

Adequate sanitation facilities include the proportion of households with:

- a direct private public sewer connection (to the dwelling or plot) or a septic system (with sufficient capacity in order not to be clogged);
- a pour flush latrine, private or shared between a maximum of two families (not public);
- an improved pit latrine, private or shared (not public).

Inadequate sanitation includes service or bucket latrines (where excreta are manually removed), public latrines, and latrines with an open pit.

3   Methodology

The methodology of this project is based on remote sensing technology and rapid urban participatory diagnostic techniques using GIS to geo-reference all data collected. The methodological approach combines recent geographical information and the systematisation of existing data through the creation of a comprehensive urban development data base. The project also emphasizes the mobilizing and capacity building of programme partners in the use of indicators and urban data in easily accessible formats such as maps and other visual tools. The aim is to create an accessible statistical and geo-referenced data base that can be updated regularly and used for measuring the achievement of MDP targets.

3.1   Data Collection for the Five Indicators

3.1.1   Literature Review

The UN Habitat guidelines[4] provide an objective framework to define and measure the five indicators. Some indicators have been adapted to the Angolan context due to the specific socio-economic situation or lack of published data.

Existing documents containing information related to the five indicators in the two cities under study were revised. DW has carried out numerous studies on poverty related issues, notably on access to water and land tenure including the following:

- Study on the informal supply and demand for land (Estudo sobre a offerta e procura informal da terra) in Luanda, 2003;
- TERRAS, a study of the land tenure situation in peri-urban Luanda, Huambo, Benguela and Namibe, 2005;
- Mapping of Environmental Risks in Luanda, 2007;
- Report on Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo, 2008;
- Study of the Peri-urban Private Renting Housing Market in Luanda, 2009;
- Report on Housing Finance in Angola, 2009;
- Report on The Informal Peri-Urban Water Sector in Luanda, 2009;
- Municipal profiles for the Municipalities of Sambizanga and Cacuaco in the Province of Luanda containing information on the situation of the five indicators in each municipality.

3.1.2   Field Research

Field data was collected by the Municipal Administrations, INOTU staff, university student interns and civil society groups from each bairro with door-to-door inquiries in pre-selected sample zones in Luanda (particularly in Sambizanga, Cazenga and Cacuaco as part of the municipal profile). The inquiries included questions on four of the five indicators included in this project (access to water and basic sanitation conditions, existence of land tenure and quality of building materials).

This part of the methodology focused on strengthening local capacity in order to ensure regular and systematic collection of data to monitor the selected indicators. This will allow Municipal Administrations and civil society organisations with local experience to gather secure information

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[4] United Nations Human Settlements Programme, Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals, 2004

which can feed into updating the SNIT and be used to by decision makers to influence public policies on urban issues.

The information collected demonstrates the situation of each indicator in the respective municipalities. However, more detailed studies can be carried out in each settlement typology in order to be able to generalize about the situation in the whole city of Luanda or Huambo.

3.1.3 Maps and Satellite Images

Maps produced by SNIT are based on purchased satellite imagery and public domain sources (Internet) and archived maps from IGCA. New Quickbird satellite images taken between 2007 and 2009 were acquired for the whole province of Luanda and the City of Huambo.

The project classified settlement and housing areas according to typologies rather than administrative boundaries and the area of study included the whole of the urban agglomeration as recommended and defined by UN Habitat.[5] This erases any discrepancies that may exist between different administrative units and enables international comparisons of the data with other cities. Using GIS tools, administrative boundaries can later be overlaid on these typology maps so that housing and settlement variations can be assessed within each administrative area. It is important to be able to detect the situation of each indicator for each administrative unit where political decisions are being made. The project has already produced maps with administrative divisions for both Luanda and Huambo which can be overlaid with typology maps in order to enable the evaluation of each indicator according to municipalities, comunas and bairros (figures 1 and 2).

Figure 1: Luanda City Limits and Administrative Boundaries

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[5] "The urban agglomeration is defined as the built-up or densely populated area containing the city proper; suburbs, and continuously settled commuter areas. This may be smaller or larger than the metropolitan area." UN Habitat, Urban Indicators Guidelines, August 2004.

Figure 2: Huambo City Limits and Administrative Boundaries
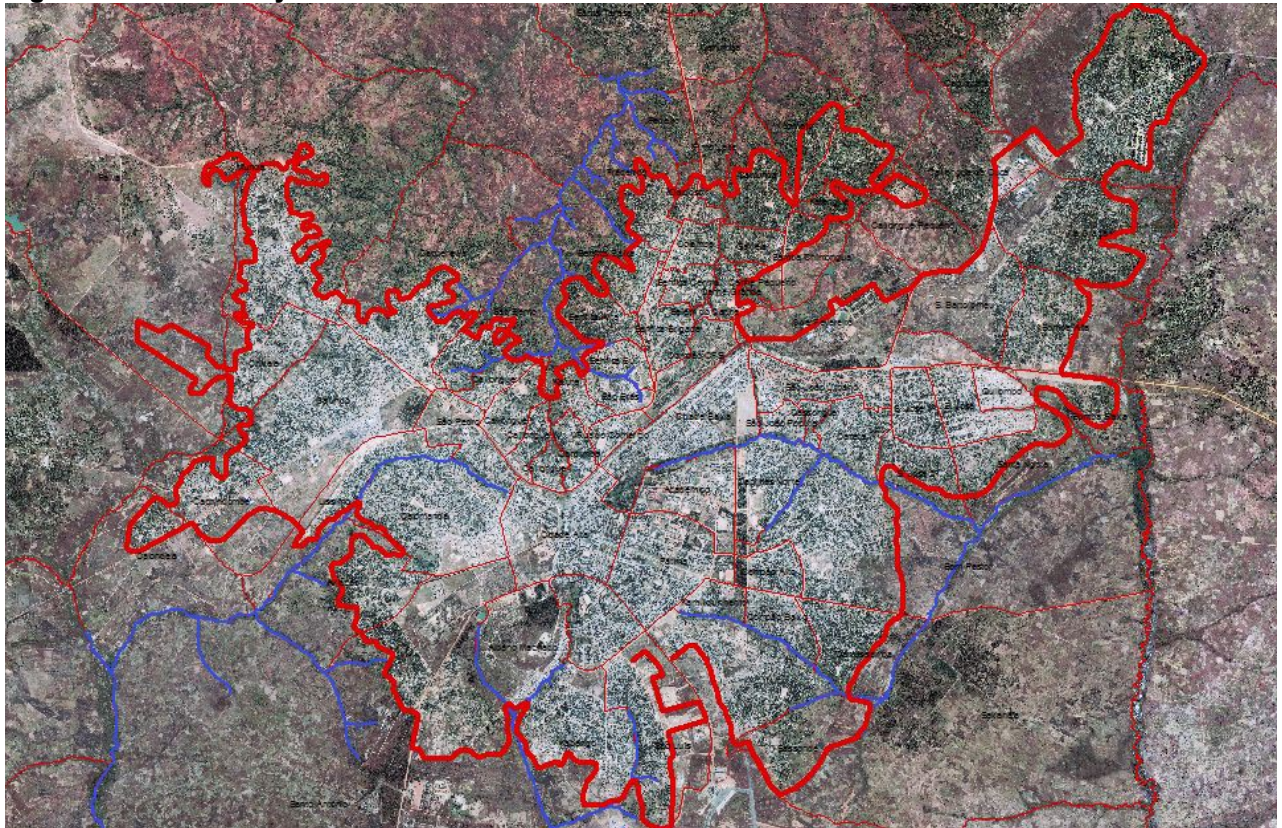
3.1.4 Participatory Mapping Using Field Data Collectors as Key Informants

The participation and training of local authorities and civil society actors was encouraged throughout this project in order to build capacities and ensure the sustainability of the data collection and monitoring process at the local level. This included participatory mapping with field data collectors (municipal administration staff, INOTU interns and civil society groups from each bairro). Such participatory mapping uses local knowledge to map the location of basic services and define problem zones at the bairro level which might otherwise not be detected.

3.1.5 Remote Sensing

In 2005 and 2006, UN Habitat in collaboration with DW and MINUHA initiated a training programme on Geographic Information Systems (GIS) in order to introduce global observatory tools in Angola such as SNIT by using GIS and remote sensing. The workshop aimed at building

technical capacities and improving communication between the participating entities such as INOTU, IGCA and provincial representatives from Luanda and Huambo in order to encourage group work and ensure flow of information between the different organizations.

Remote sensing is an important research method using satellite imagery to map demographic information, which would otherwise have to be gathered through a population census. This method has been used to collect information on population density, urban expansion, transportation systems etc. Remote sensing is particularly useful in the Angolan context due to a lack of demographic data as no national census has been conducted in more than 35 years[6]. Rapid changes in demographics and the socio-economic situation of the population in the post-war years make it increasingly important to regularly monitor such data. GIS is an efficient tool for presenting and analysing geo-referenced data which are necessary for decision-making at the municipal level.

3.2   Analytical Framework for Luanda

3.2.1   Developing Settlement Typologies

Remote sensing in GIS was used to identify settlement typologies with similar physical and socio-economic characteristics for the City of Luanda in order to be able to generalize about the status of each of the five indicators in each typology. All areas of Luanda were mapped into different zones based on satellite images and informants who are familiar with the urban environment of the city were then requested to identify and categorize each type of development.

The typologies have been defined based on urban form and types of housing which reflect different socio-economic conditions that are associated with each type of housing and zoning as well as the levels of access to basic services. For example, zones with similar physical structure which were built during the same period generally have a similar level of population density, tenure security, housing quality and access to urban infrastructure and public services such as piped water and sewage system. Ten different typologies were defined in total, one rural and the following nine urban typologies (figure 3):

Old Urban Centre: Developed more than 35 years ago, during the colonial period. Areas originally built with an adequate standard of infrastructure, according to a conventional urban model. Service provision has generally deteriorated due to poor maintenance and inadequate supply due to the increasing demand. Combination of old and modern architecture, multi-storey housing with the construction of new contemporary high-rise buildings. There is also a notable change in the original use of the buildings (raising of high walls, construction of annexes, infill between buildings and rooftop extensions) in order to maximise the use the space. Examples of neighbourhoods defined as old urban areas are Mutamba and Maculusso.

New Suburbs and Condominiums: Areas under current development or developed less than 10 years ago (mainly after the end of the war in 2002). These areas have an acceptable level of infrastructure and were planned according to a conventional urban model often for real estate ventures in a public-private partnership. These settlements usually contain zones of single-family housing and zones of apartment buildings and are often characterized by gated compounds.

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[6] INE (1983) A partial census was carried out in Luanda and Malanje.

Bairro Popular(s): Built in the colonial era more than 35 years ago. Developed for social housing programs, either initiated by the government, or by private companies, for their low and medium income employees. With a regular street pattern and an acceptable standard of permanent infrastructure, such as Bairro Popular (near the Cemetery) and Marçal in Rangel.

Social Housing Zones: Built less than 8 years ago (after the end of the war in 2002). Developed by the government with an aligned street pattern. This category includes for example the bairro of Panguila in Cacuaco and Zango in Viana.

Owner-built on Planned Sites (auto-construção dirigida): Owner-built houses constructed less than 10 years ago on sites with an aligned street pattern planned by the government or organized by families with medium to high income. These areas are characterized by single-family houses, such as Capolo.

Transitional Musseques: Initially informally settled before independence but reconstructed and regularly improved by residents over time. Developed by individuals (de particulares) very close to urban areas on land that is considered very valuable. Today these zones receive a great deal of investment and are gradually being transformed into more formal bairros with some urban services, such as Catambor.

Organized Musseques: Settlements developed by residents in the 1980s with an aligned street pattern, but eclectic housing structures and various levels of maintenance, such as Palanca and Mabor.

Old Musseques: Constructed more than 35 years ago (before independence). Informal settlement patterns with an ad-hoc building structure and precarious houses. Most of Sambizanga and Rangel which are located close to the centre of Luanda, fall into this category.

Peripheral Musseques: Constructed less than 10 years ago on the periphery of Luanda. Unplanned development with an irregular street pattern, mainly initiated by families with low incomes. The construction standard is quite precarious and the houses poor, such as in Paraiso in Kicolo.

Rural Settlements: Low density peri-rural occupation including irrigated and unirrigated garden plots in the green-belt beyond the city limits but within the province of Luanda.

Figure 3: The nine urban typologies that were identified: location in Luanda, urban form and typical housing for each typology
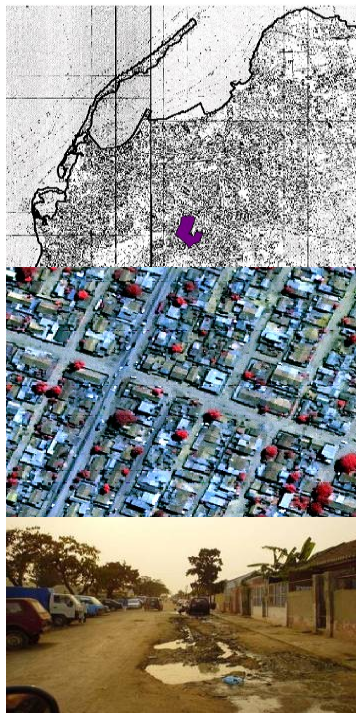
'Bairro Popular'   Old Musseques   Organized Musseques
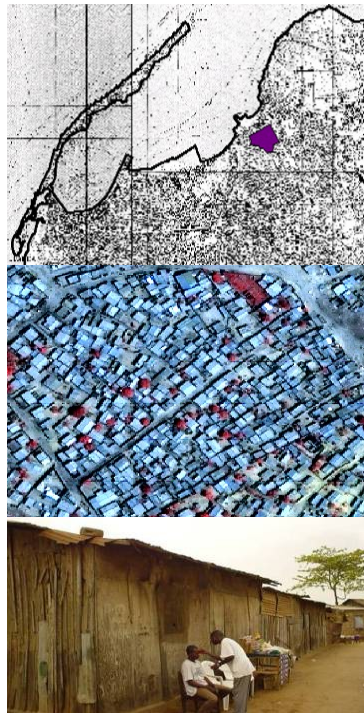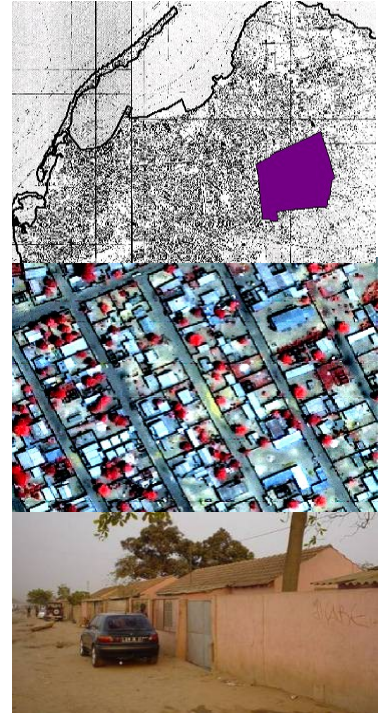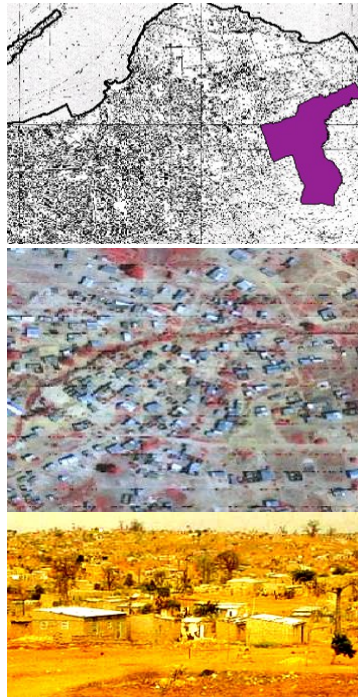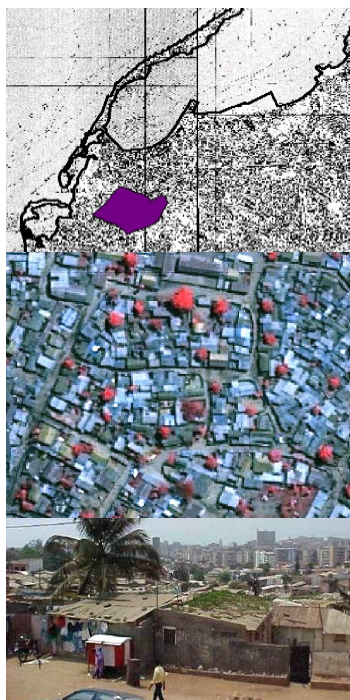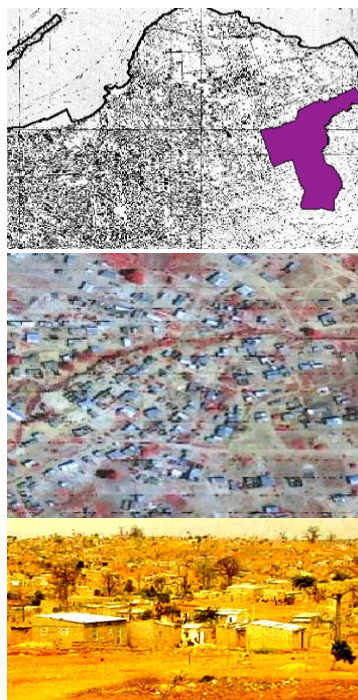
Each typology was then located on a base map of Luanda in order to be able to geo-reference the socio-economic characteristics of each typology (figure 4).

