

# **A DIACHRONIC STUDY ON THE URBAN GROWTH OF DAKAR YEAR 1988, 1998 AND 2007**

Presented by DIALLO Ngagne  
PGD in GIS and Cartography  
Gis analyst in the Cadastre of Senegal  
*Republic of Senegal*  
*Ministry of Economy and Finance*  
*DGID/Cadastre*

## **Abstract**

Urban evolution is a situation which concerns a very significant problem in today's world. Urbanization is growing at a rapid rate in cities around the Globe. The Percentage of advancement of the urbanisation is due to many factors depending on the specificity of each country. Of particular interests are socio-economic and environmental impacts.

There is the need for studies in the field of urbanisation to incorporate appropriate town planning using relevant applications such as space technology like remote sensing, Geographic Information Systems (GIS) and cartography. Such applications which are particularly necessary for the understanding of urban evolution for the improvement on the quality of life of inhabitants are lacking especially most of African countries.

The aim of the paper is to provide an insight into the use of GIS and remote sensing as decision support tool in Urban Management System (UMS). The urban management issues are considered as a means of solving some of the current problems such as appropriate allocation of habitation zone and suitable set up of infrastructure.

The city of Dakar has a population of 1,030,594 (2005 estimate) inhabitants representing more than 45 % of the total population of Dakar (2,452,656) has been selected as a case study. It was selected due to the high rate of urban change directly linked to people seeking better quality of life. The analysis therefore reveals the reality on ground and the expected results suggests some re-orientation in the urban management system.

**Key Words:** urban management system (UMS), space technology, remote sensing, Geographical information system (GIS).

## **1. Introduction**

### **- Presentation of Dakar**

A former village of fisherman, Dakar means “Dakhar” which is a tamaranian tree in Wolof, one of the national dialect in Senegal. It was invaded by colonists during the XIXe century. Dakar is the political and economical capital of Senegal and is the most developed area of the country despite its small size; it is the seat of many international organizations. It shelters also the whole of the institutional structures of the country. Its economic and demographical concentration makes it an important business district. It is also the main routes to international markets because of its seaport and airport. Dakar has a concentration of 90 % of commercial and industrial activities of the country.

### **- Geographical characteristics**

Dakar is situated in the western part of Senegal and open into the Atlantic Ocean to the west. It has an area of 550 km<sup>2</sup> and covers completely the peninsula of the Cape Vert. The area has is tropical climate with the rainy season from June – October and average annual rainfall of 150 mm. Average temperatures vary from 17 – 31°C. In the rainy season the wind blows from the sea, in the dry season the harmattan sweeps seaward from the Sahara. The natural resources of the region include fish, peanuts, phosphate, iron ore, gold, titanium, oil and gas and cotton. The fishing sector has replaced the groundnut sector as Senegal's export leader.

### **- Demographic characteristics**

The urban community of Dakar comprises of Pikine, Guédiawaye, Rufisque and Bargny. The population of Dakar had reached a threshold of 300 000 residents as at independence in 1960. With a density of approximately 4,000 residents/km<sup>2</sup>, Dakar has political, administrative services and cultural diversity which is a cosmopolitan haven for two million residents, Although the area coverage of Dakar is less 0.3 % of the national territory, it shelters more 25 % of the total population of the country, which as at 2005 is estimated as 11,658,000

## **2. The Problem of Urbanisation of Dakar**

Before the colonization by the Europeans, majority of the population of Dakar was distributed towards the coast. This was to develop fishing activities because of the strategic position of Dakar and the wealth of its coastal zone. Urbanization during the colonial period was marked by forms of racial and social

segregation, often expressed in terms of health and hygiene, which continue to structure the city till the present time. The land use was fully controlled by the colonialist and the distribution was also done by the colonial administration. This situation has brought an urban management problem, with needs now growing with respect to employment, education, health, hygiene, infrastructure, among others which are related directly to urban management plan. The high urban growth rate in Dakar, Senegal, has strained municipal water supply and sanitation services (Faruqui et al, 2002)

### **3. Typology of the urban screens of Dakar**

The history of human habitation in Dakar - at least in documented form - begins on the nearby island of Gorée. Three major types of communities in Dakar include the traditional, irregular and regular habitations.

