

## Impact of urban population on the environment of the city of Brazzaville

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**ABSTRACT:** *Urbanization is the development of a city. It is a major phenomenon that has gained momentum in recent years and almost all key cities of the world in general and Africa in particular. Brazzaville, the political capital of the Republic of Congo and the seat of central power has not remained untouched by this phenomenon of urbanization. The increase in the population of Brazzaville predicts a rise in demand for goods and services at all levels including environmental pressures from human activities. The growth of urban population feels the pressure that it exerts on the environment that goes with multiple consequences. Brazzaville is a city in the developing world where population growth in recent years and the spatial extensions have hardly allowed the establishment of a specific framework to fight against environmental problems. This requires the implementation of an appropriate urban governance to fight against environmental pressures.*

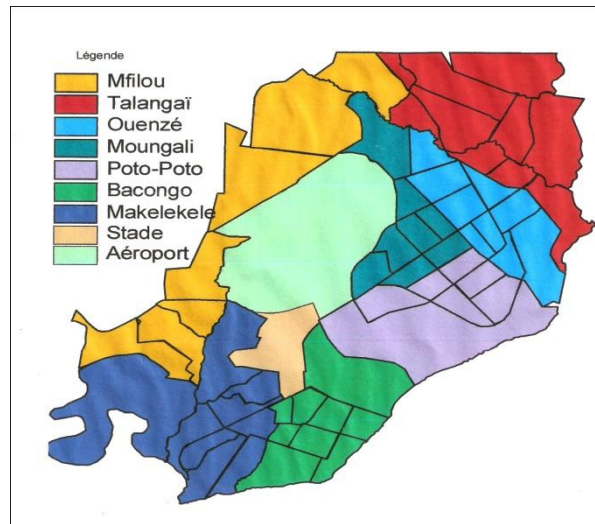
**KEYWORDS;** *Impact, urban population, environment, city, Brazzaville*

### I. INTRODUCTION

Urbanization is a phenomenon that affects all countries in the world with a population growth and the proliferation of cities. This is a phenomenon which deflects the inevitable and affects all cities of Africa south of the Sahara. This phenomenon of urbanization that continues to preoccupy African States has particularities and continues exponentially. It reached an alarming stage leading to a spatial growth and defies all predictions made in terms of urbanization and land use. The surrounding villages are swallowed up and disappear in favor of suburbs that are born haphazardly. Brazzaville, one of the cities of Africa in recent years knows very rapid population growth due to the influence and its many functions it performs. These functions are political as well as administrative and social, as it is the first city in the Republic of Congo and the seat of the central government. In tropical countries, urbanization continues and has taken a rapid pace (Vennetier, 1967). The city of Brazzaville is in contrast with a dynamic socio-spatial recomposition (Ziavoula, 2006). The population growth has major impact on the environment of the city of Brazzaville. This impressive urbanization has its roots in the rural exodus (Vennetier, 1990). This article proposes to study the environmental problems of the city of Brazzaville, when we know that these are the result of the growth of the urban population. This article first examines urban growth, then the environmental problems (pollution, global warming climatic, transport, waste, noise ... ..) and finally proposes ways or approaches to fight against environmental pressures. These are the main objectives of this work.

### II. STUDY AREA

Brazzaville is the political capital of the Republic of Congo, and the first settlement of the country. It is located on the right bank of the Congo River. Brazzaville was administratively divided into 7 districts until 2011 are; Makélékélé, Baongo, Poto Poto, Ouenzé, Talangai, Mounkali, Mfilou and as shown in this figure (**Fig. 1**).



**Fig 1; Districts and Neighborhoods of Brazzaville**

But due to the spatial growth of the city, two other districts were born. This is singularly Djiri and Madibou (2011) City with multiple functions, Brazzaville annually attracts many new citizens who come from everywhere. It is located in the department of pool. It is bounded north and south by the department of the pool, to the east by the Congo River and to the west by the department of pool. The geographical coordinates of the city of Brazzaville; 4 degrees south latitude 16, longitude 15degrés16 is. His current area of 263.9 km<sup>2</sup> and a population of 1. 373.382 inhabitants (CNSEE 2007) or a density of 5204hab / km<sup>2</sup>.