Figure 4: Map of Settlement Typologies in Luanda

Legenda

TIPOLOGIAS

Assentamentos Rurais, ,	Musseques, Perifericos, Alinhados
Bairro Popular, Antigo,	Musseques, Perifericos, Nao Alinhados
Bairro Popular, Novo,	Musseques, Transicao,
Musseques, Antigos, Desordenados	Urbano, Antigo,
Musseques, Antigos, Ordenados	Urbano, Novo,
Musseques, Ordenados,	Zona Industrial, ,
	Limites de bairros
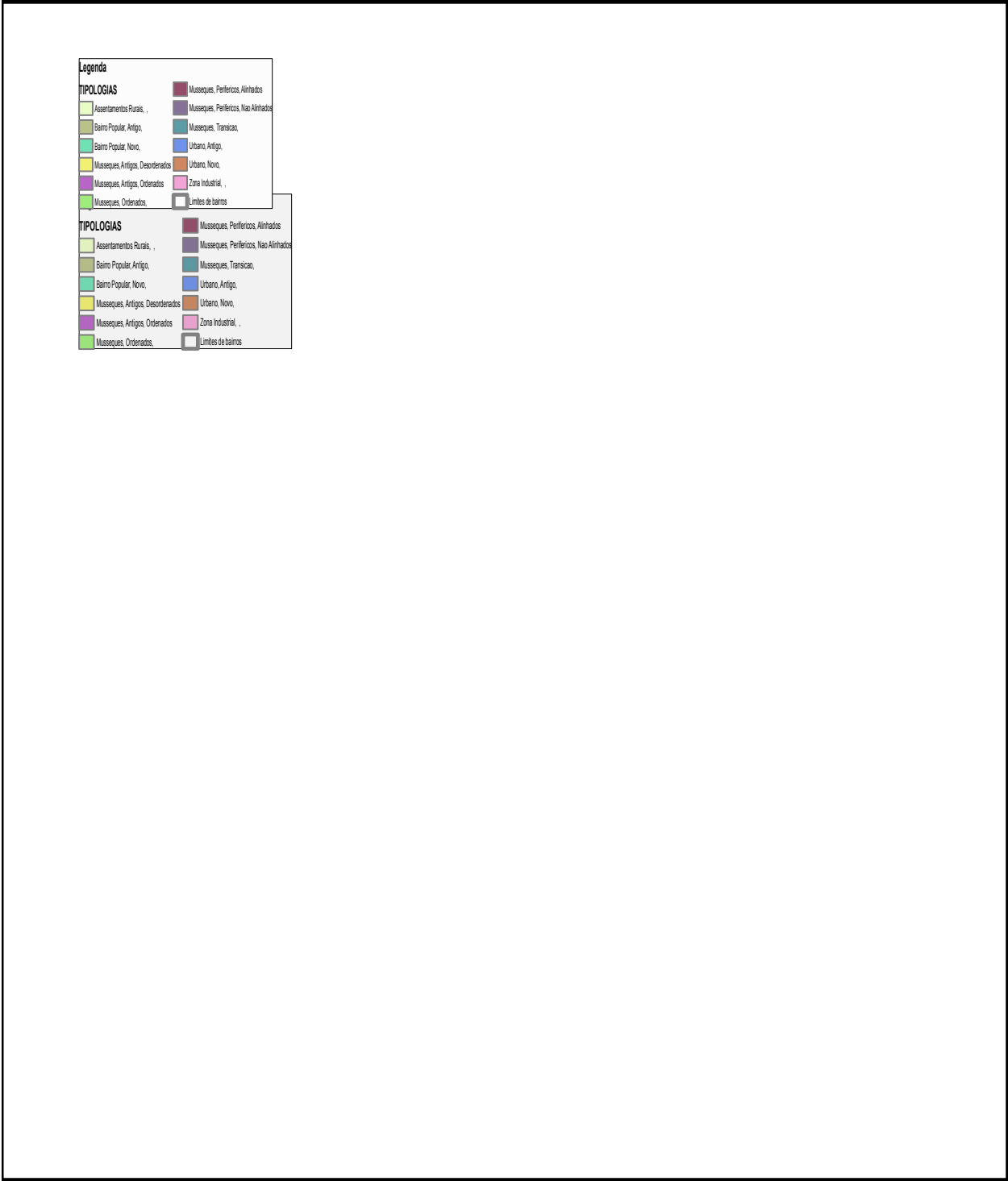
3.2.2 Demographic Analysis

A demographic analysis was done by calculating the population in different settlement typologies by using remote sensing in GIS. Recent QuickBird high resolution (0.80m) was procured and geo-referenced. For 12 months from mid 2008 through 2009 teams of GIS technicians from INOTU and Development Workshop carried out a detailed roof-top mapping of all residential units and built structures in the province of Luanda. This involved delineating over 950,000 individual housing units. In addition to this field teams were recruited involving municipal administrations, students and local civil society organisations to collect household and demographic information in all of the residential typology areas. This information was geo-referenced by the field researchers who were trained in the use of GPS technology. The field data was later synthesised and mapped. This provides important and relatively accurate information on the population of the two cities in the absence of a census. The demographic analysis also allows detecting approximately how many people are affected by each indicator in each settlement typology.

Three approaches were used to map houses in Luanda:

1. In areas of very high density of single-level houses, roofs that were visible in satellite images were mapped in polygon shapefiles which were than measured in square metres (figure 5). This method was adopted because it is usually impossible to identify individual houses, the edges of the roof on one house often being right next to the edges of the roofs of its neighbours.

2. In areas where individual houses can be identified more clearly we have mapped each house as a dot, and so the resulting data sets consist of point shape files.

3. The boundaries of apartment blocks (*predios)* were mapped as polygons, and the number of apartments in each *predio* was estimated by multiplying the number of levels or floors with the number of apartments on each level. The number of levels and apartments was counted by enumerators who visited each apartment block.

Figure 5: Mapping of roofs in GIS
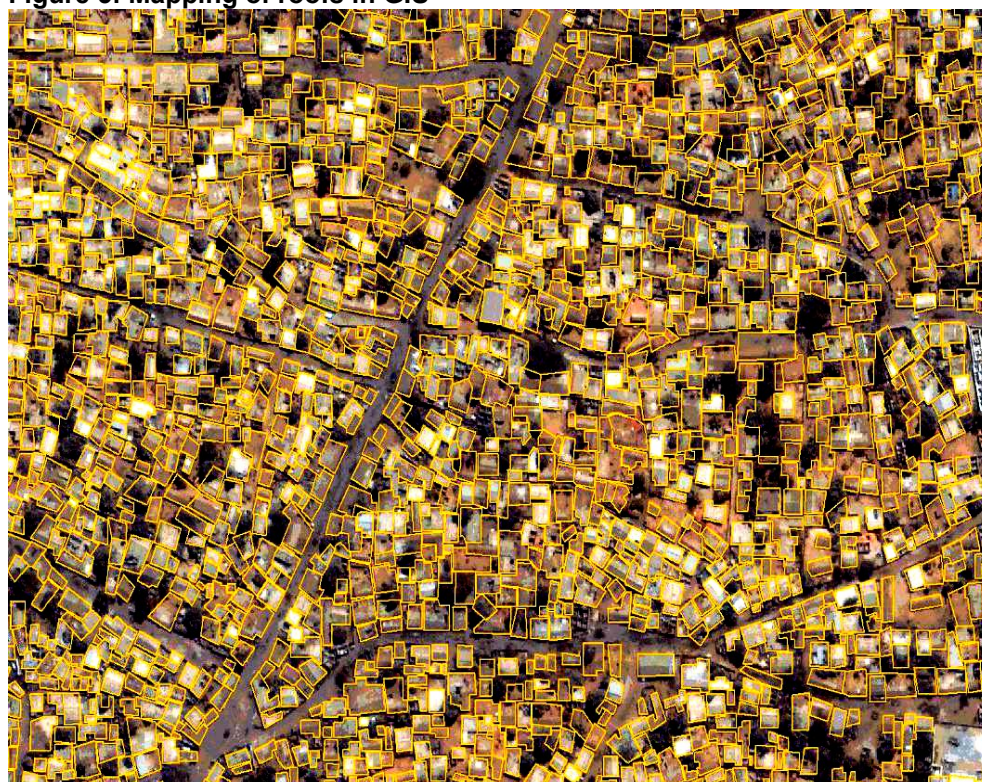
Two methods were used to estimate the number of people living in the houses that were mapped:

1. An estimate was obtained of the number of square metres of roofing per person from data collected at 482 homes where both the number of residents and roof area (in square metres) was reported. The homes were informal structures in Cazenga, Sambizanga and Cacuaco. Processing of these figures gave a figure of 6.6 square metres of roof per person[7].

2. For houses mapped as points and for apartments, the following estimates of the number of people per household, based on previous DW research, were used: 5 people per apartment, 6 people per house in urban housing types, and 7 people per house in all other housing types.

The number of people in each settlement typology was calculated based on the housing types characterizing each typology and the estimated number of people living in each housing type. This allows estimating the number of people negatively affected by each indicator.

Table 1: Estimated number of people in each housing type in Luanda

Typology	Category	Population	% of total population
Old Urban Centre	Older than 35 years	1 237 028	3%
New Suburbs and Condominiums	New Post-war	622 950	3%

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[7] In fact, there was an average of 8.5 square metres of roof area per resident in the 482 homes. However, the figures were skewed by a small number of homes that had few residents living within large houses with extensive roofing. For this reason, the median figure of 6.6 square meters of roofing per person was adopted as providing a more reasonable estimate.

Bairro Popular	Older than 35 years	477 956	1%
Social Housing Zones	New Post-war	83 290	2%
Owner-built on Planned Sites	New Post-war	163 721	7%
Transitional musseques		2 312 701	11%
Organized musseques	Post Independence	396 736	8%
Old musseques	Older than 35 years	118 380	40%
Peripheral musseques	Post Independence	241 787	21%
Industrial Zone		165 693	0.05%
Rural Settlements		2 957	4%
Total		**5 823 200**	**100%**

The number of people in each comuna of all the municipalities in Luanda was estimated using the same method with the administrative boundaries that have already been defined by DW.

Table 2: Estimated number of people in each comuna and the percentage of the total population in Luanda in 2008

MUNICIPIO	COMUNA	Area Ha.	Population	Percentage	Density Pop/Ha
CACUACO	CACUACO SEDE	25,309	243,200	4.2%	10
	FUNDA & KIFANGONDO	27,631	111,200	1.9%	4
	KIKOLO	4,229	506,200	8.7%	120
	Total Municipal	**57,170**	**860,600**	**14.8%**	**15**
CAZENGA	CAZENGA SEDE	1,050	537,700	9.2%	512
	HOJI YA HENDA	950	370,600	6.4%	390
	TALA HADI	1,860	274,300	4.7%	147
	Total Municipal	**3,860**	**1,182,**	**20.3%**	**306**
INGOMBOTA	ILHA DO CABO	190	22,100	0.4%	116
	INGOMBOTA	150	13,700	0.2%	91
	KINANGA	160	24,500	0.4%	153
	MACULUSSO	140	15,600	0.3%	111
	PATRICE LUMUMBA	320	53,800	0.9%	168
	Total Municipal	**960**	**129,70**	**2.2%**	**135**
KILAMBA KIAXI	CAMAMA	8,284	206,600	3.5%	25
	ESTORIL	1,345	112,600	1.9%	84
	GOLFE	3,062	400,900	6.9%	131
	HAVEMOS DE VOLTAR	189	43,100	0.7%	228
	NEVES BENDINHA	360	64,400	1.1%	179
	PALANCA	1,144	64,600	1.1%	56

		Total Municipal	**6410**	**907,800**	**15.6%**	**142**
MAIANGA	CASSEQUEL		340	131,400	2.3%	386
	MAIANGA		260	47,800	0.8%	184
	PRENDA		346	129,600	2.2%	375
	ROCHA PINTO		962	220,200	3.8%	229
		Total Municipal	**2470**	**529,00**	**9.1%**	**214**
RANGEL	MARCAL		120	40,400	0.7%	337
	RANGEL		160	91,900	1.6%	574
	TERRA NOVA		350	44,300	0.8%	127
		Total Municipal	**630**	**176,600**	**3.0%**	**280**
SAMBA	BENFICA			204,200	3.5%	8
	FUTUNGO		3,090	196,700	3.4%	64
	MUSSULO		3,970	16,900	0.3%	4
	RAMIRO		9,866	11,900	0.2%	1.21
	SAMBA SEDE		250	73,300	1.3%	293
		Total Municipal	**34,530**	**503,000**	**8.6%**	**15**
SAMBIZANGA	NGOLA KILUANJE		910	252,600	4.3%	278
	OPERARIO		153	75,400	1.3%	493
	SAMBIZANGA SEDE		355	145,800	2.5%	411
		Total Municipal	**1,418**	**473,80**	**8.1%**	**334**
VIANA	BARRA DO CUANZA		47,390	15,500	0.3%	0
	CALUMBO		21,000	81,100	1.4%	4
	VIANA SEDE		65,940	963,500	17%	15
		Total Municipal	**134,330**	**1,060,100**	**18.2%**	**8**
	TOTAL FOR LUANDA		**241,778**	**5,823,200**	**100%**	**24**

According to these findings, the total population of Luanda was 5,823,200 people in 2008. By now that figure will have increased. The total population of Luanda according to these calculations corresponds to a high annual population growth (of 8% since 2000) demonstrated by the estimates made in the Study on the Informal Offer and Demand for Land (Estudo sobre a offerta e procura informal da terra) carried out by DW in 2003. The following map demonstrates the distribution of the population in Luanda according to these calculations (figure 6).

Figure 6: Population density in Luanda

Comuna	
Densidade	
	< 500
	500 - 2500
	2500 - 5000
	5000 - 10000
	10000 - 20000
	20000 - 30000
	20000 - 30000
	40000 - 50000
	50000 - 60000
	60000 - 70000
	70000 - 80000
	80000 - 90000
	90000 - 100000
	> 100,000
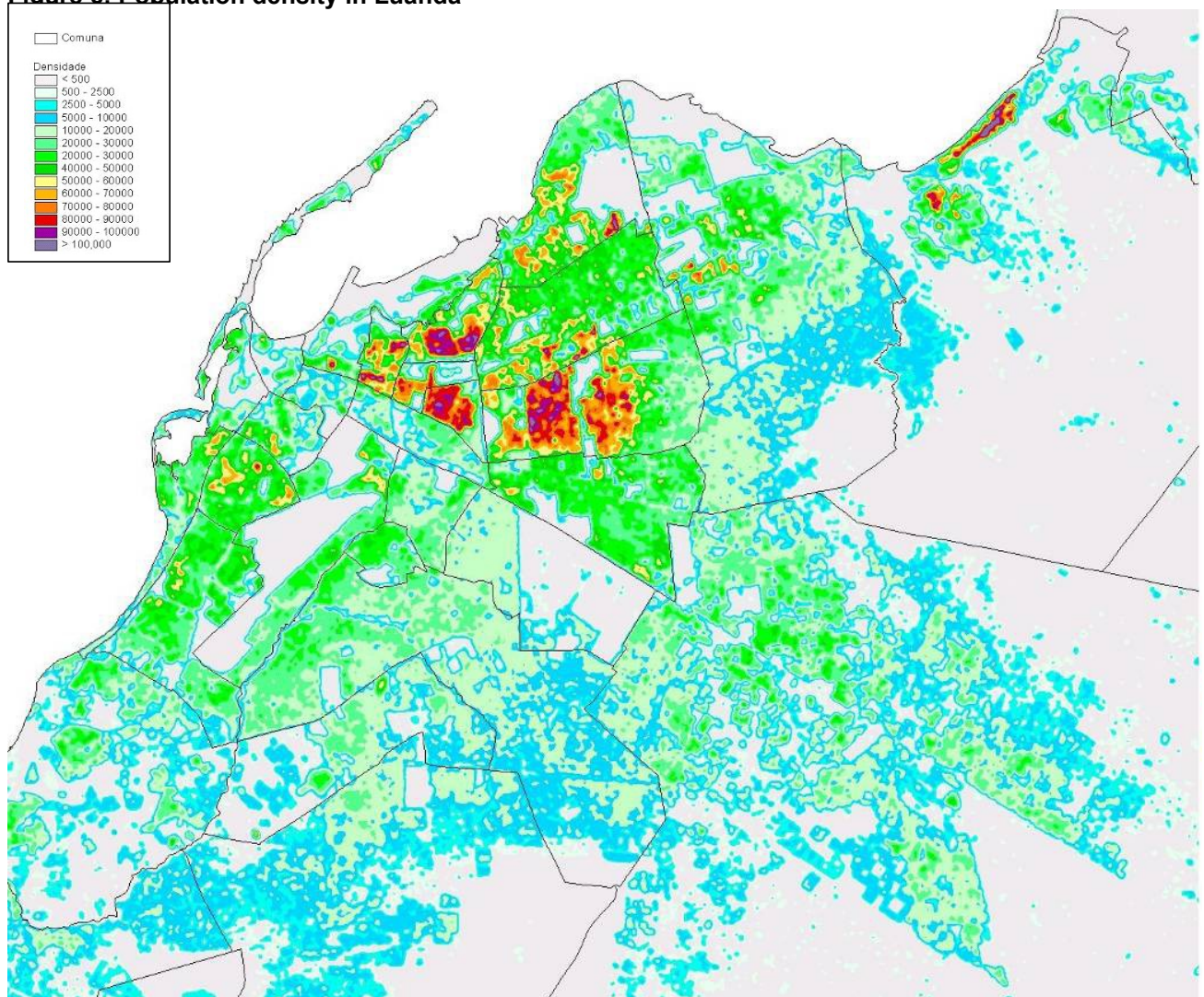
3.3   Analytical Framework for Huambo

3.3.1   Developing Settlement Typologies

A similar method was used to identify typologies in Huambo as in Luanda. Recent satellite imagery and existing maps were used to develop a framework of different settlement typologies, ranging from the urbanized city centre to the largely unserviced, informal settlements in the peri-urban areas. The settlement typologies were then verified in site visits and in interviews with key informants who confirmed the spatial distribution of *bairros* with different characteristics. The typologies serve as the sample framework representing differences within the city with regard to the five pre-defined indicators. Fewer typologies were identified in Huambo, which is a much smaller and less complex city than Luanda (figure 7). The following three housing settlement types were identified:

>   Formal housing
>   Semi-formal housing (that have at some time benefited from basic infrastructure)
>   Informal housing