- The traditional habitation

The traditional habitation was the first occupation area of the Dakar people. It is characteristic being that it has a pattern mainly towards the beach side. Its population is made up of the lébou (fishermen in Wolof).

- The irregular habitation

The irregular habitation occupies a very important percentage in the urbanization of Dakar.

- The regular habitation

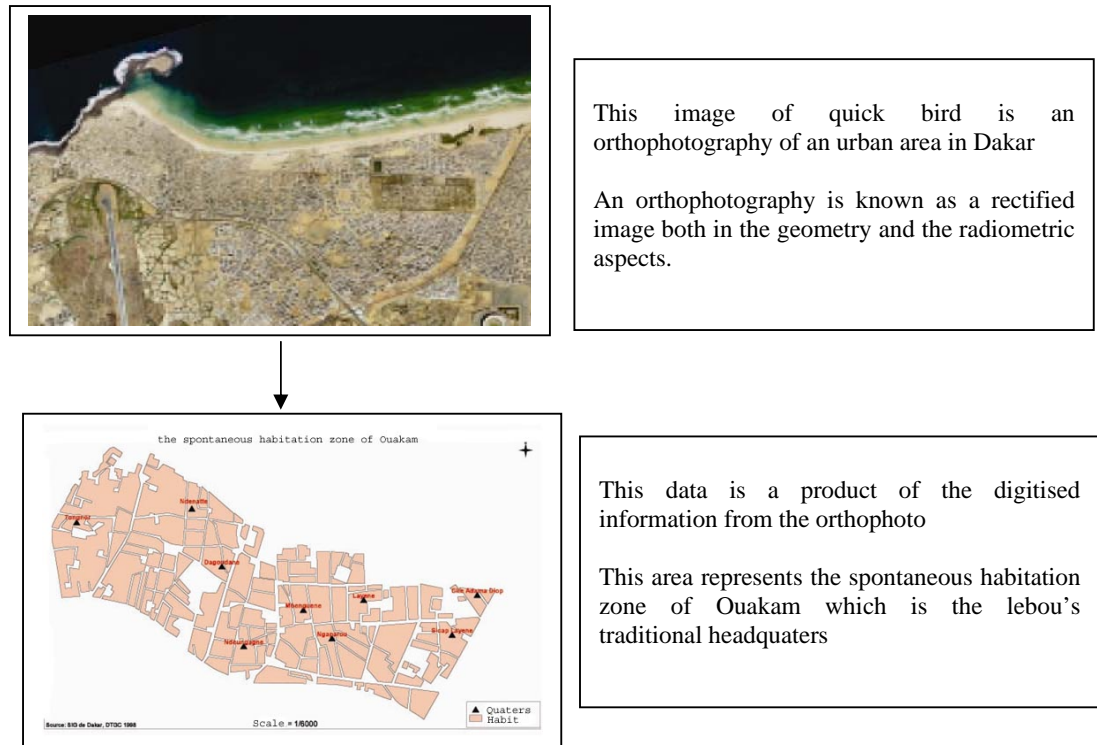
Large public expenditure for infrastructure was allocated by the colonial authorities leading to the development of regular habitation in the 19<sup>th</sup> century.

### **4. Urban evolution of Dakar**

#### **- The dynamism of the urban**

The city of Dakar has a population of 1,030,594 (2005 estimate) inhabitants representing more than 45 % of the total population of Dakar (2,452,656) (*Source*, Wikipedia). Within the whole of Senegal, Dakar is considered to have the highest urban change due to many facts like exodus, poverty, etc. The analysis gives an insight into the on ground and the results are expected to suggest some re-orientation in the urban management system. The metropolis of Dakar is presently with a varied urban screen of regular habitat to irregular in its major parts. The town of Dakar, within the framework of the economic and social life and pole of attraction, is confronted, in its evolution, with various problems. The acts of the fast demographic trends, the insufficient infrastructures and the land occupation are not properly managed. These problems are currently worsened by the rural migration and its corollary: irrational occupation of space, poverty which takes alarming proportions and of the populations which do not have any more essential access to basic services.

The dynamism of the urban occupation constitutes an important factor in the city planning of Dakar. The usage of the modern techniques like space technology in this domain currently plays a vital role into the extraction of data and analysis of dynamic urban areas (Figure 1).