### III. THE REVIEW OF THE LITERATURE

The research literature on the impact of the urban population on the environment of the city of Brazzaville part of the urban crisis and environmental problems facing cities around the world in general and the cities of the Third world in particular. In the current context of the evolution of the urban population of Africa south of the Sahara in general, and particularly Brazzaville important reforms should be considered to meet the needs of the population and save the hazards environment. Mutations in the world today; these authors (Ziavoula 2006; Dorrier Apprill 2006a) speak of the urban environment of Brazzaville, particularly waste management districts and streets of the capital city are still littered with rubbish. Environmental problems are caused by the rapid growth of urban population (Balkiabiya, 2008). The urban growth in a city raises the very important environmental problems. These include access to water problems, electricity and basic services like transport, hospitals, and training (Dorrier Appril, 2006b Allessembaye, Louembe, 2000). In the extension of Rio, was posted an institutional interest of donors to the environmental management of cities (Dorrier Apprill, 2002). The environmental management becomes increasingly crucial to the extent that it raises many concerns about the extent. Environment of urban damage is an immediately sensitive social reality. In everyday life and in everyday language, the concept of urban environment refers to a multiplicity of factors perceived as a problem in the city; pollution of air, water quality, sanitation, transport conditions, noise, landscape degradation, preservation of green space, deteriorating living conditions. (Metzger, 1994) Management of African cities in general, and in particular Brazzaville continues to cause huge problems when we know that for a long time, keep out of the cities popular mass colonization aimed. The increase in urban population thereby causes a degradation of the urban environment of the city of Brazzaville (Nzoussi, 2014).

### IV. THE EVOLUTION OF THE POPULATION OF BRAZZAVILLE

Worldwide, the urban population believes exponentially. African cities are experiencing annual population growth above 4%, compared to Asian or Latin American cities where urban growth appears to be low (Moustier and Falla, 2004) The limits of urban growth and social and environmental price (...) are still not taken into account (Miras, 2010).

The increase in the population of Brazzaville is staggering. The causes of this growth are to be found in rural-urban migration and external migration due mainly to the influx of Congolese from the other side (Congo-Kinshassa) who are in search of for better and sometimes cross the Congo river to swim and at the peril of their lives living. This event has taken an alarming pace. That is why there is need to put an end to this migratory soaring, the government of Brazzaville triggered operation called the 'slap of seniors' following what the more than 400,000 undocumented were deported and expelled. It should be noted that the evolution of the urban population of the city of Brazzaville is explained not only by rural-urban migration but also by structural

adjustment policies that have strengthened the disengagement of the state in rural areas (Priopode, 2005) .The two Figure (02) shows the evolution of the population of Brazzaville from 1900 to 2005.

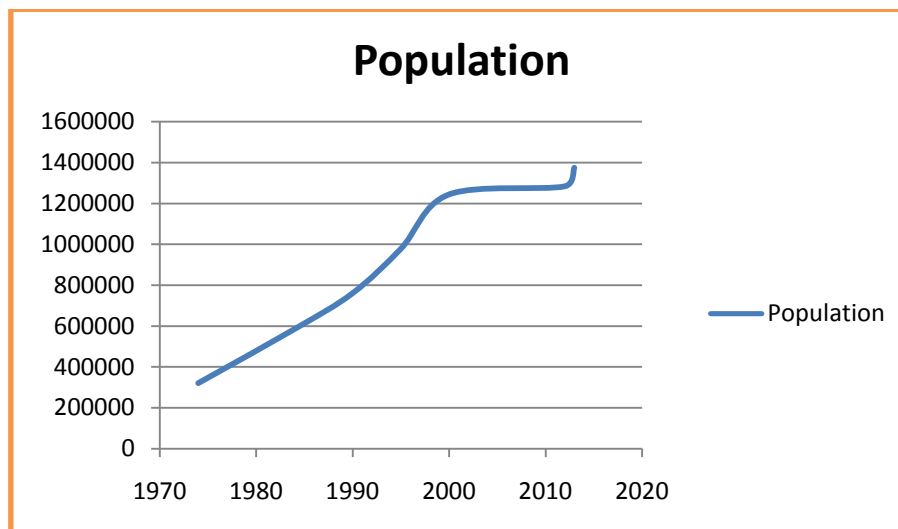


Fig. 2; Evolution of the digital population of Brazzaville from 1974 to 2013 (NCSEC)

This figure shows the evolution of the population of the city of Brazzaville from 1974 to 2013. In fact, when looking at the figure, it is clear that the population of Brazzaville has evolved considerably over the years. She reached over a million people in the year 2000. But in recent years; natural increase is accelerated as it was during the 1980s.