Figure 7: Map of Settlement Typologies in Huambo
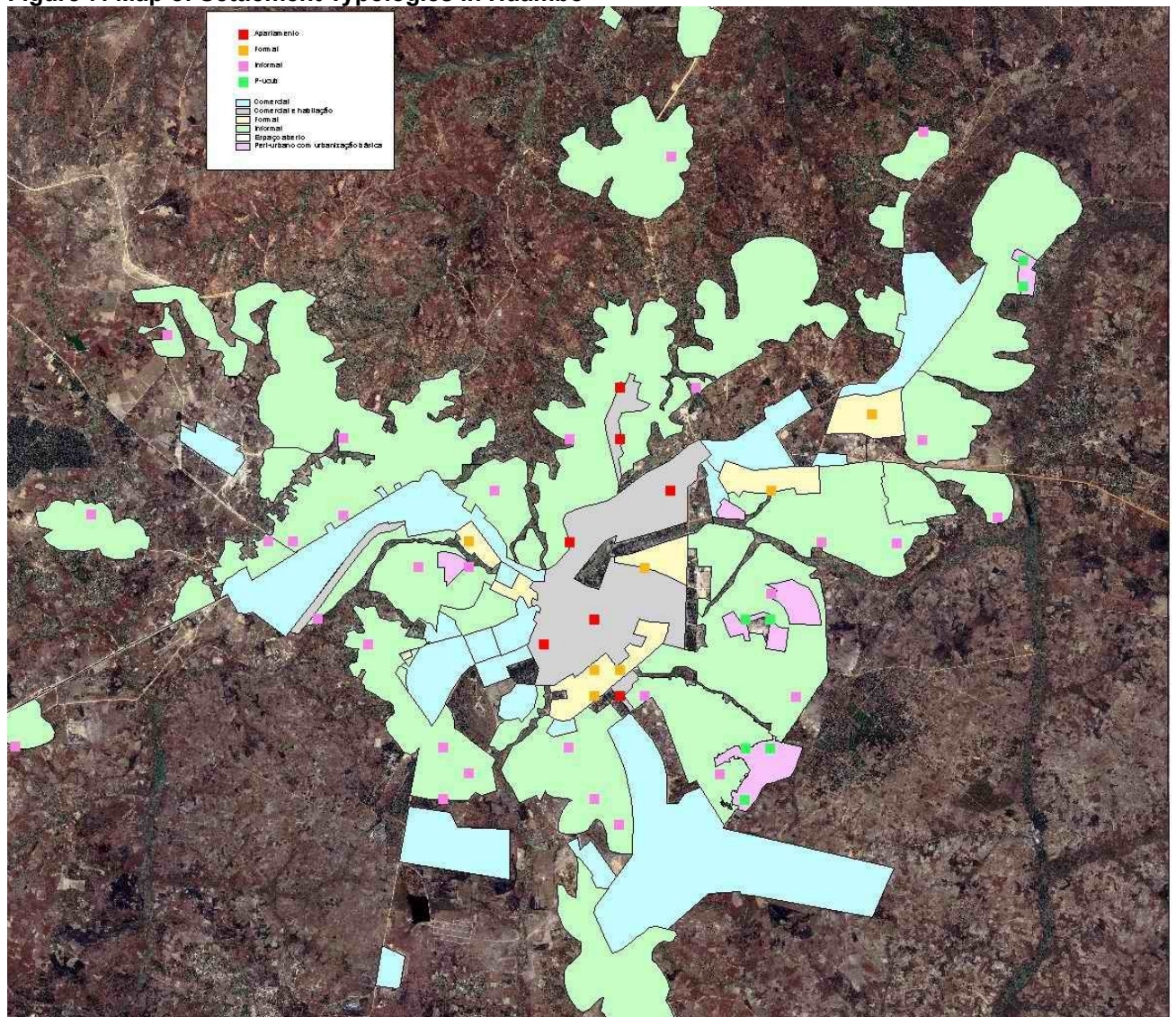
3.3.2 Demographic Analysis

The same approach was used to map houses and estimate the number of people living in each house in Huambo as was done in Luanda:

1. Quickbird satellite images were used to digitize all visible roofs in the whole City of Huambo as point objects, locating approximately 48,000 individual households.

2. Each household was assumed to have 6 residents or family members based on data obtained from a survey of 400 random households during the 2008 survey of water supplies and demands.

3. The number of roofs in the city was plotted using ArcView GIS software and then multiplied by the average number of members of each household (6 people).

4. A different method was used for apartment buildings in the formal area of the city. Apartments in the lower city (cidade baixa) had been counted by a group of researchers. The team counted all apartments in the upper city (cidade alta) and multiplied this number with nine which is the medium number of household members according to the household survey questionnaire.

5. The following number of households and estimated population were recorded in each type of housing zone:

Table 3: Estimated number of people in each housing type in Huambo

Zone	Households	Population	% of total population
Formal housing	4,093	24,558	8%
Semi-formal housing	1,263	7,578	3%
Informal housing	43,828	262,968	89%89%
Open space	**303**	1,818	1%
Total	**49,487**	**296,922**	100%

By plotting this information in ArcView, a map was created with the number and population density for the City of Huambo. Figure 8 below shows the results of this analysis with high density areas in red, medium density areas in yellow and low density areas in green. The areas within the urban perimetre, but without any population are industrial zones, military areas, graveyards, Benguela railway infrastructure, green zones, rivers, recreational areas, hospitals, schools and universities.

Figure 8: Population Density in Huambo
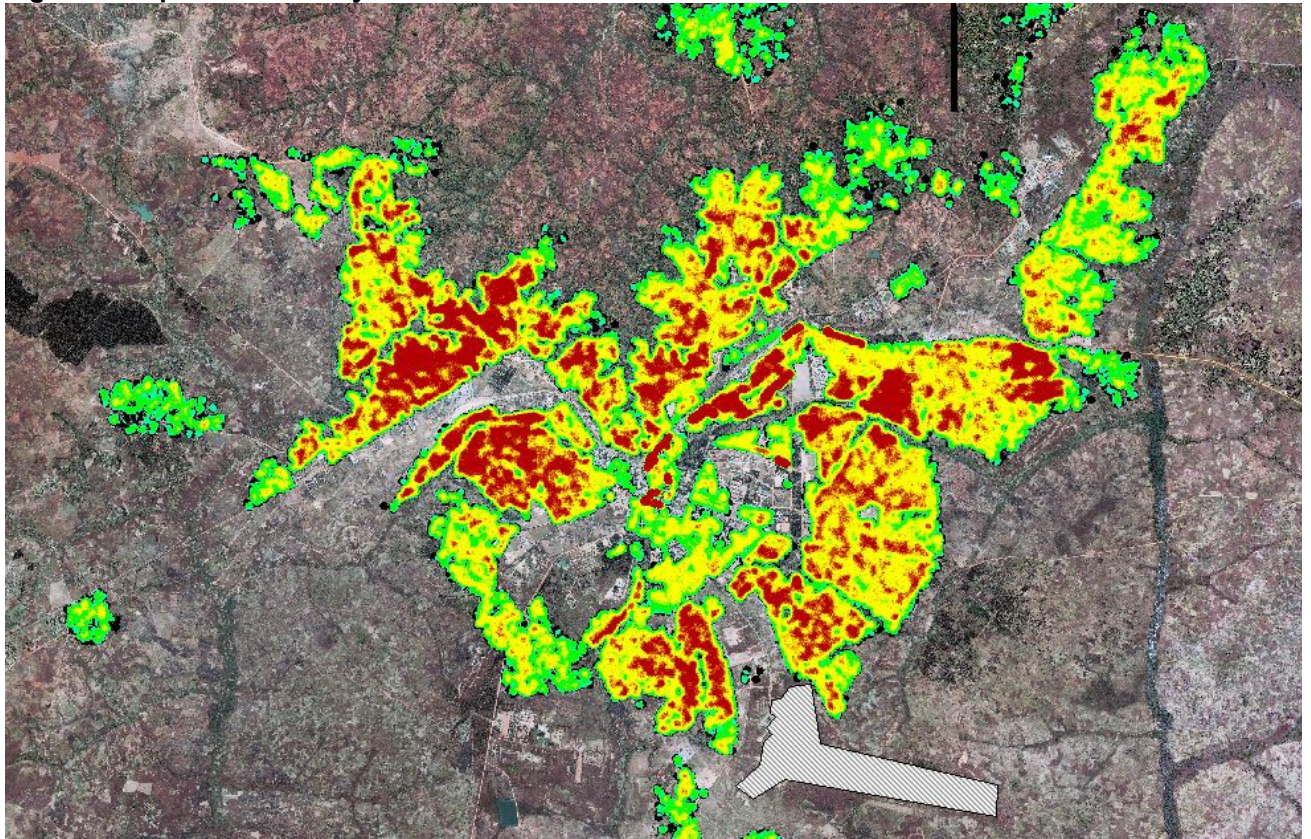
3.4 Spatial Analysis of Data for the Five Indicators

The geo-referencing of typologies for the two cities facilitates the spatial analysis of data collected on the five indicators and any other important information concerning living conditions in each area. This sort of analysis can reveal catchments or service areas, where various basic services, such as water, schools and hospitals, are lacking. These mapping tools can greatly improve public decision-making, which, due to lack of information, often ends up responding to limited urgent issues instead of applying a strategic approach to reach long-term goals.

4   SNIT Monitoring Framework

4.1   Ranking and Scoring

Specific sub-indicators, based on UN recommendations, existing socio-economic data and focus group discussions, were identified and ranked from 1 (best conditions) to 3 (worst conditions) to measure the level of each of the five indicators included in the analysis (table 4).

Table 4: Ranking of sub-indicators

Indicator	Sub-indicator	Ranking
Indicator 1: Overcrowding		
Population per km^2	Low density with no areas of overcrowding	1
	Medium to high density with some areas of overcrowding	2
	High density with large areas of overcrowding (with a density of more than 500 people per hectare)	3
Indicator 2: Secure tenure		
Type of settlement depending on level of organization and infrastructure	Planned/organized/titled	1
	Upgradeable/organizable/untitled	2
	Unorganized/unurbanised	3
Indicator 3: Durable structures		
Housing building material	Tijolos (ceramic bricks) or Cement blocks	1
	Adobe or Wood	2
	Pau-a pique or Corrugated iron (chapas)	3
Roof material	Telhas (ceramic tiles) or Concrete	1
	Corrugated iron	2
	Thatch (capim)	3
Site Location	Low risk/Safe	1
	Medium risk/Poor drainage/ Limited access	2
	High Risk/Flood-prone/Utility Clearance/Hazardous	3
Indicator 4: Access to safe water		
Main source of water	Connection to public water pipes	1
	Public water taps (chafariz) or Improved wells with manual pumps	2
	No access to safe water (the informal water market or traditional wells)	3
Indicator 5: Access to improved sanitation		
Sanitation facilities	Connection to sewage system	1
	Septic tank (fossa septica) or Improved dry pit latrines	2
	None/Inadequate/Public latrine	3
Solid waste removal	Regular/Household pickup	1

| | Irregular/Containers/Deposits | **2** |
| | None | **3** |

Some generalizations can be made for each typology based on satellite imagery, results of previous studies, sample studies in the field and interviews with informants who are familiar with the physical environment and socio-economic reality of different areas in the two cities. However, more detailed studies need to be undertaken with a significant sample size for each typology in order to be able to make statistically sound assumptions on the level of each of the five indicators.

4.2 Indicator 1: Overcrowding

Definition of indicator: Areas with a population of more than 50,000 people per km^2

The last national census for Angola was conducted in 1973 and only a partial census in Luanda and Malanje in 1982. Projections on Angola's current population vary greatly, with the most realistic (2008) estimate being around 18 million people nationally. Overall population density in the country is quite low at 8.6 persons per km^2, but the density in some parts of the main cities where a large majority of the population lives as a result of the war, is very high, particularly in some of Luanda's musseques. During the armed conflict, many of those living in the rural areas fled to the relative safety of the urban centers, particularly Luanda, where most of them still live today.[8]

Further, due to population migrations and limited housing construction during the war, there is a lack of adequate housing in Angola's urban areas. According to a report on Housing Finance carried out by DW in 2009, "it is estimated that Angola's shortfall of housing is over 875,000 units[9] and that 65% of existing housing lacks basic services such as water and sanitation[10] and is in need of major upgrading." The Angolan Government estimates that one million houses will need to be built in four years (2009-2012) as part of their housing programme.[11]

UN Habitat recommends monitoring the population growth of a city in order to prevent unmanageable densities and promote a sustainable development of the urban area in harmony with its environment and the overall system of settlements. According to UN Habitat, "high population growth without accompanying infrastructure development, adequate supply of basic services, accessible and affordable land and shelter, sufficient employment and economic opportunities is conducive to urban disorder and environmental degradation."[12]

UN Habitat defines "overcrowding" as the "proportion of households with more than three persons per room," including "bedrooms, dining rooms, living rooms, studies, habitable attics, servant rooms, kitchens and other separate spaces intended for dwelling purposes." [13] According

[8] Development Workshop, _Housing Finance in Angola_, December 2009.

[9] Ministry of Urbanism & Environment, "_Défice habitacional sobe para 60%_", Jornal de Angola, 18.05, Luanda 2007

[10] Ministry of Urbanism & Environment, _Perfil Urbano em Angola_, Luanda 2005.

[11] Development Workshop, _Housing Finance in Angola_, April 2009.

[12] United Nations Human Settlements Programme (2004) _Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals._
http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

[13] United Nations Human Settlements Programme (2004) _Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals._
http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

to previous studies carried out by INOTU/DW, the average number of people per room in Luanda is approximately three (figure 9). A survey in each typology area is planned to be carried out in order to further refine this data.

Figure 9: Number of people per room in Luanda.[14]

Number of people per room in Luanda
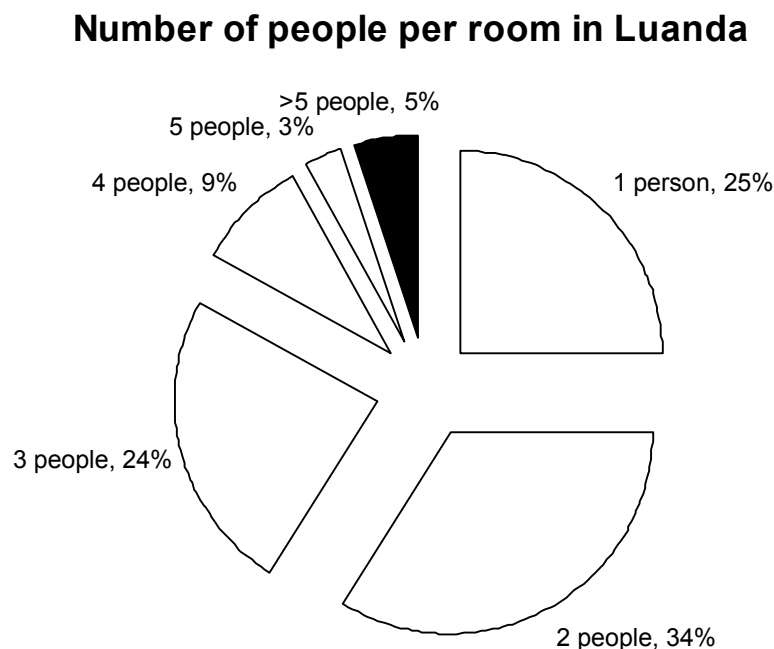
Due to lack of demographic data in Angola, it was necessary for the SNIT project to develop an information model on population density (number of people per hectare). Demographic information for each typology was collected by using satellite imagery as described in the section on demographic analysis above. Precise geo-referenced information on population density, such as developed by the current SNIT project, is very rare, particularly in African cities. This is the sort of basic information which will greatly facilitate the definition of problem zones and public decision-making in all sectors and allows us to measure MDG indicators with a good degree of precision.

Population data was divided into the following three groups and ranked from low to high density (table 5). In order to accurately measure population density for each typology, it is necessary to take on the arduous task of defining all open spaces, vacant lots and commercial or industrial areas. This has yet to be done. However, specific areas within certain typologies can be identified with a density of over 500 people per hectare, which has been defined as overcrowding. No typology has been identified as overcrowded in its entirety.

Table 5: Ranking of Indicator 1: Overcrowding

Ranking	Population per km²	Density pop/Ha.	Description
1	Low density	< 100	Peri-Rural, New Peripheral Settlements, Sub-Urban & Condominiums, Social Housing, Self Built Planned Settlements

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[14] **Source:** Inquiry of households in the Municipalities of Maianga, Sambizanga e Cacuaco in the Province of Luanda.

2	Medium density	100 – 200	Very high density areas located close to the city centre: Organized & Transitional Musseques
3	High density	200 – 300	Some Old Inner-City Musseques which include areas with a population density of more than 500 people per hectare

It should be emphasized that low density is not necessarily the most desirable form of settlement, since residents of such areas often need to travel long distances in order to reach services such as water, schools and grocery stores. On the contrary, most sparsely populated European and North-American cities are striving to increase population density. Medium to high density zones are often located close to city centres with access to a large range of services and are therefore popular areas to live in. However, when settlements have reached population density which can be considered as overcrowding, the advantages linked to high density are diminished by factors such as competition for scarce resources and health risks due to a lack of sanitation facilities and services.

4.3   Indicator 2: Secure Tenure

Definition of indicator: Level at which secure tenure is ensured for households and individuals.

According to the Angolan Constitution and Land Law, land is the property of the State. After independence, land owned by Portuguese colonialists could be nationalized by the state 45 days after it had been abandoned by the owners. In practice, citizens have the right to settle on land and with the passing of time acquire de-facto occupation. Angolan cadastral and property title records have not been systematically updated since independence in 1975 and during the war, the legal framework, which governed the use of land, was weak. People occupied any area that appeared to be empty, and then informed the bairro authorities, the administration or the Soba (traditional chief), depending on the location (figure 10). [15]

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[15] Development Workshop, *Housing Finance in Angola*, April 2009.

Figure 10: Marking of land and granting of land titles in peri-urban areas

However, according to a new land law that was approved in 2004, only those who own land in the few areas where an urban development plan exists and have gone through the expensive and arduous process of obtaining formal title from the provincial government, have legal rights. Further, according to a new regulation on land titles from 2007, all residents of the country have to legalize their tenure before 2010 or otherwise risk being expropriated without any compensation. Thus, land owners who have acquired their land by occupation, do not in fact have a secure tenure even if they feel that they have regularised their occupation and have a notarised bill of sale from the local government. Informal land markets exist in all urban and peri-urban districts in all provinces of Angola and approximately 30% of residents in peri-urban districts have purchased their land on the informal real-estate market (figure 11).[16]

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[16] Development Workshop, *Housing Finance in Angola*, April 2009.