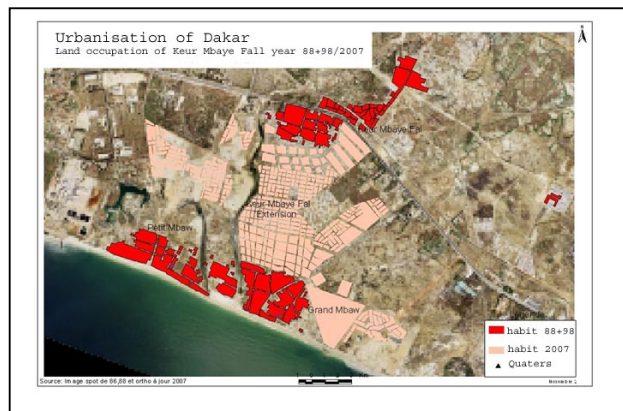
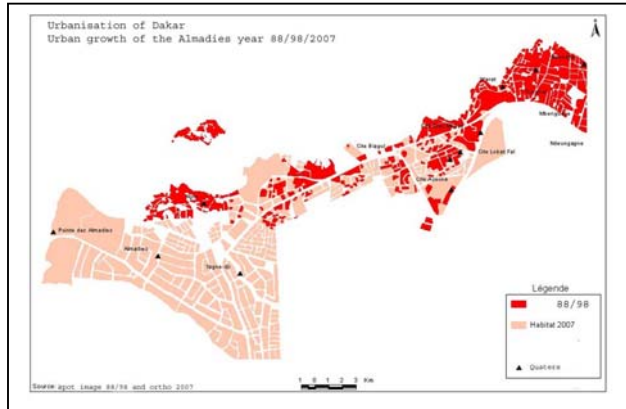
**Figure 1 : Modern techniques for analysis of dynamic urban areas**

- **A diachronic analysis of year 1988-98 and 2007 satellite images**

The method of temporal analysis of satellite image is a process which makes it possible to separate the permanent structures of occupation from the ground by estimating their annual variations. It finds its application in the field of the urbanization. Thus, multi temporal analysis is very essential in making diachronic studies for accurate estimation of the urban changes for improved decision-making. In this case study, the data used were obtained from quick bird orthophotography and spot images of Dakar taken in 1988-98 and 2007.

The study attempts through a diachronic and comparative analysis of three different dates (1988, 98 and 2007) to show the impact of the urban operations on the space occupation of Dakar. Thus the results of the analyses on the orthophotography (quick bird image rectified) and of the satellite images (spot) and

overlay enabled the assessment of urban screens of space evolution on large poles such as Almadies, Keur Massar or Keur Mbaye Fall (Figure 2).



**Figures 2 : Assessment of urban screens of space evolution on large poles (Almadies, Keur Massar or Keur Mbaye Fall)**

### Urban evolution: Stakes and perspectives

It is obvious to note that despite the fact that urbanization has its advantages by providing areas of inhabitation; it also constitutes a source of many problems such as the socio-economic aspects that go with land occupation as social aspects, from where stakes and prospects are needed. The stakes of this urbanization is very pronounced as illustrated by the images using the process of space technology such as geoinformation are socio-economic natures. Thus it can note that there is need for:

- Good urban management system.
- Well distributed infrastructures in urban areas.
- Rational distribution of the equipment such as Hospital, Market, station road...

With this importance of the rural migration towards the urban zones, it very obvious that Dakar which counted 2 411 528 inhabitants in 2001 according to the estimate of the DPS/MEFP can go only in the direction of an exponential increase in the urban percentage in the horizons of 2020 (Table 1)

**Table 1 : Demographic trends for Dakar**

<b>Year</b>	<b>Demographic trends of the urban sector YEAR PERCENTAGE OF The URBAN POPULATION Compared to The TOTAL POPULATION</b>
1961	22 %
1976	32 %
1988	39 %
1994	45 %
2015	56 %

**Source :** DPS/MEFP

The continuation of this tendency will involve a rate of urbanization equal to 56,4 % in 2021 and the major part of this urban population would be concentrated in the area of Dakar which accommodates each year almost 120 000 new comers. (Source: DPS/MEFP).

### **Conclusion**

Cities in 21<sup>st</sup> century should be sustainable cities that are able to enhance the global economic competitiveness, improve the quality of life and the environment. To achieve this goal, we need to adopt space sciences and technologies in the urban planning process.

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