#### 4.1 On cityscape Brazzaville

Tropical African cities have a particular morphology. Colonization and urbanization have totally changed the morphology of African cities. From 1950 to 1990, for example, the urban population in Africa south of the Sahara has increased up to threefold (Bocquier, 1999).

In fact, when talking about the urban landscape of the city of Brazzaville, reference is made to transport, housing, spatial planning, sanitation, energy...

Like most colonial cities, Brazzaville is a dual city. On one side is the city center, the seat of aristocrats and all urban structures. It is also the core of the city i.e. the place where the city took its origins. The central areas which are the intermediary between the city center and the suburbs. Mention may be made to Bacongo born in 1909, Poto-Poto (1911), Ouenzé, Moungali, Diata ... Finally come the suburbs born and extend a disproportionate manner with all the evils associated with urbanization. The city has gradually equipped structures and infrastructures (airport, schools. Roads, hospitals, universities.. .) before and after independence in 1960. Some countries have been destroyed during the unfortunate events 1997. But, everything was renovated and rebuilt. Clearly, the urban landscape of Brazzaville bears the mark of a colonial past with a city center wearing urban amenities, and the peripheral devices equipped with infrastructure and viable neighborhoods structures.

#### 4.2 The special districts and the distribution of population

The sex and age class brings up the differences between the boroughs. According to the districts, the percentages of women in Makélékélé 51%, Bacongo 46% to in Poto-Poto Moungali 45% to 49% to 48% and Ouenzé Talangai 50% (Balkiabiya, 2008) .Has Moungali, Poto-Poto Bacongo and the proportion is less than 5 years. It is in these districts that there is a relatively old population. In 1985 for example, the sex ratio of Bacongo and Makélékélé was around 100, and that of Moungali Ouenzé was 102, Poto-Poto 96.

Regarding the distribution of the population, it should be noted that during the general census of population and housing (GPHS), the city of Brazzaville were 585,812 inhabitants, 2,934,343 men, a percentage of 51% .The sex ratio was 100.30 in 1984. We observe the balance between the sexes. In 2002, the sex ratio was 99.6%.

The city of Brazzaville was built in the southern part of the country. The population is unevenly distributed, as the southern suburbs are home to over population, compared to the northern parts of the city where there are some sparsely populated areas. With explosions camp M'Pila in 2012 (explosion of a munitions depot on a perimeter of 5km<sup>2</sup>), the configuration of the city, in the northern part had changed completely. The

spatial extension these days seems to be for the people of the northern districts. But to acquire an area of land to construct in such a city still poses many problems. The recent report of the World Bank in 2014 indicates that the Congo has 50% of the urban poor against 75% in rural areas. It is ranked 136<sup>th</sup> out of the 182 HDI (Human Development Indicator), UNDP (United Nations Development Program) (Nzoussi, 2014c). As in most country towns in developmental urban population Brazzaville is in favor of women, who represent 51% of the total population against 49%.

In short, rapid population growth in recent years continues to pose significant problems for the urban environment of the city of Brazzaville.