Figure 11: Type of Occupation in Peri-urban Angola[17]

ACCESS TO LAND DW 2005
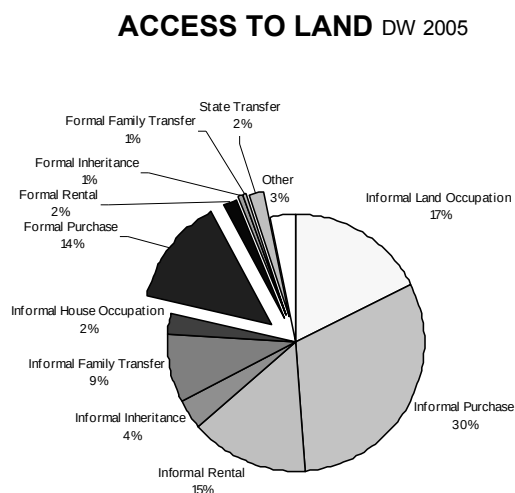
People who have acquired their land on the informal land market are all at risk of expropriation by the state or even commercial developers who have secured clear legal concessions to tracts of urban land. Only those owner occupiers with legally registered land titles are able to secure bank loans for housing construction. In the face of the great shortage of housing, the majority of the population have opted to build their own houses, sometimes in hazardous locations such as steep hillsides, causeways, flood drainage, etc. The State reluctantly grants construction permission or ignores these constructions and in many cases ends up demolishing houses built on supposedly unauthorised areas. [18]

According to UN Habitat, if a high proportion of the urban population is housed illegally without title to the land and building permits, this "is a sign that housing development is proceeding without proper government controls, and that government is either tolerant of housing which does not comply with its regulations or is unable to prevent trespasses." It is also emphasized that settlements should be planned and that land should be accessible and available at reasonable prices for individuals and the private sector. A sufficient supply of affordable land "shows if the local government is able to respond to the growing needs by developing infrastructure in undeveloped parts of the city or providing incentives for new developments." [19]

No statistical information is available on land titles in Angola, although it is evident that there is a lack of affordable land with regularized land titles due to the weak legal, administrative, technical and investment capacity of the government at all levels in urban development. Thus, national urban policies need to focus on the social and economic inclusion of the majority of citizens and modify policies and regulations that exclude. [20]

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[17] Development Workshop, *Housing Finance in Angola*, April 2009.

[18] Development Workshop, *Housing Finance in Angola*, April 2009.

[19] United Nations Human Settlements Programme (2004) *Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals.*
http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

Security of land tenure generally varies according to settlement layout. Organized and planned settlements are much more likely to have secure tenure than unorganized ones. Thus, this indicator was measured by dividing land into the following three settlement types according to the level of organization and infrastructure:

Table 6: Ranking of Indicator 2: Secure Tenure

Ranking	Type of settlement	Description
1	Organized/planned settlements	Planned settlements that generally have access or allowances for public infrastructure and where the majority of the population already has secure or provisional tenure (for example, Central Urban Areas, newly planned subdivisions, condominiums and existing Bairro Populars). People living in these areas also have more tenure security than residents of zones which are at risk of being demolished "for public use" such as the construction of major streets or because they are located in environmentally hazardous areas.
2	Upgradable settlements	Organized musseques with an aligned street pattern where public infrastructure, such as sewers, water pipes and electricity, can easily be installed. Residents in these areas can be considered to have more secure tenure, as these zones are generally well organized, and can be upgraded and urbanised without demolition of housing.
3	Unorganized settlements	Settlements with an unorganised urban layout and built without an aligned street pattern are difficult to upgrade with urban services. These settlements often need reorganization before the instalment of service infrastructure and have a higher risk of demolition therefore tenure is not secure. If such zones are located in environmentally hazardous locations their tenure is highly insecure.

A significant proportion of Luanda's settlements are unurbanised musseques and are destined for upgrading, re-ordenamento or demolition. Their insecure tenure status puts at risk the savings and assets of the poor that have been invested in their housing over many years. The upgrading of urban services and infrastructure should be planned in a way that minimalizes forced removals of existing occupants and families and the demolition of their housing. Existing occupants' tenure rights should be protected whenever the public-good is not under threat.[21]

4.4   Indicator 3: Durable Structures

> _Definition of indicator:_ _Proportion of households living in a housing unit considered as 'durable', i.e. built on a nonhazardous location and has a structure permanent and adequate enough to protect its inhabitants from the extremes of climatic conditions such as rain, heat, cold, humidity._

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[20] Development Workshop, _Terra – Urban Land Reform in Post-war Angola: Research, Advocacy & Policy Development_, 2005, p. 23.

[21] Development Workshop, _Terra – Urban Land Reform in Post-war Angola: Research, Advocacy & Policy Development_, 2005, p. 23.

According to the UN, the right to adequate housing is an important factor in order for people to have an acceptable standard of living as promoted by the Universal Declaration of Human Rights in 1948 and the International Covenant on Economic, Social and Cultural Rights from 1966. Non-durable structures, which do not provide adequate protection from the elements, and expose residents to high morbidity and mortality risks, are one of the components that define a slum. [22]

It is not easy to define durable structures, since this indicator depends on many different factors such as building material, maintenance and climate. A building that may be durable in one area might not be durable in another area that is prone to geological or climate related hazards such as earthquakes or floods. However, some of these factors, such as construction quality and maintenance are not easily measurable.

Thus, the main sub-indicator used to determine the status of durable structures was housing building material as recommended by UN Habitat. Manufactured cement blocks, which are the most common building material in Angola, are considered quite durable. Other materials that are used are: ceramic bricks (tijolos), adobe bricks, wood, corrugated iron and traditional cement (pau a pique). Building material was divided into the following three hierarchically ranked categories:

Table 7: Ranking of Indicator 3: Durable Structures

Ranking	Building material	Description
1	Tijolos (ceramic bricks)	The most expensive building material, traditionally used in high-rise buildings in the city centre
	Cement blocks	The most common building material in Luanda which provides adequate protection from wind and rain
2	Adobe (un-burnt clay bricks)	A common building material in the provinces outside of Luanda, which, if used in the right way, provides sufficient protection from wind and rain
	Wood	An uncommon building except in old musseque houses, material that varies in quality depending on timber resistance to termites.
3	Pau-a-pique	A traditional mixture of wood and clay, which, if properly maintained, provides sufficient protection from wind and rain, but rarely used in recent construction due to the lack of resistant wood.
	Corrugated iron	Low quality building material that is not durable and does not provide sufficient protection from wind and rain.

Roof material, which is also considered an important indicator of the durability of dwellings and the financial means of its inhabitants, was ranked separately and divided into the following three categories:

Table 8: Ranking of Indicator 3: Durable Structures

Ranking	Roof material	Description
1	Ceramic tiles (telhas)	The most expensive roof material, traditionally used in high-rise buildings in the city centre
2	Corruagated iron (chapas de zinco	The most common roof material in Luanda, which, if well maintained, provides moderate protection from wind and rain. Asbestos cement

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[22] United Nations Human Settlements Programme (2004) *Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals.*
http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

	ou de lausalite)	sheets are known to be a health risk.
3	Thatch roofs (capim)	Low quality roof material that is not durable and does not provide sufficient protection from wind and rain unless it is maintained very regularly. Thatch roofs are a clear indicator of limited financial means and are rarely used in Luanda

Figure 12: Cement blocks are the most common building material in Luanda
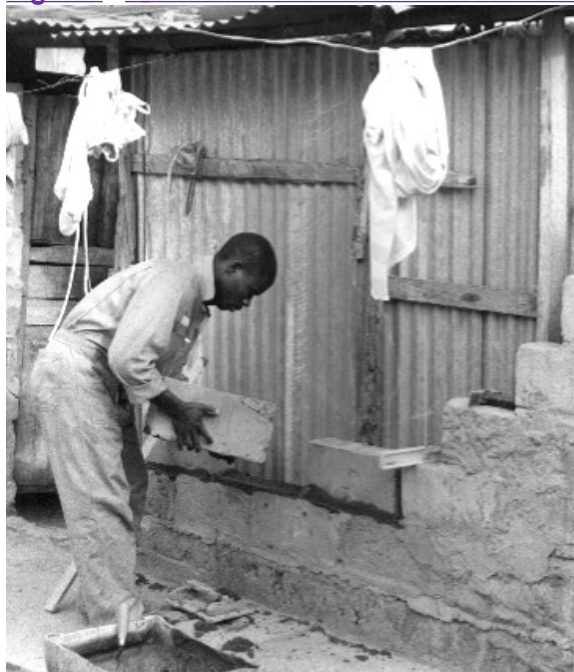
In order to better analyse this indicator, the UN Habitat guidelines also include an extensive indicator on houses in hazardous locations, as dwellers may not enjoy adequate protection in such areas even though their houses are built with strong building materials. The definition of this indicator is: "Proportion of housing units built on hazardous locations (per 100,000 housing units)." Some zones are hazardous due to geologically reasons such as landslides, earthquakes and floods, where settled housing is subject to disasters with less than a hundred year interval. This also includes housing settled on garbage mountains, high-industrial pollution areas or other high-risk zones such as railroads, airports, energy transmission lines etc. [23]

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[23] United Nations Human Settlements Programme (2004) *Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals.* http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

Figure 13: Floods during the rainy season are a major problem in Luanda's musseques

The safety of site location is ranked according to the following three categories:

Table 9: Ranking of Indicator 3: Durable Structures

Ranking	Site location	Description
1	Low risk/Safe	Low risk areas are located far from flood zones and have proper infrastructure to protect them from environmental hazards such as drainage systems and roads.
2	Medium risk/Poor drainage/Limited access	Areas which lack sufficient infrastructure such as proper drainage systems, solid waste removal and roads and thus are under risk of flooding and have limited access to services.
3	High Risk/Flood-prone/Utility Clearance/Hazardous	Sites in areas which are located close to still ponds or rivers or have a declination of more than 30 metres and are in risk of flooding and land slides.

Development Workshop and the Luanda Provincial Department of Health have produced an environmental risk map of Luanda based on flooding, erosion and cholera risk. The risk map is used to identify the number and location of housing units under threat from environmental hazards.

4.5 Indicator 4: Access to Safe Water

> *Definition of indicator: Proportion of the population with sustainable access to an improved water source, that is, the percentage of the urban population that uses any of the following types of water supply for drinking: piped water, public tap, borehole or pump, protected well, protected spring or rainwater.*

The indicator of safe water access depends on multiple factors, including quality of the water, price and distance from the water source. According to UN Habitat, water should be affordable (less than 10% of the household income) and available in sufficient quantities (at least 20 litres per person per day) without excessive physical effort and time (less than an hour a day to collect water for the household at 20 litres per person). It is emphasized that "improved water sources do not include vendor-provided waters, bottled water, tanker trucks or unprotected wells and springs." [24] Thus, neither households who are connected to public water pipes that only function occasionally, nor households who have access to water in abundant quantities from an unprotected well, nor people who have the financial means to regularly fill their private tank with water from a cistern truck, are considered to have a sustainable access to an improved water source. Furthermore, most people in Angolan urban areas, particularly in Luanda, use more than one source of water.

It is possible to estimate the number of people with access to public water pipes and taps quite accurately by using satellite images illustrating the extent of the public water pipes and location of standpipes. However, it should also be considered that these water sources often do not function properly and therefore people who have a domestic connection to public water pipes or live close to a standpipe often have to resort to a secondary water source. Overlaying such data with the population map makes it possible to calculate how many people have access to standpipes within 100 meters of their homes when the standpipes are functioning. The GIS projection of the public water network against settlement typology is used to determine accurately the level of access to safe water in each typology.

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[24] United Nations Human Settlements Programme (2004) *Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals.*
http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

Figure 14: Line of jerry-cans marking places in a queue for a standpipe

Although, such mapping of water sources can be useful in order to determine the number of people with access to each water source, it does not communicate the percentage of each household's total water use which comes from each source, since these sources are often variable. However secondary sources of water are normally from what would be classified as "unimproved" sources using UN Habitat criteria. Such data, however, can be gathered in detailed sample studies for each typology, including information such as the amount and quality of water collected from each source, price and distance from water source. It is recommended to use the proportion of each water source in each area ranked according to the following table in order to more accurately measure this indicator as recommended by UN Habitat.

Table 10: Ranking of Indicator 4: Access to Safe Water

Ranking	Water source	Description
1	Connection to public water pipes	Households in Luanda, located close to the centre of the city, obtain water through their own piped connections to the formal water supply network. These households often pay very low or flat rate fees to the water company even though they have better access than people who have to buy water through the informal sector. The public water company EPAL *(Empresa Pública da Água,* Luanda) does not actively enforce payment because it recognizes that the service is poor and water meter reading and billing is expensive. Therefore, income for the maintenance and expansion of the system is limited.[25] Illegal connections to the public water pipes are quite common in areas located close to the city centres. While illegal connections can not be considered sustainable a larger proportion of the population gains access to clean water through these connections than the 8% of households that have formal contracts with EPAL.

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[25] Development Workshop, *The Informal Peri-Urban Water Sector in Luanda*, June 2009.

2	Public water taps (chafariz) or Improved water pipes with manual pumps	Public water taps or standpipes in Luanda and manual pumps in Huambo are built by the public water company EPAL, EPHAS or NGOs within neighbourhoods that have an available connection to the water pipeline. Access to standpipes tends to be in pockets as standpipe projects usually cover only very limited geographical areas and serve about 1,000 people each within 100 meter radius. Sometimes people walk relatively long distances with heavy loads of water in order to get water from a standpipe. The water from these pipes is normally paid for through the committee which manages and maintains the manual pump and collects a contribution from the consumers to maintain and sustain the system.
3	No access to safe water (the informal water market or traditional wells)	According to UN Habitat the informal water market, which sells water from cistern trucks or private water taps or tanks for market price, and unprotected wells with low quality water, can not be considered sustainable or improved sources of safe water.
		The informal peri-urban water market in Luanda is estimated to turn over almost 250 Million US Dollars per year. It provides almost 20 litres or water per person per day to almost 4 million people at a price of about US $ 0.01 per litre. The water for the informal water supply system comes from *girafas* (supply points where cistern trucks fill up), from illegal connections to the pipeline and from the re-sale of water by households with domestic connections.
		Cistern trucks supply water to private tanks and sometimes to public water taps in Luanda. Prices vary greatly between areas depending on distance and access from the pumping stations. Due to fluctuating prices and supply of water provided by cistern trucks, this can not be considered a sustainable water source.
		Traditional wells are the main source of water for the overwhelming majority of households in Huambo. This is an easily accessible source of water that supplies sufficient water for most of the year. However, the wells are unprotected and the water can not be considered safe.

The first two categories, connection to the public water pipes and public water taps are considered sustainable according to UN Habitat and the last one, the informal water market and unprotected wells, is unsustainable. However, public water pipes and standpipes become unsustainable when they are not working which in many cases happens frequently, so that people have to resort to a secondary (unsustainable) water source. Further, sometimes people have to travel a considerable distance in order to get water at public water taps and even pay for the water, although the price is generally very low, around 5 Kwanzas for 20 litres in Luanda, and thus considered affordable for most households. The informal water market is an unsustainable source of water both because of the price people have to pay, the effort and time spent on accessing water and because people can not depend on this source as a stable source of water. Traditional wells are not found in Luanda due to the very deep water table, but in Huambo they often supply low quality or easily contaminated water and are therefore considered unsafe.

4.6 Indicator 5: Access to Improved Sanitation

> *Definition of indicator: Proportion of the population with access to adequate sanitation, or percentage of the population with access to facilities which, in hygienic terms, separate human excrements from human contact, animals and insects.*

The main sub-indicator applied in order to measure access to improved sanitation is the type of sanitation facilities used by residents, as recommended by UN Habitat. It is also important to take into account the condition of the sanitation facilities and the number of households using each facility. For example, a sewage system or septic tank which does not have sufficient capacity and easily gets interrupted or a sanitation facility that is used by more than two households is not considered improved sanitation. Sanitation facilities were divided into the following three hierarchically ranked categories:

Table 11: Ranking of Indicator 5: Access to Improved Sanitation

Ranking	Sanitation Facilities	Description
1	Connection to the sewage system	The Luanda sewage system covers a very limited part of the city close to the city centre and is in need of repair. In some areas the system does not work due to lack of maintenance. A sewage system which works properly without getting clogged is considered the most hygienic type of sanitation facilities. There exists no sewage system in Huambo
2	Septic tanks (fossa septica)	Septic tanks which are considered to be improved sanitation facilities are very common in Angolan urban areas
2	Improved dry pit latrines (latrina seca)	Improved pit latrines such as poor-flush latrines and ventilated improved pit latrines are considered to be adequate sanitation facilities.
3	Inadequate or No facilities	Uncovered pit latrines and public latrines are considered inadequate. In some areas people do not have access to any kind of sanitation facilities and are therefore forced to using measures such as a bucket or an open pit in the ground ('poço roto'), or sometimes use rubbish deposits or vacant lots or a grassy field, which poses serious public health risks to the neighbourhood.[26]

UN Habitat also recommends using extensive indicator 9: Regular solid waste collection, defined as the "proportion of households enjoying weekly solid waste collection," to measure the performance of this indicator. Solid waste poses considerable threat to human sanitary conditions by blocking drains and breeding flies which spread diseases such as malaria and dengue. Further, according to UN Habitat "regular solid waste collection is a clear indicator of the effectiveness of a municipal administration."[27] Stagnant water ponds due to non-existent or deficient sewage and rain water drainage systems also add to sanitation problems in many bairros.

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[26] Information obtained from sample inquiries on the access to water and basic sanitation conditions for a baseline study for the urban observatory (Estudo de base do observatório urbano).
[27] United Nations Human Settlements Programme (2004) *Urban Indicators Guidelines – Monitoring the Habitat Agenda and the Millennium Development Goals.*
http://ww2.unhabitat.org/programmes/guo/documents/urban_indicators_guidelines.pdf

Figure 15: Solid waste in the musseques

Solid waste collection was ranked into the following three categories:

Table 12: Ranking of Indicator 5: Access to Improved Sanitation

Ranking	Solid Waste Collection	Description
1	Regular	Regular waste removal services at least once a week are only available for populations located in planned urbanised areas of the two cities.
2	Irregular	Communal rubbish deposits in the form of neighbourhood level containers and "irregular" waste removal services are offered in some aligned musseques which are easily accessible by waste removal trucks. However, these are usually not door-to-door services and people normally have to carry their rubbish a distance to deposits on main streets where the trucks pass by.
3	No services	In most of the unaligned musseques there is no solid waste collection and rubbish piles up and breeds insects which pose sanitation risks to the population. In these areas people have to take care of their garbage themselves, either by burying it, burning it or by simply leaving it out on the street in informal rubbish deposits (lixeiras salvagems).

5 Ranking of the Five Indicators in Luanda

5.1 Indicator 1: Overcrowding

The population estimates for Luanda (approximately 5,823,200 people) support estimates made in previous studies carried out by DW. This means that about one-third of the Angolan population is concentrated in the capital city. With a population of almost 6 million and a population growth rate of about 7% per annum, the population of the city is increasing by at least 400,000 per year. If it is assumed that the average household size is 6.7 persons, it can be assumed that almost 60,000 new households are being formed in the city of Luanda each year and that this is the number of new homes that need to be constructed to keep pace with population growth.

Population density in Luanda was estimated for each typology using satellite imagery, as described in the section on demographic analysis above, to determine the number of people in each typology and the overall surface of each typology in square kilometres. However, these numbers should be interpreted cautiously since open spaces and areas with other land use than housing have not been identified. Furthermore, as already mentioned, high density is not negative unless it includes areas of overcrowding and low density is not necessarily desirable in urban areas. Areas of overcrowding were identified and located on a map of typologies. Population density was then ranked from low to high density mostly based on the presence or absence of overcrowded zones (table 13).

Table 13: Ranking of Indicator 1: Overcrowding in Luanda

Typology	Area Km²	Population	Density Pop/Ha	Overcrowding	Ranking
Old Urban Centre	16	1 237 028	103,78	No areas of overcrowding	1
New Suburbs and Condominiums	128	622 950	12,74	No areas of overcrowding	1
Bairro Popular	5	477 956	178,38	No areas of overcrowding	1
Social Housing Zones	22	83 290	54,34	No areas of overcrowding	1
Owner-built on Planned Sites	110	163 721	36,16	No areas of overcrowding	1
Transitional musseques	97	2 312 701	64,04	Some areas of overcrowding	2
Organized musseques	21	396 736	229,20	Some areas of overcrowding	2
Old musseques	82	118 380	280,61	Large zones of overcrowding	3
Peripheral musseques	229	241 787	54,05	No areas of overcrowding	1

Industrial Zone	22	165 693	1,341.36		n/a
Rural Settlements	1,760	2 957	1,371.39		n/a
Total	**2,492**	**5 823 200**			

Analysis of satellite images revealed that around 76% of Luanda's population of 5,823,200 lived in old and peripheral musseques in 2008. Approximately 1,039,000 people (18% of the total population) lived in areas designated as overcrowded with a density of more than 50,000 people/km^2, almost all of them (more than 90%), in old or peripheral musseques (figure 15). These numbers correspond to calculations made by the Ministry of Urbanism and Housing, which estimates that 80% of the urban population lives in informal settlements, or in compounds considered as precarious.[28]

Figure 16: Old and peripheral musseques and areas with a density of more than 50,000 people per km^2
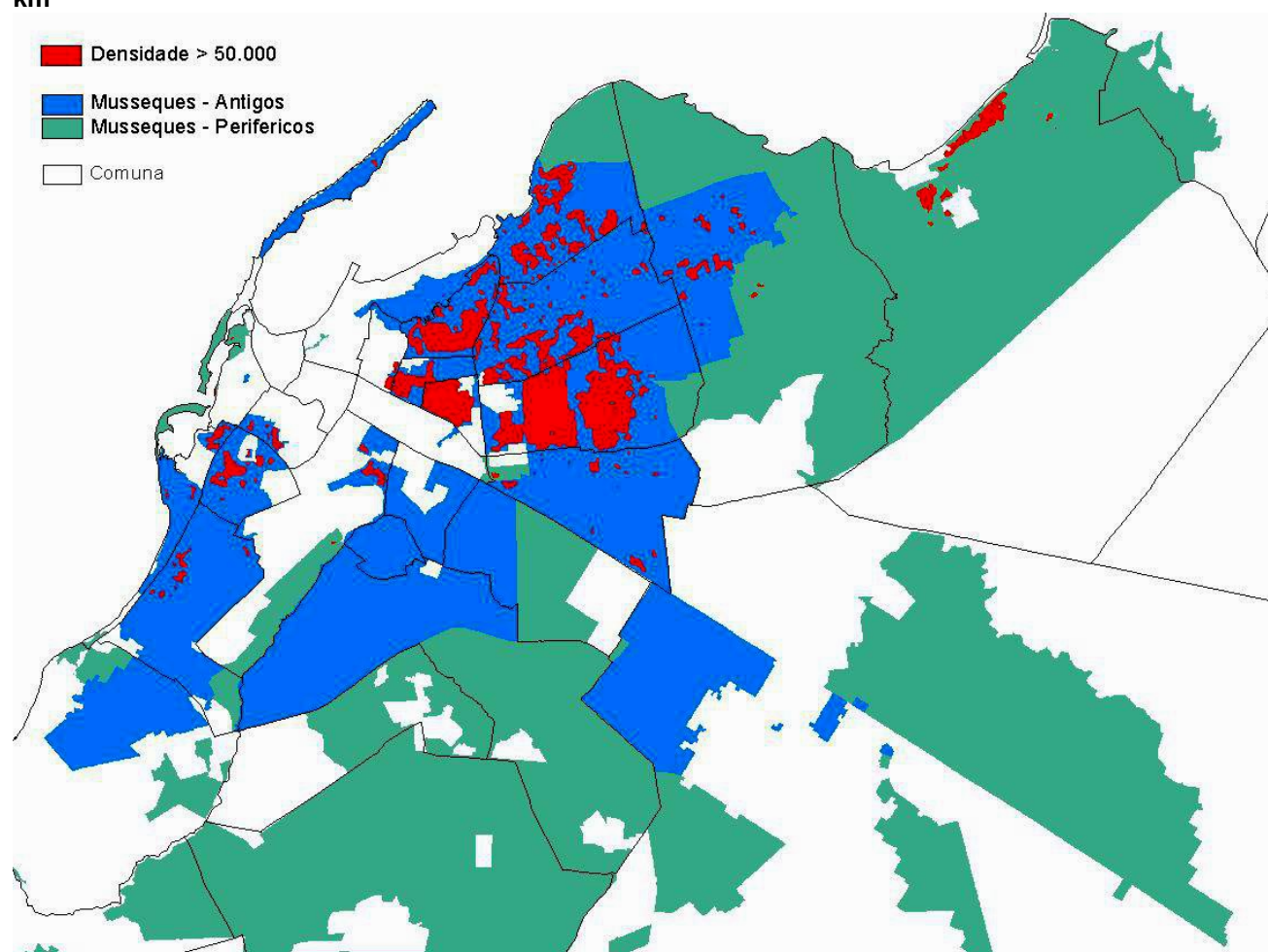
5.2   Indicator 2: Secure Tenure

During the colonial period Luanda's peri-urban areas were mostly sparsely occupied garden plots, scattered peasant cultivations or areas set aside for future development. Land occupation was demarcated by the colonial-era cadastre. With independence, some peri-urban and peri-

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[28] Development Workshop, *Housing Finance in Angola*, April 2009.

rural colonial occupations were abandoned and the cadastre ceased to be updated regularly. Due to an absence of the traditional neighbourhood chiefs or Sobas in most parts of Luanda, members of the local administration or coordinators of residents' commissions who are respected in the neighbourhood are usually responsible for overseeing land transactions.[29]

The opportunity to formally receive a plot of land in Luanda from the state is very limited. On the one hand, there is very weak institutional capacity to effectively respond to requests for land, and on the other, a widespread lack of confidence exists in the government's capacity to deliver urbanised housing plots. Defending the argument of "public interest", the government forcibly removed thousands of people from inner-city areas of insecure tenure, to make way for new housing developments and infrastructure such as roads and drainage channels. The displaced population was resettled on the margins of the city in new areas, often far from their previous homes and places of employment. [30]

DW's 2004 study of peri-urban Luanda indicates that over 80% of land is informally occupied and the residents do not have any means of regularising their occupation. Thus only 20% of land was accessed through formal means and has a clear title.[31] Even in the city centre, which has the biggest proportion of secure tenure, a considerable number of house-owners are in different phases of the acquisition process with the Government Commission for the Selling of Housing Patrimony (Comissão para venda do Património habitacional do Estado). Thus, many areas are illegal settlements according to the law, although they have a planned urban structure with an aligned street pattern that greatly facilitates the regularizing of land titles.

The following table shows the Secure Tenure ranking of typologies according to settlement type.

Table 14: Ranking of Indicator 2: Secure Tenure in Luanda

Typology	Type of settlement	Population	% of total population	Tenure Ranking
Old Urban Centre	Planned/organized	1 237 028	3%	**1**
New Suburbs and Condominiums	Planned/organized	622 950	3%	**1**
Bairro Popular	Planned/organized	477 956	1%	**1**
Social Housing Zones	Planned/organized	83 290	2%	**1**
Owner-built on Planned Sites	Planned/organized	163 721	7%	**1**
Transitional musseques	Upgradeable	2 312 701	11%	**2**
Organized musseques	Upgradeable	396 736	8%	**2**
Old musseques	Unorganized informal settlement	118 380	40%	**3**
Peripheral musseques	Unorganized informal settlement	241 787	21%	**3**
Industrial Zone		165 693	0.05%	

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[29] Development Workshop, *Housing Finance in Angola*, April 2009.

[30] Development Workshop, *Housing Finance in Angola*, December 2009.

[31] Development Workshop, *Housing Finance in Angola*, December 2009.

Rural Settlements		2 957	4%	
Total		**5 823 200**	**100%**	

Further recommendations on the process of securing titles to land in peri-urban areas has already been presented to the government and can be found in annexes of the present report.

5.3   Indicator 3: Durable Structures

A sample study for Luanda that was carried out in the Municipality of Sambizanga revealed that a large majority of houses are built with cement blocks (64%-93% depending on settlement typology), which is considered a high quality building material in Angola. The second most common building material is ceramic bricks (3%-29% depending on settlement typology), which is considered superior in quality to cement blocks (figure 16). This indicates that a large majority of the population in Luanda lives in houses made of durable building material.

Figure 17: Building Material in the Municipality of Sambizanga

Building material in the three comunas of the Municipality of Sambizanga
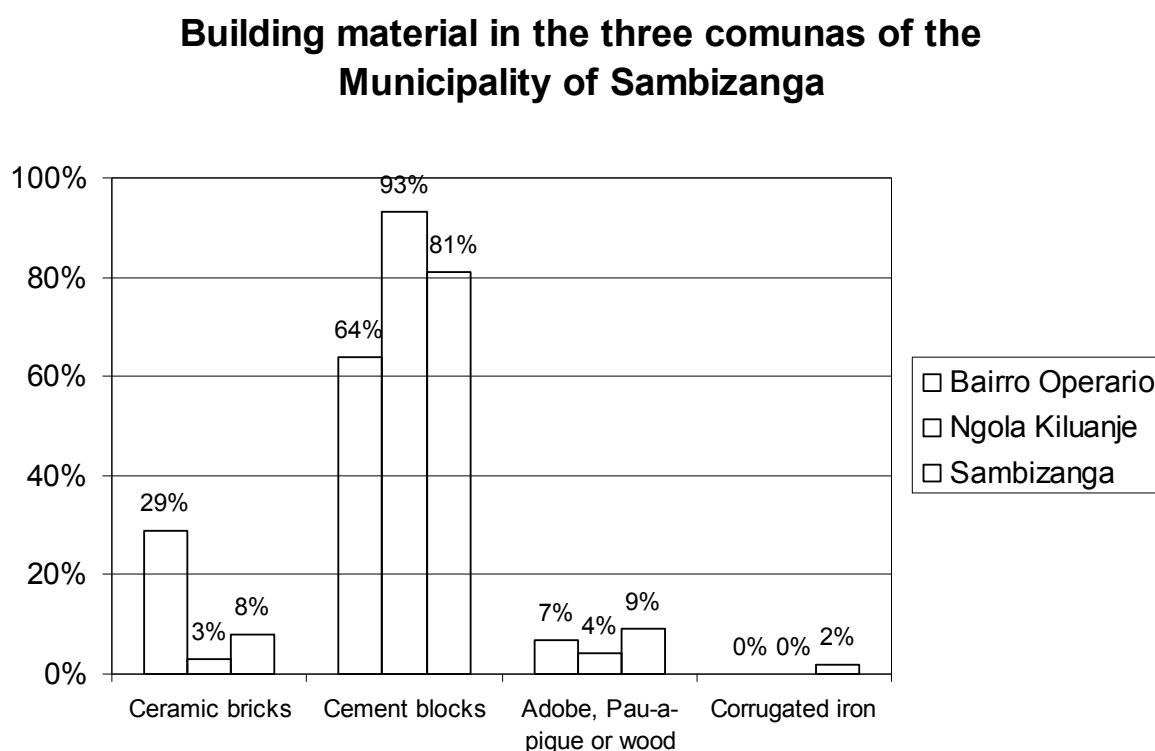
Corrugated iron is by far the most common roof material in Luanda. However, the state of these roofs varies greatly, some are well maintained and have weather proof insulation while others have started to rust and have holes in them. Corrugated iron reflects sun rays and can therefore get very hot during the warmest season unless it is well insulated. Therefore, it is difficult to estimate the durability of a structure based on roof material only. It mainly helps to identify the most durable dwellings that have roofs made of ceramic tiles and the poorest dwellings with grass roofs from the rest.

The following table demonstrates how durability of building and roof material was ranked for each typology. The overall ranking was calculated by adding up the score on each sub-indicator for each typology, dividing the sum by two and approximating to the next whole number.

Table 15: Ranking of Indicator 3: Durable Structures in Luanda

Typology	Building Material	Rank	Roof Material	Rank	Overall ranking
Old Urban Centre	Ceramic bricks and cement blocks	1	Ceramic tiles and concrete	1	**1**
New Suburbs and Condominiums	Cement blocks and ceramic bricks	1	Ceramic tiles and concrete	1	**1**
Bairro Popular	Cement blocks and ceramic bricks	1	Corrugated iron and ceramic tiles	2	**1**
Social Housing Zones	Cement blocks and ceramic bricks	1	Corrugated iron and ceramic tiles	2	**1**
Owner-built on Planned Sites	Cement blocks	1	Corrugated iron	2	**1**
Transitional musseques	Cement blocks	<u>1</u>	Corrugated iron	2	**2**
Organized musseques	Cement blocks and or Adobe clay blocks	2	Corrugated iron	2	**2**
Old musseques	Ceramic bricks, Adobe and corrugated iron, Pau-a-Pic	<u>2</u>	Corrugated iron	2	**2**
Peripheral musseques	Cement blocks, corrugated iron	2	Corrugated iron	2	**2**
Industrial Zone					
Rural Settlements					
Total					

Floods and landslides caused by heavy rains are the main geological hazards that occur in Luanda. DW in collaboration with the Luanda Provincial Health Department (DPSL) has mapped the main areas susceptible to flooding and erosion which threaten the city's residents. The environmental situation in Angola's peri-urban districts has progressively deteriorated during the several decades of conflict. These peri-urban areas can be considered to be in a chronic public health crisis. Rural populations which migrated to Luanda in search of a safe-haven did not settle in an organised way and in some cases occupied environmentally risky sites such as those along river banks or drainage courses susceptible to severe erosion.

According to a field study in the Municipalities of Cacuaco, Cazenga and Sambizanga, an estimated total of 237,000 people live within all the areas of sheet flooding and a total of about 33,600 people live within the surrounds of stagnant pools in these municipalities.

While the heavy rains, such as took place during the rainy season of 2007, are unexpected and can cause substantial damage, it seems obvious that the impacts of flooding are exacerbated by poor urban planning and poor maintenance. With better planning (and control) many informal and structurally weak houses would not have been built in places where they were vulnerable to flows of water or severe erosion. Likewise, better maintenance of drainage lines would enable much of the storm water to flow away rapidly. But more than anything else, it is probably the lack of sanitation and garbage removal that aggravate the impacts of flooding, particularly around large stagnant pools. The cost of filling in such pools would seem to be low, but the benefits are likely to be considerable.

Figure 18: Areas affected by environmental hazards in Luanda

Areas and types of flooding
- Buraco
- Desabamento
- Desabamento/lago
- Lago
- Lagoa
- Riverine flood areas
- Standing water

Terrain slope
(change in elevation within 250 metres)
- Less than 15 metres
- 15 to 30 metres
- 30 to 45 metres
- 45 to 60 metres
- More than 60 metres

Cacuaco

Sambizanga

Ingombota

Cazenga

Rangel

Maianga

Viana

Samba

Kilamba Kiaxi

2   0   2   4 Kilometers
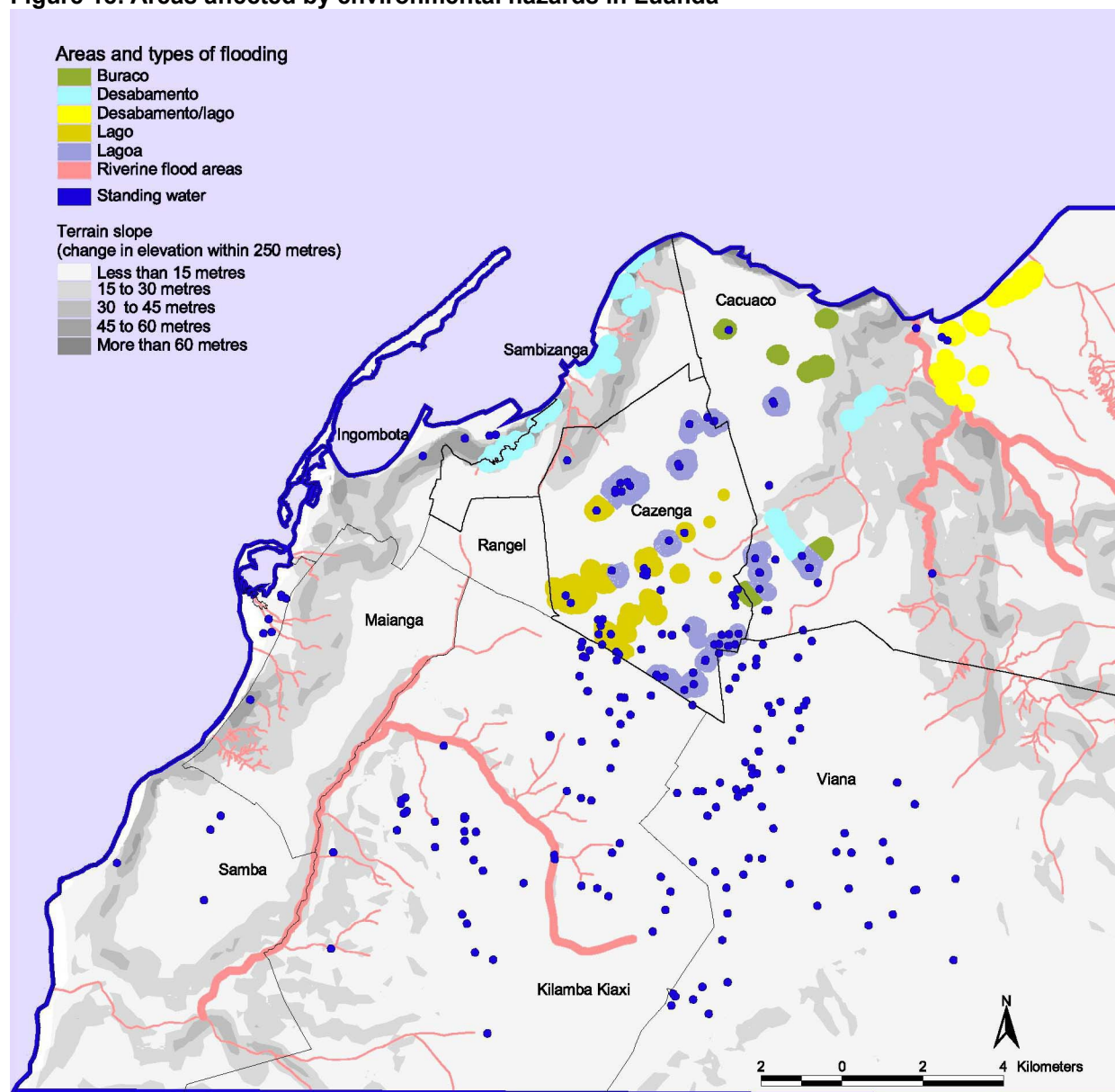
5.4   Indicator 4: Access to Safe Water

According to a household study carried out in 2006, the most common source of water in peri-urban Luanda is a neighbour's water tank (55%) and the second most common source is a cistern truck (20%). Thus, approximately 75% of the water in these areas comes from an unsustainable water source. The other sources of household water are standpipes (13%) and domestic connections (12%). Although only 8% of households in Luanda obtain water through their own household water connections, another 4% obtain water from somebody else's tap in areas close to the city centre where piped water is available (figure 18). In some cases household members walk to another bairro to obtain water.[32]

Figure 19: Main Source of Water in Luanda

Present main source of water in Luanda
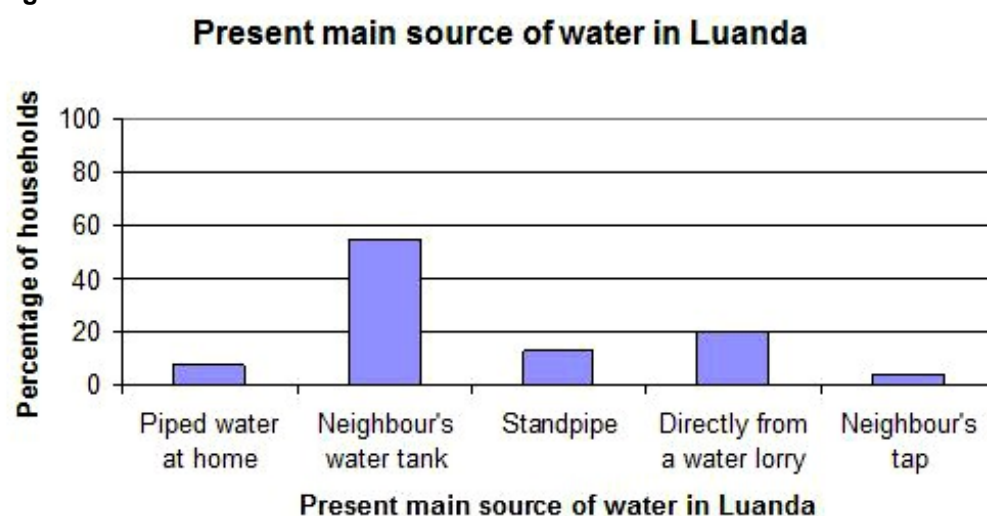
According to the study of the informal water market, the average price of water purchased from a standpipe is quite low at 0.32 Kwanzas per litre or about 5 Kwanzas per bucket, although the price of water at a standpipe varies between areas of the city[33] Thus, water at standpipes seems to be affordable for most people who rely on this source of water in Luanda and can therefore be considered sustainable as long as it does not require too much time and effort to collect the water which ideally should be within 100 meters from the household.

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[32] Development Workshop, *The Informal Peri-Urban Water Sector in Luanda*, June 2009.
[33] Development Workshop, *The Informal Peri-Urban Water Sector in Luanda*, June 2009.

Figure 20: Price of Water at Standpipes in Luanda
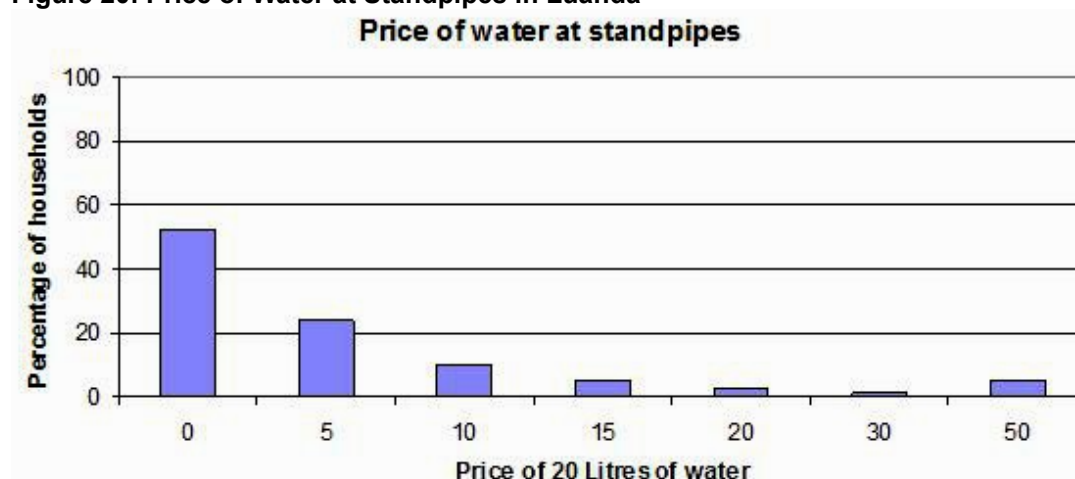
Price for water from cistern trucks varies more than prices for water at standpipes. Water purchased from trucks is generally less expensive close to the EPAL pumping stations (girafas) on the River Bengo at Kifangondo and at Kikuxi on the River Kwanza and in areas where trucks can draw water from the piped network. According the study on the informal water market in Luanda, the water purchased from private tanks that have been filled by cistern trucks (0.86 kwanzas per litre) is around 6.6 times more expensive than it was when it was bought at the source. The price also tends to fluctuate depending on the road conditions and distance the trucks have to travel.[34] The following map illustrates the price of 20 litres of water in each bairro in Luanda.

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[34] Development Workshop, *The Informal Peri-Urban Water Sector in Luanda*, June 2009.

Figure 21: Average price of water (kwanza per 20 litres) in Luanda


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Average Price of Water
   Bairro [Kz/20L]
 ■ 60
 ■ 55
 ■ 50
 ■ 40
 ■ 35
 ■ 30
 ■ 25
 ■ 20
 ■ 15
 ■ 10
 ■ 5
 □ No informal market
```
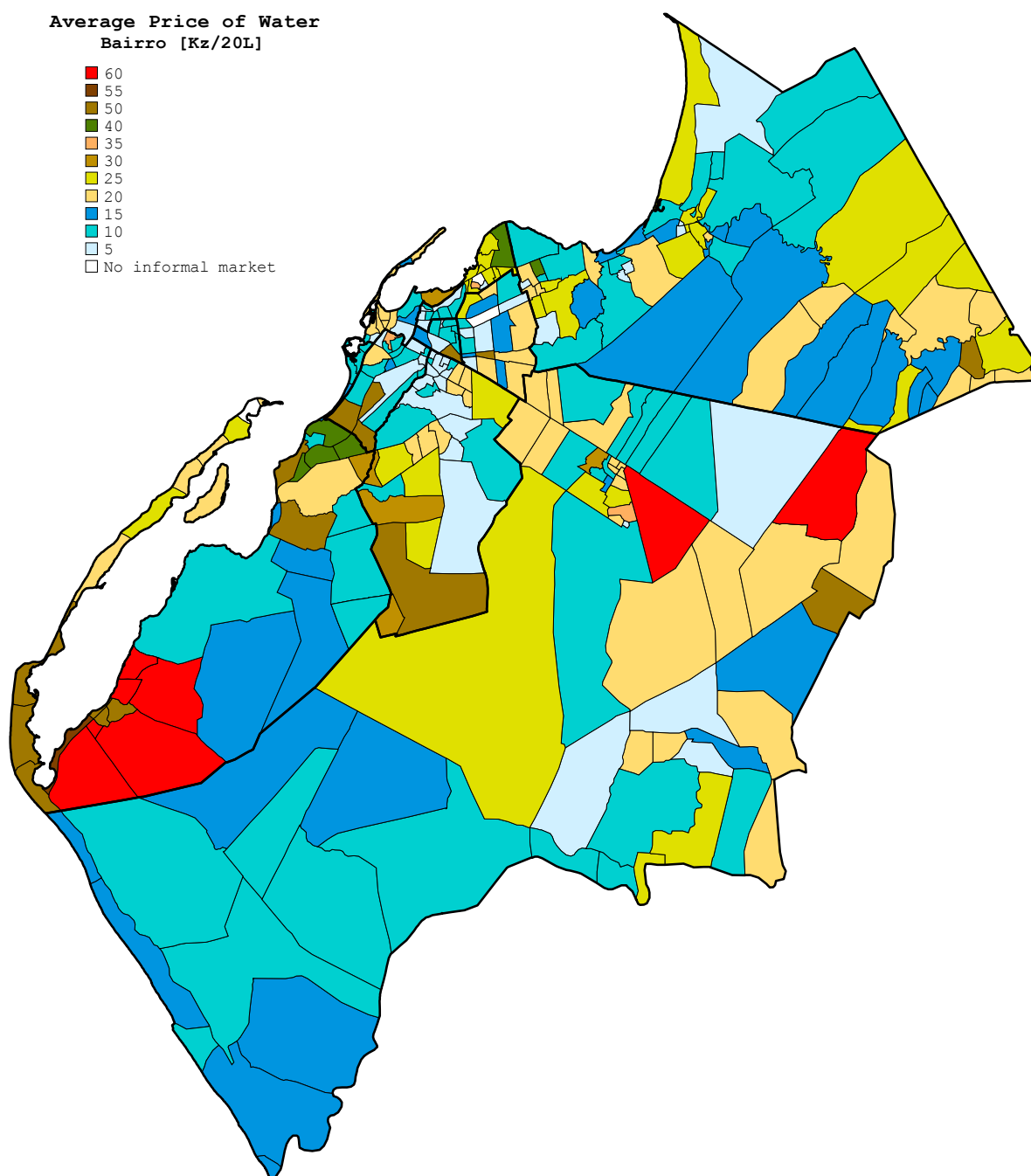
Source of water varies significantly between different areas of the city, for example recently developed settlements south and east of the city are more dependent on the informal sector for water supply than other areas. However, there are no areas of the city where the informal water sector is completely absent. There are also differences between bairros in the same comuna. [35] The following table demonstrates the score of each settlement typology on this indicator.

Table 16: Ranking of Indicator 4: Access to Safe Water in Luanda

Typology	Water Source	Population	% of total population	Ranking

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[35] Development Workshop, *The Informal Peri-Urban Water Sector in Luanda*, June 2009.

Old Urban Centre	Connection to public water pipes and cistern trucks	1 237 028	3%	**1**
New Suburbs and Condominiums	Connection to public water pipes and cistern trucks	622 950	3%	**1**
Bairro Popular	Cistern trucks and connection to public water pipes	477 956	1%	**2**
Social Housing Zones	Cistern trucks and connection to public water pipes	83 290	2%	**2**
Owner-built on Planned Sites	Cistern trucks and standpipes	163 721	7%	**2**
Transitional musseques	Illegal connection to public water pipes and cistern trucks	2 312 701	11%	**3**
Organized musseques	Illegal connection to public water pipes, standpipes and cistern trucks	396 736	8%	**3**
Old musseques	Cistern trucks and standpipes	118 380	40%	**3**
Peripheral musseques	Illegal connection to public water pipes, standpipes and cistern trucks	241 787	21%	**3**
Industrial Zone		165 693	0.05%	
Rural Settlements		2 957	4%	
Total		**5 823 200**	**100%**	

5.5   Indicator 5: Access to Improved Sanitation

Precarious sanitation conditions are a serious problem in most of Luanda's musseques. According to a study on the peri-urban rental housing market in Luanda, perceptions of sanitation conditions vary considerably between typologies. In the recent comuna of Ngola Kiluanje, which is located far from the city centre, 34% of tenants consider that they have a very poor level of sanitation while it is 7% in the pre-independence musseque of Maianga.[36] Even though households may have sanitation facilities that are considered to be improved, bathrooms are often located in the back yard or shared by several households.

Solid waste is one of the main sanitation problems in Luanda, although rubbish collection has been improving in the last few years. Drainages, where they exist, often get clogged because of rubbish and in some musseques mountains of rubbish are spread throughout the bairros. Municipal Public Sanitation and Green Space Services (Repartição Municipal de Saneamento Público e Espaços Verdes) are responsible for street cleaning and solid waste removal. A new door-to-door solid waste collection process, where residues are deposited in 200 l containers, is being implemented in the old urban areas of Luanda as part of the programme Urbana 2000, which is an affiliation of several companies in the area.

The deficient environmental sanitation in most of Luanda's musseques can partly be blamed on the municipalities' lack of initiative and cooperation. Rubbish is mainly collected in organized areas which are easily permeable by private solid waste collection trucks and around critical areas such as markets and grocery stores. A lack of proper sanitation facilities or public bathrooms also forces some people to do their necessities outdoors. One possible way to tackle the issue of rubbish in Luanda`s musseques is to involve the population in the solving of this

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[36] Development Workshop, *Peri-urban Private Renting Housing Market in Luanda*, 2008

problem, for example by creating micro-companies to collect waste in the bairros, composed of residents and directed by comunal administrations.

According to a sample study that was carried out in the Municipality of Sambizanga, a considerable proportion of the population in two (Bairro Operario and Sambizanga) of the three comunas seems to have access to some kind of solid waste removal services and either put their garbage in a container or leave it on the ground for the waste removal trucks. Around 10-20% of residents in these same comunas either buries or burns waste. The majority of residents in two of the comunas (Ngola Kiluanje and Sambizanga) appear to leave their waste in garbage piles or on the street where there is no regular waste removal.

Figure 22: Solid Waste Disposal in the Three Comunas of the Municipality of Sambizanga

Solid waste disposal in the three comunas of the Municipality of Sambizanga
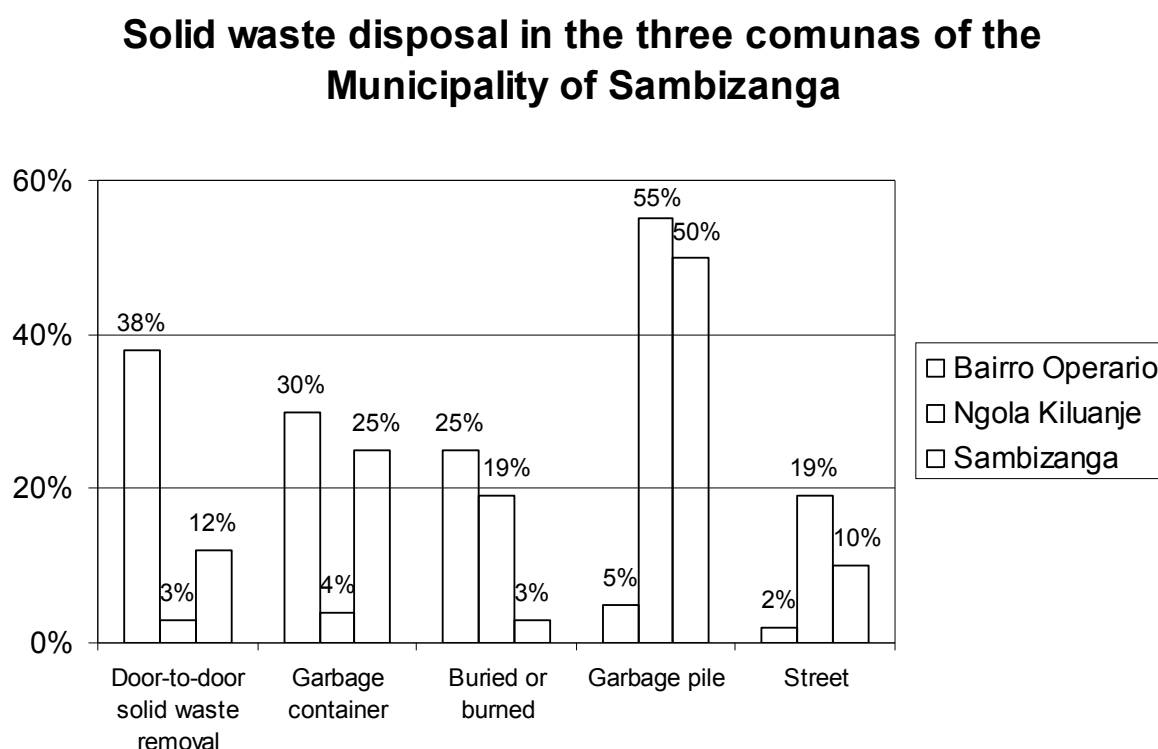
The following table demonstrates the scores of each sub-indicator used to measure access to improved sanitation, in each settlement typology in Luanda. The same method was used to calculate the overall ranking as was done for the indicator on durable structures: the score on each sub-indicator was added up for each typology, the sum divided by two and approximated to the next whole number.

Table 17: Ranking of Indicator 5: Access to Improved Sanitation in Luanda

Typology	Sanitation facilities	Ranking	Solid waste removal	Ranking	Overall ranking
Old Urban Centre	Connection to the sewage system	1	Regular	1	**1**
New Suburbs and Condominiums	Connection to the sewage system	1	Regular	1	**1**

Bairro Popular	Connection to the sewage system or septic tanks	2	Regular	1	**2**
Social Housing Zones	Septic tanks or pit latrines	2	Irregular	2	**2**
Owner-built on Planned Sites	Septic tanks or pit latrines	2	Irregular	2	**2**
Transitional musseques	Septic tanks or pit latrines	3	Irregular	2	**3**
Organized musseques	Septic tanks or pit latrines	3	Irregular	2	**3**
Old musseques	Pit latrines or no facilities	3	No services	2	**3**
Peripheral musseques	Septic tanks or pit latrines	3	No services	3	**3**
Industrial Zone					
Rural Settlements					
Total					

6 Ranking of the Five Indicators in Huambo

6.1 Indicator 1: Overcrowding

No census has been carried out in Huambo since 1970, when the population of the city was 61,895 people. Although Huambo was greatly affected by the war, it also experienced population growth due to flight of rural people to the relative safety of the city between 1974 and 2002, particularly in the informal housing areas. However, due to the war which impeded any economic activities, the population of the urbanized central part of the city declined during those years. [37]

Lack of population data and large-scale migration due to the war has made it difficult to estimate the population of the city and previous estimates vary considerably. According to SNIT estimates based on remote sensing using satellite imagery and sample questionnaires, the total population of Huambo is around 300,000 people with approximately 30,000 people (11% of the total population) living in the urban centre and 265,000 people (89% of the total population) in the peri-urban areas. The highest population densities were registered in apartment buildings in the formal part of the city and in the oldest peri-urban areas of the city.

The following table demonstrates the population density according to settlement typologies in Huambo.

Table 18: Ranking of Indicator 1: Overcrowding in Huambo

Typology	Area Km²	Population	Density Pop/Ha	Overcrowding	Ranking
Formal	15	24,558	16.87	No areas of overcrowding	**1**
Semi-formal	1	7,578	76.22	No areas of overcrowding	1
Informal	29	262,968	91.56	Some areas of overcrowding	2
Open Space	122	1,818	0.15		
Total	167	**296,922**			

6.2 Indicator 2: Secure Tenure

In Huambo, the *Sobas* traditionally indicated an area where a new arrival could build, although their authority diminished during the war. Government control over land is relatively weak in Huambo, due to frequent migrations because of the war and it is still possible to occupy on an unclaimed plot of land and inform the local authorities in order to get their approval for the settlement.[38] However, such approval does not provide secure tenure and the people who occupy land in this way are at high risk of losing it.

As in Luanda, security of land tenure in Huambo varies between the three types of settlement structure, which characterizes each typology (according to the following table).

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[37] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

[38] Development Workshop, *Housing Finance in Angola*, April 2009.

Table 19: Ranking of Indicator 2: Secure Tenure in Huambo

Typology	Type of settlement	Population	% of total population	Ranking
Formal	Planned/organized	24,558	8%	**1**
Semi-formal	Upgradeable	7,578	3%	**2**
Informal	Unorganized	262,968	89%	**3**
Open space		1,818	1%	
TOTAL		**296,922**	**100%**	

6.3 Indicator 3: Durable Sturctures

In the City of Huambo, the majority of houses constructed during the colonial era, are made of brick and covered with corrugated iron or asbestos sheets. Houses which are being built today are normally made of adobe or cement blocks. Since the cement blocks are more expensive, this material is most often used by builders with more financial means. A large part of housing construction is of adobe blocks, particularly in peri-urban areas.

In the poorest peri-urban areas of the City of Huambo, people generally construct their houses with adobe blocks, which can be durable if they are protected from water damage and properly maintained. However, because of non-adequate construction techniques and lack of maintenance, adobe constructions appear to be of a low standard in many areas of the city.

Figure 23: Building Material in Each Typology in Huambo[39]

Building material in each typology in Huambo
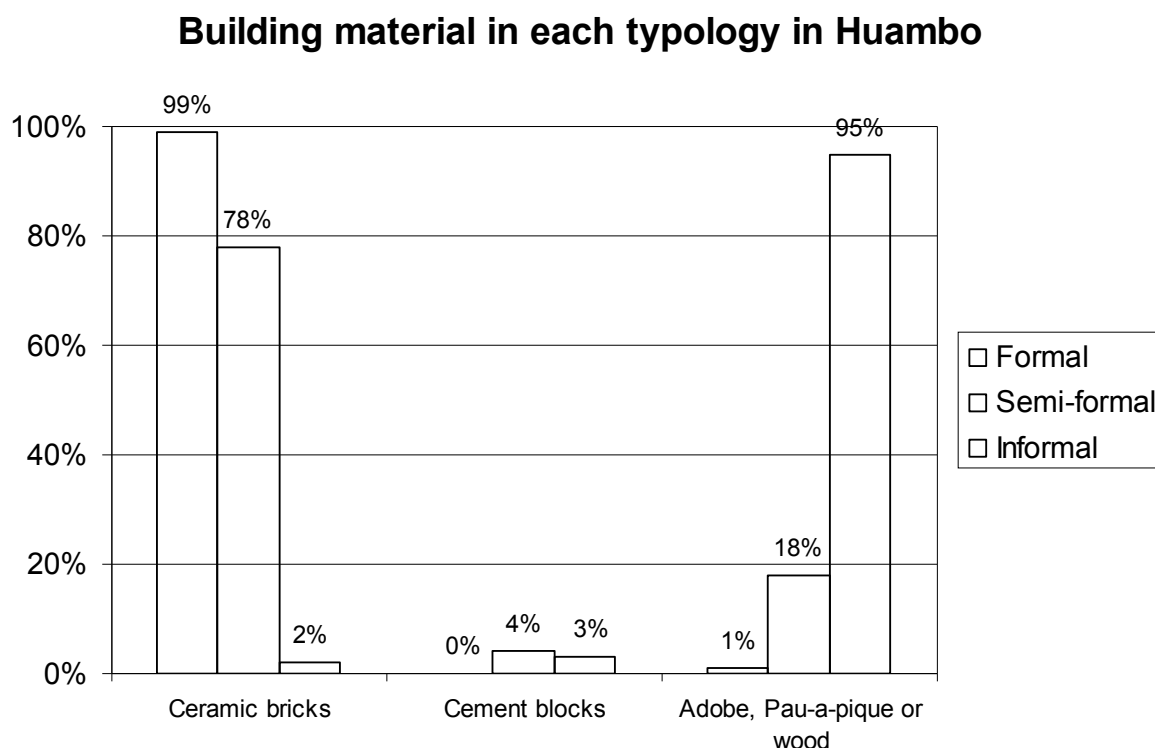
Quality of building material in Huambo varies according to settlement typologies as demonstrated in the following table.

Table 20: Ranking of Indicator 3: Durable Structures in Huambo

Typology	Building material	Ranking	Roof and floor material	Ranking
Formal	Tijolos and cement blocks	**1**	Telhas and corrugated iron	**1**
Semi-formal	Cement blocks and adobe bricks	**2**	Corrugated iron	**2**
Informal	Adobe bricks (and approximately 5% cement blocks)	**3**	Corrugated iron and thatched roofs	**3**

The demographic analysis revealed a general population of approximately 300,000 in Huambo, of which approximately 250,000 live in informal and semi-formal settlements in peri-urban areas. Based on the estimation that approximately 80% of the houses in these areas are made of

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[39] Pesquisa Terra de 2004   Zonas informais e semi-formais

adobe bricks, it can be concluded that approximately 200,000 people or 65% of the population lives in such houses.

6.4   Indicator 4: Access to Safe Water

Due to different climate conditions, access to water is generally much easier in Huambo than it is in Luanda. The informal water market of cistern trucks is only active during the peak of the dry season in Huambo.

The residents of the City of Huambo have access to three principal sources of potable water:
Domestic connection to the public water system
Public water taps (chafarizes)
Protected wells and boreholes with manual pumps (cacimbas melhoradas com bombas manuais)

Public water taps and improved water pipes with manual pumps have the same ranking as they provide similar access to water based on two different technologies.

The main water source for the majority of households in Huambo is traditional wells, as 46% of households have their own well, and another 28% of households use a neighbour's well. Another main water source used by more than 10% of households are protected wells or boreholes with manual pumps mostly built by NGOs such as the Red Cross and Development Workshop during the war.[40]

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[40] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

Figure 24: Main Source of Water in Huambo

Huambo - main source of water
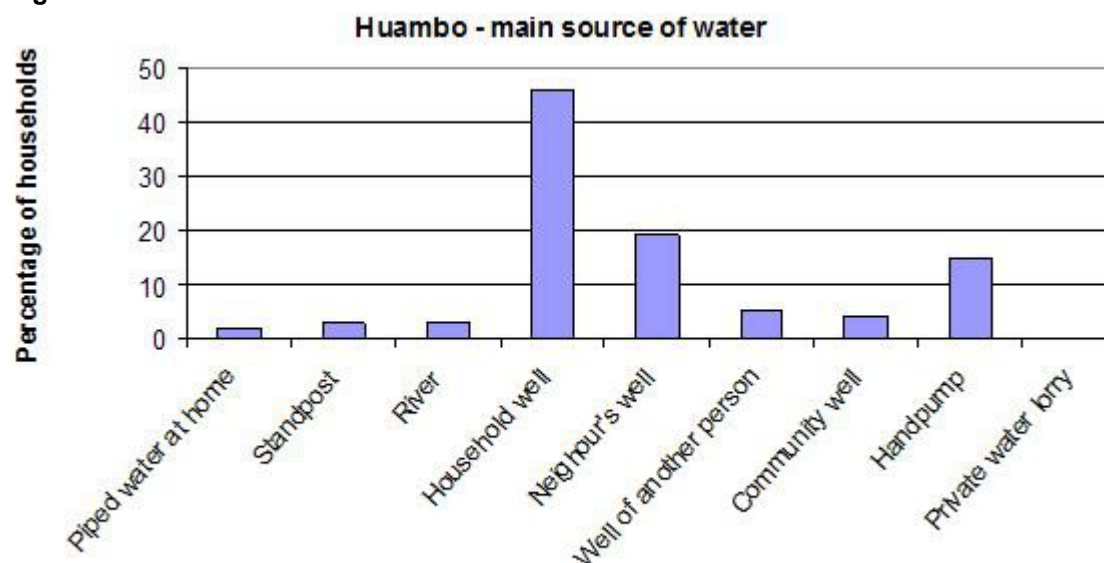
The following graph demonstrates the main source of water according to types of housing which reflect settlement typologies besides apartment blocks that are located in formal settlements.

Figure 25: Main Water Source in Each Typology in Huambo

Huambo - main water source by type of housing
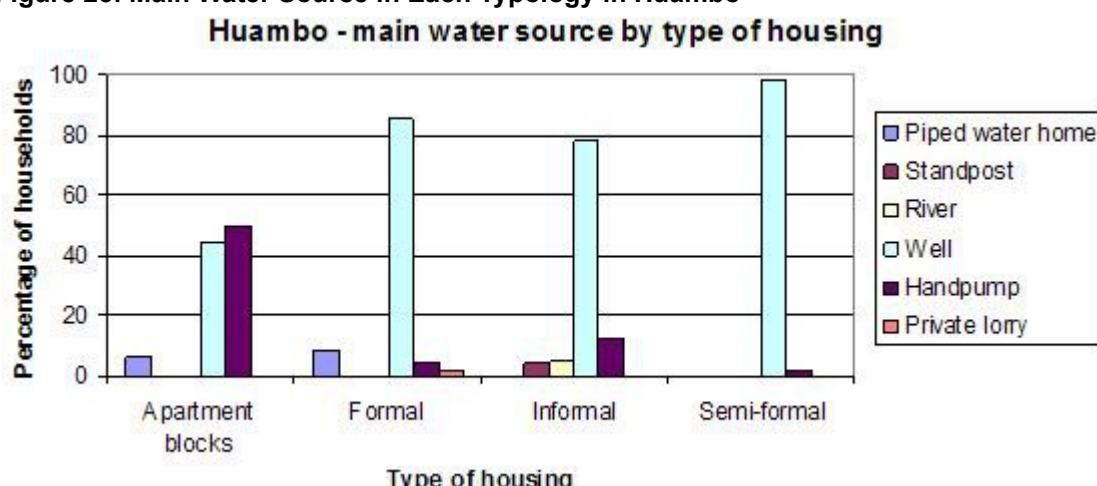
Traditional wells are the most frequently mentioned main source of water, by far, in all types of housing except apartment blocks where the main source of water are manual pumps. In Huambo, manual pumps are an important alternative source of water, particularly during the dry season when traditional wells dry up. The river is also an important source of water in the dry season. Standpipes, which provide similar access to water as manual pumps are not as common in Huambo as in Luanda. The public water pipes are only mentioned as a main source of water in a small part of formal settlements. According to a study carried out in 2008, only 3.25% of households in formal settlements have functioning piped water and another 32.5% have a connection to piped water that does not supply water. Although a large part of semi-

formal settlements have connections to the public water pipes, only a small part of them was functioning in 2008. [41]

Figure 26: Connection to Public Water Supply in Each Typology in Huambo
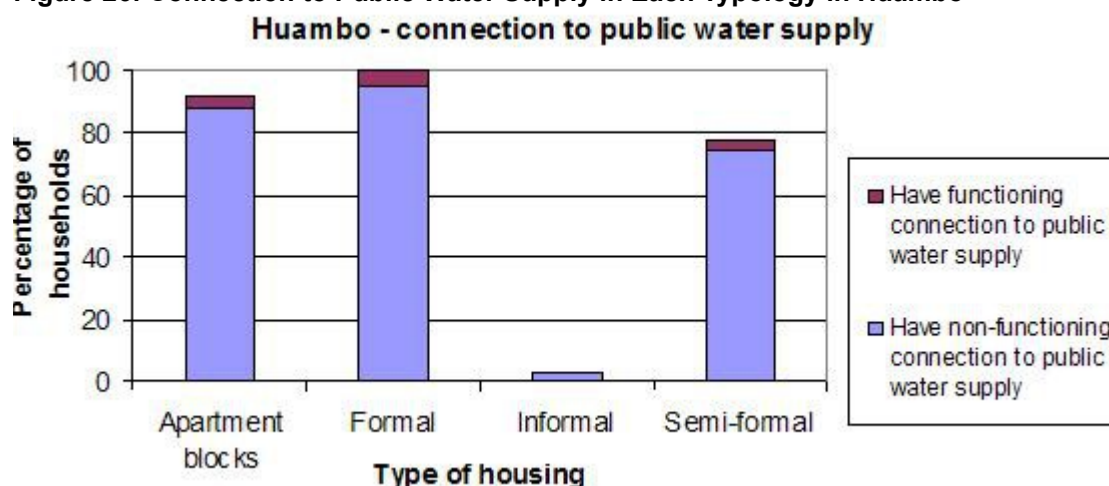
Manual pumps, which provide water from protected wells, are much more common in Huambo than public water taps (standposts). During the war, NGOs (the Red Cross and Development Workshop) funded programmes for the digging of wells and installation of manual pumps in formal and informal parts of the city. In some areas, where water could only be found at a certain depth or water in the upper levels of the soil was of poor quality, boreholes with manual pumps were installed. These programmes of wells and boreholes are managed by a committee which has a small fund with contributions from the users to guarantee operation and maintenance. [42]

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[41] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

[42] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

Figure 27: Access to Standposts or Manual Pumps in Each Typology in Huambo

Huambo - percentage of households who mention access to water through standposts or handpumps
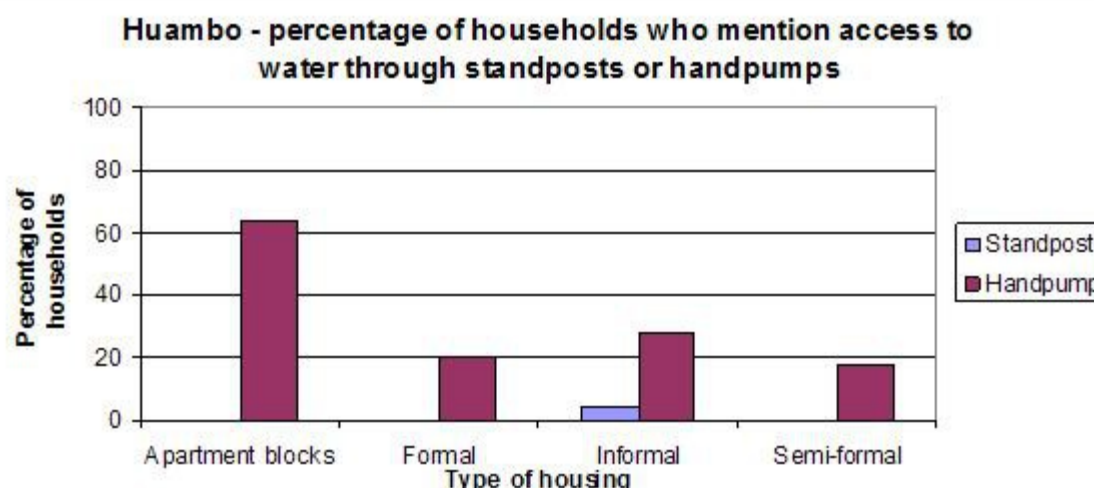
In 2008, there were more than 190 improved water points with manual pumps in Huambo, the majority of which were constructed by DW as of 1997. There are only 21 public water standpipes in Huambo, which were financed by the provincial government in 2007 and 2008, as illustrated on the following map. Of these 21 taps, only 13 were operational in May 2008, which means that eight taps were still not connected to the public water network.

A large portion of the population in the peri-urban areas is located close to the improved pipes or taps. However, there are still vast areas where the only water source is traditional wells which may be contaminated due to deficient sanitation and possibly spread diseases such as cholera. Almost all households in semi-formal settlements use traditional wells and a vast majority in both formal and informal settlements (see the following graph). [43]

Figure 28: Access to Traditional Wells in Each Typology in Huambo

Huambo - percentage of households who mention access to water through traditional wells
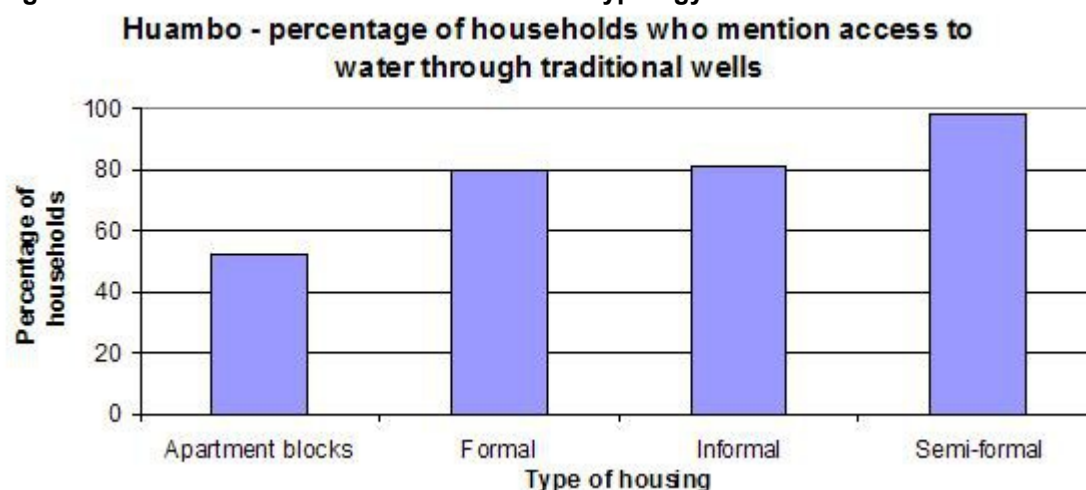
It is likely that households will continue to use traditional wells given the easy access it provides to water and the lack of alternatives. When households do not have their own well, they very often have access through the well of a neighbour, or a community managed well, usually free of charge. According to the water study of 2008, water is generally free in the city of Huambo and residents generally feel that it is inappropriate to charge other households for water.[44]

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[43]Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

[44] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

The main benefit of having a well is its proximity to the dwelling (a mean distance of 50 metres), which makes it easily accessible. Only domestic connection to public water pipes is closer to the house. The mean distance to other sources of water is significantly more, particularly to standpipes (600 metres), which are located in sparsely populated areas to the north of the city. The mean distance to the main water source is greatest for apartment blocks in the formal part of the city, which are the least likely to have a household well and where people generally have to walk to a manual pump to obtain water. [45]

Figure 29: Mean Distance to the Main Source of Water in Huambo

Huambo - mean distance to the main source of water
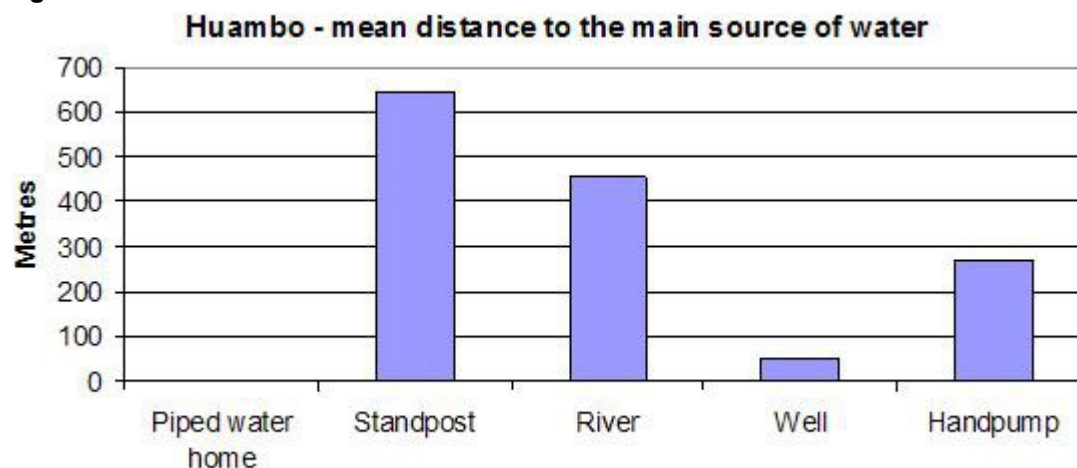
Table 21: Ranking of Indicator 4: Access to Safe Water in Huambo

Typology	Water source	Population	% of total population	Ranking
Formal	Connection to public water pipes, manual pumps and traditional wells	24,558	8%	**1**
Semi-formal	Traditional wells	7,578	3%	**3**
Informal	Traditional wells, manual pumps and standposts	262,968	89%	**2**
Open space		1,818	1%	
TOTAL		**296,922**	**100%**	

6.5   Indicator 5: Access to Improved Sanitation

According to a study from 2008, the majority of households in formal settlements have a toilet that is linked to the sewage system. The only other sanitation facility used in these areas are septic tanks, which are also considered to be improved sanitation. The situation is quite similar in semi-formal settlements, although there a small portion of households use dry latrines, which are not considered very hygienic. The most common sanitation facility in informal settlements are septic tanks, but a considerable part of households have dry pit latrines and some do not

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[45] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

have access to any sanitation facilities and defecate in the open air (1% of the overall number of households).[46]

Figure 30: Sanitation Facilites in Each Typology in Huambo

Huambo - household sanitation (toilet or latrine)
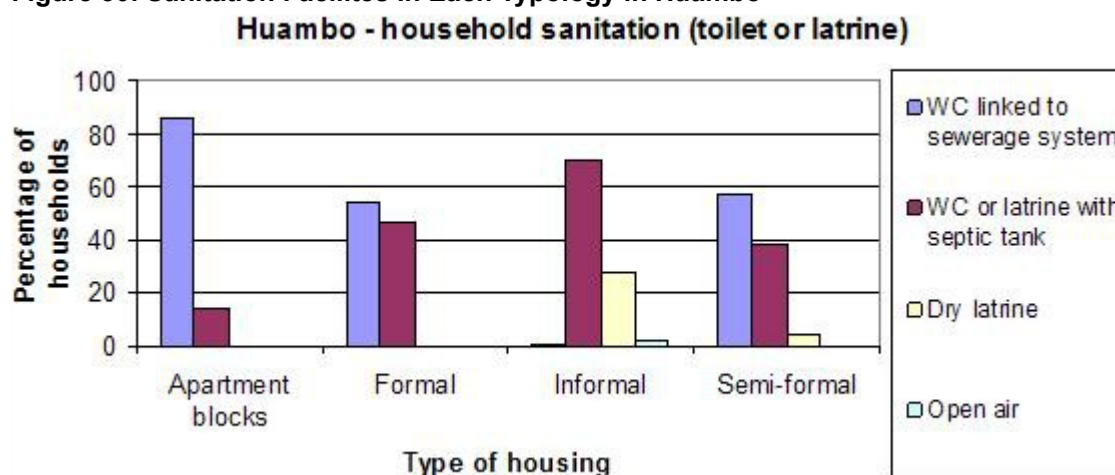
One of the main sanitation risks in Huambo are waterborne diseases such as cholera due to deficient sanitation which contaminates the upper level of the soil and water table and consequently shallow traditional wells. This occurs in particular where latrines are located close to the wells or where septic tanks are emptied on the surface (in gardens or waste land) and left there while it dries and stabilises before being used in fields and gardens. Such diseases also occur in very poor areas where households whose main source of water is a river defecate in the open air. Observations also suggest that there still exists a low awareness among some of the population in relation to risks of water consumption from traditional wells and rivers.

Solid waste removal is very efficient in the formal part of Huambo with garbage bins and containers on practically every street corner. Thus, the city centre is much cleaner than Luanda. Solid waste removal is less regular in semi-formal settlements, although garbage is generally not a serious sanitation problem in these areas. On the other hand solid waste removal is completely lacking in most of the informal settlements where garbage can cause severe sanitation risks.

The following table demonstrates the scores of each sanitation sub-indicator according to settlement typology in Huambo.

Table 22: Ranking of Indicator 5: Access to Improved Sanitation in Huambo

Typology	Sanitation facilities	Ranking	Solid waste removal	Ranking

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[46] Development Workshop, *Beneficiary Willingness & Ability to Pay Assessment for Water Services in Huambo*, May 2008.

Formal	Sewage system or septic tanks	1	Regular	1
Semi-formal	Pit latrines or septic tanks	2	Irregular	2
Informal	Pit latrines or occasionally septic tanks and some without any facilities	3	No solid waste removal services	3

7   Geographic Analysis of Indicators

One of the main purposes of SNIT is to geo-reference data for each of the five indicators in Luanda and Huambo in order to be able to measure levels of poverty and monitor the progress towards attaining the MDGs at local levels in these cities. This allows accurate mapping of the socio-economic situation in different areas of the two cities and locating service catchment areas and gaps in access. The information system is particularly useful in the Angolan urban context where there is general lack of other forms of local level socio-economic data. The SNIT will help government administrators and planners at all levels to problem zones and plan investments for areas in need of specific interventions.

7.1   Demographic Analysis of Each of the Five Indicators

The demographic analysis revealed the number of people living in each settlement typology. Thus, if the percentage of households with safe tenure, that lives in durable structures and has access to safe water and sanitation is known for each typology, it is possible to calculate the number of people that are most negatively affected by each indicator and in need of better services.

It is also possible to locate areas with very high densities of people requiring better services from the population density maps of the two cities and the mapping of typologies that were defined as overcrowded. The demographic analysis shows that 76% of the total population of Luanda lives in old and peripheral musseques and approximately 89% of the total population of Huambo lives in informal settlements, where there is limited safe water, sanitation and title security. Thus, it is possible to locate areas with very high densities of people requiring better services.

7.2   Poverty Mapping Based on the Combined MDG Indicators

The ranking of all five MDG indicators combined was calculated for each city in order to be able to detect the settlement typologies which are most severely affected (see the following table).

These calculations have revealed that it is usually the same typologies that rank low on all five indicators (peripheral musseques in Luanda and informal settlements in Huambo), while other ones rank high on all of them (urban areas and bairro popular in Luanda and formal areas in Huambo).

This allows overlying the maps ranking each indicator and creating an integrated poverty map where the poorest settlement typologies in urgent need of better services can be located.

Municipal Poverty Maps can be developed for each urban municipality and be used in preparing municipal development plans and contribute to the annual budgeting processes in these municipalities.

Table 23: Luanda urban poverty indicator matrix

Settlement Typology	INDICATOR 1 Ranking Overcrowding (People per km^2)	INDICATOR 2 Ranking Secure tenure	INDICATOR 3 Ranking Durable structures (Building and roof material)	INDICATOR 4 Ranking Access to safe water (Source of water)	INDICATOR 5 Ranking Access to improved sanitation (Sanitation & solid waste removal)	MDG URBAN INDICATORS Overall ranking
Old Urban Centre	1	1	1	1	1	1.0
New Suburbs and Condominiums	1	1	1	1	1	1.0
Bairro Popular	1	1	1	2	2	1.4
Social Housing Zones	1	1	1	2	2	1.4
Owner-built on Planned Sites	1	1	1	2	2	1.4
Peripheral musseques	1	3	2	3	3	2.4
Transitional musseques	2	2	2	3	3	2.4
Organized musseques	2	2	2	3	3	2.4
Old musseques	3	3	2	3	3	2.8
Industrial Zone	n/a	1	1	2	2	1.5
Rural Settlements	1	3	3	3	3	2.8

Table 24: Huambo urban poverty indicator matrix

Settlement Typology	INDICATOR 1 Ranking — Overcrowding (People per km²)	INDICATOR 2 Ranking — Secure tenure	INDICATOR 3 Ranking — Durable structures (Building and roof material)	INDICATOR 4 Ranking — Access to safe water (Source of water)	INDICATOR 5 Ranking — Access to improved sanitation (Sanitation & solid waste removal)	MDG URBAN INDICATORS — Overall ranking
Formal	1	1	1	1	1	1.0
Semi-formal	1	2	2	3	2	2.0
Informal	2	3	3	2	3	2.6

8   Recommendations

The data collected to date is based on sample studies performed in specific areas in the two cities and focus group discussions. Some generalizations have been made for each typology based on this data, which is not statistically significant for each typology. The next stage in developing the SNIT will be to validate the data in each typology area using a quantifiable questionnaire incorporating the Poverty Score-Card supplemented by observation and verification of findings by key informants.

It is recommended to regularly gather detailed data for each typology on the sub-indicators used to measure the performance of each of the five indicators stipulated by UN Habitat on an annual or bi-annual basis in order to track progress on MDG achievement. The cartographic data and monitoring framework developed by SNIT will greatly facilitate the collection of such data, as well as technical capacities that were developed at the national and local government level during the research process.

Geographical information must be updated annually or bi-annually as new cartographical and satellite imagery becomes available. The mapping of the expansion zones of the two cities must be kept up-to-date and the team trained in remote sensing techniques should update the geo-referenced demographic model on a regular basis.

Annual monitoring bulletins of progress against the MDG indicators, using the current monograph as a baseline, should be produced and disseminated annually for both Luanda and Huambo and shared with the provincial decision makers and planning authorities in both cities. Annual provincial workshops should be held involving Government, academic and research institutions and civil society in order to discuss the progress against the MDG indicators.

Training workshops should be held with national and provincial level physical planning and urban policy institutions in order to disseminate the current study and to explain how the SNIT's monitoring tools and the resulting information produced can be incorporated into the practice of the designated institutions.

The implications of the SNIT and the finding of the current study should be considered by urban policy-makers and physical and economic planners. It is evident from the study that a sustainable approach to urban development against the MDG indicators must be broad based and incremental. For example, progress against Indicator 2 on the Security of Land Tenure, suggests a participative approach to urban upgrading that does not forcibly remove large numbers of existing occupants.

Improvement in the quality and extension of urban service networks will have a far more significant impact on MDG Indicators than high cost prestige demonstration projects that impact on only a few people. Relatively low-cost and simple actions can have an immediate and significant impact on the MDG Indicators. Examples are:

> Promotion of building low-cost improved latrines in households that are unlikely to be served by water-born sewer systems in the medium term future;
> Extension of community standpipe networks so that musseque communities gain access to water within 100 meters of their homes;
> Simplifying land registration procedures so that existing residents living in areas that are considered upgradeable can improve their tenure security;
> Long-term planning of unoccupied areas in order to create organized urban neighbourhoods which facilitate the installation of urban infrastructure.

In Luanda the SNIT has identified the geographical areas, where indicators are the most critical. This information can be used by planners to identify where investment in upgrading services will have the most impact on the majority of people. A step-by-step strategy for

reducing poverty in these areas could involve initially upgrading inadequate or non-existing services to intermediate levels such as shared community standposts where household water connections are not yet feasible or affordable; and the provision of storm drainage to areas that have a high risk of flooding. Such investments will have an immediate and large scale impact on the lives of families living in these areas and show a significant improvement in the MDG Indicators.

9 Conclusions

The main purpose of SNIT is to have an affect on policy making in order to meet the UN millennium development goals. It is necessary for governments to have access to reliable and regularly monitored information in order to be able to make objective policies with the aim of reducing poverty. The national and local governments have already demonstrated their commitment towards creating such a monitoring data base by participating in the development and implementation of SNIT. The participation of local administrations in this project has also created important research capacities for future collection and monitoring of SNIT data.

Policies have already been influenced by SNIT related data, particularly on land tenure with the following documents which are included in annexes of the present project:
   a) Preparation of a regulation of the Land Law on upgradeable rights, based on the principles of the Habitat Agenda;
   b) Preparation of an orientation guide to regulate urban and rural land;
   c) Implementation of pilot-projects on participative urban planning and occupation of land in collaboration with INOTU, IGCA and provincial governments;
   d) Promotion of micro-credit housing loans through the mobilization of housing credit support funds using the upgradeable housing model.

Urban poverty reduction is an enormous task in cities like Luanda and Huambo which have suffered the affects of decades of conflict. The massive shift of populations from rural to urban areas during these years has compounded the problem. The continuing rapid population growth often hides real progress and the impacts of increasing infrastructural investments and projects realised due to the parallel growth in demand. The National Territorial Information System (SNIT) can be an invaluable tool in monitoring the needs or "demands" for urban services in a manner that will assist state and non-state actors to plan their strategies to more effectively "supply" these services.

Annex A: Security of Tenure:

Documents that can be used as evidence of tenure.
• formal title deeds to both land and residence;
• formal title deeds to either one of land or residence;
• enforceable agreements[5] or any document as a proof of a tenure arrangement
• formal rental contracts (tenant households);
• customary tenure or irregular occupants, with tax payment documents (property tax, municipality tax
• customary tenure or irregular occupants who possess utility bills.

Evidence of perceived protection from forced evictions
Data for this indicator can be obtained through households surveys asking several questions about the perception that individuals have about their own tenure security. Household survey questions may include:

- If there is a political change (country/city) do you think your documents proving secure tenure status will still be protecting you from eviction? Yes/ No
- Do you think that there is a possibility that you could be evicted from this dwelling without due legal process? Yes/ No
- If yes, by whom? By my spouse / By other family members / By the public authorities / By my landlord.

Annex B: DW Poverty Score Card Questions

1. **Floor Material**
Wood	☐ 1
Marble	☐ 2
Granite	☐ 3
Cement	☐ 4
Ceramic tiles (tijolo)	☐ 5
Adobe	☐ 6
Beaten earth	☐ 7
Other	☐ 8
(specify)	

2. **Building Material**
Ceramic Bricks	☐ 1
Cement Blocks	☐ 2
Adobe	☐ 3
Pau-a-pique	☐ 4
Grass	☐ 5
Other	☐ 6
(specify)	

3. **Type of Energy Used to Cook**
Electricity	☐ 1
Gas	☐ 2
Petrol	☐ 3
Coals	☐ 4
Firewood	☐ 5
Animal Manure	☐ 6
Agricultural Distposal	☐ 7
Other	☐ 8
Do Not Cook	☐ 9

4. **Does the Household Have a Fan?**
Yes	☐ 1
No	☐ 2

5. **Does the Household Have a Telephone?**
Yes	☐ 1 (landline or cellphone?)
No	☐ 2

6. **Does the Household Have a Radio?**
Yes	☐ 1
No	☐ 2

7. **Does the Household Have a Television?**
Yes	☐ 1
No	☐ 2

8. **Does the Household Have a Bycicle?**
Yes	☐ 1
No	☐ 2

9. **Does the Household Have a Motorbike?**
Yes	☐ 1
No	☐ 2

10. **Where Do Household Members Usually Do Their Necessities?**
Connected to the sewage system	☐ 1
Septic tank	☐ 2
Dry latrine	☐ 3
Open ditch	☐ 4
Open pit (poço roto)	☐ 5
River or lake	☐ 6
Bucket	☐ 7
Grass, field or open air	☐ 8
Other (specify)	☐ 9

11. **When Was the Last Time a Member of the Household Read a Newspaper?**
Today or Yesterday	☐ 1
In the Last 7 Days	☐ 2
In the Last Month	☐ 3
In the Last Year	☐ 4

12. **What is the Main Source of Potable Water for the Household?**
Piped Water in the residence	☐ 1
Piped Water in the building or from a neighbour	☐ 2
Neighbour Tank	☐ 3
Public standpipe	☐ 4
Manual water pump	☐ 5
Protected well	☐ 6
Traditional Well	☐ 7
Protected water source	☐ 8
Unprotected water source	☐ 9
Rain water	☐ 10
Marsh or river	☐ 11
Cistern Truck	☐ 12
Bottled mineral water	☐ 13
Other (specify)	☐ 14