## V. ENVIRONMENTAL PROBLEMS.

The environment has the great merit of force to apprehend reality to raise issues in a comprehensive manner (Pourtier, 1992). The city of Brazzaville is facing serious environmental problems that concern both the public authorities and the population. These are;

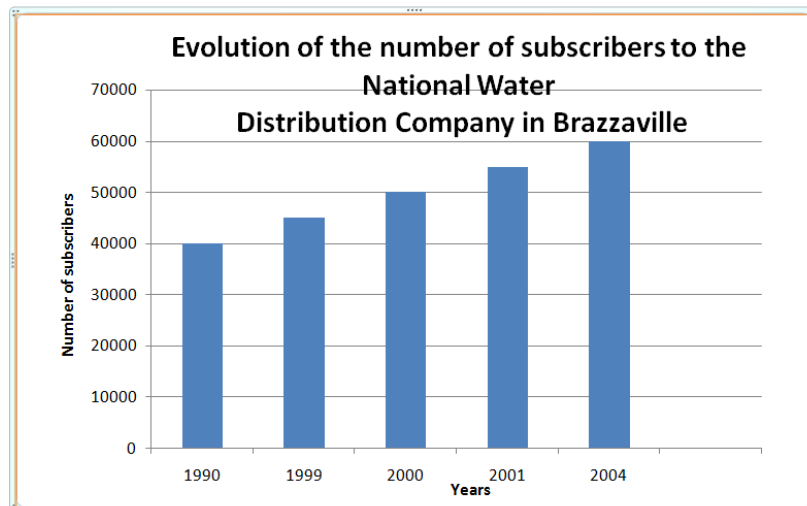
### 5.1 Water

In most cities in sub-Saharan Africa, generally in Brazzaville, the water problem is still acute. Although drained by numerous rivers (the Tsiémé, the Cooler, Madoukou, M'filou ...) and rivers including Djoué and especially the Congo River, the most powerful river in the world after the Amazon by its flow rate 40milles m<sup>3</sup> of water / s, the city of Brazzaville suffers from a glaring shortage of water. This can be seen much more in outlying areas that grow in a disproportionate manner and lack most of the urban amenities and viable. This is especially true because the suburbs are marginalized and there is the lack of infrastructure (Dureaud et al, 2000). Although being a key natural resource for life and survival, water is still scarce in Brazzaville. Forcing people to wake up very early to have recourse to wells and boreholes. Some people have developed good faith drilling around their plots for lucrative reasons 150cfa by means of 25-liter bottle is \$ 0.3. As shown in the figure below (Fig 3).



*Figure 3; Crowds of people around a borehole in Brazzaville*

In the city of Brazzaville management and distribution of drinking water was given to the NWDC (National Water Distribution Company) created 1967. This one is faced with many problems related to the obsolescence of its network and financial resources. Water supply is provided from two stations; the first is located in the existing Djoué since 1954 before the creation of the NWDC, and the second Djiri created 1986. These two resorts offer a capacity of 150,000 m<sup>3</sup> of water. In 1990, a population of 760,300 inhabitants, only 44,600 people had a subscription to the NWDC, so supplied, and 60,183 in 2004 (Balkiabiya, 2008). The water problem is felt more and more especially with the extension the city has resulted in the birth of two new districts. The following (Figure 4) represents the number of subscribers NWDC 1990 to 2004.



**Figure 4** Evolution of the number of Subscribers to the national water distribution company in Brazzaville

This figure shows the evolution of the number of subscribers NWDC 1990 2004. He to note that the number of customers grows at the same rate as the population of the city, and 2004 serves as an example. Although having mixed performance due to the above factors, said company strives to increase strategies to meet the needs of its customers.

## 5.2 Electricity

The increase in population is also accompanied by the increase and improvement of infrastructural facilities, goods and services. This is quite the opposite in the cities of tropical Africa and particularly in Brazzaville. The electrical network in Congo Brazzaville in general and in Brazzaville particular is old and date of colonization. Then it is defective and no longer meets the face of increasing urban population Brazzaville. It is characterized by repeated power cuts forcing people to resort to devices of stabilization and elevation of blood pressure. This electric inconvenience plunges many neighborhoods in the dark, lacking public lighting. Faced with this situation, the wealthy families use power generators and gas lamps while poor families for their lighting use candles and oil lamps .The table below illustrates this: (Table 1) .In Brazzaville, 82 % of the population uses the oil that is the main source of household. Then comes the electricity produced by the National Society of Electricity (NSE).

**Table1: Main source of household lighting as Brazzaville**

Source of lighting	number of urban	percentage
Electricity N.S.E	34	66%
Electricity private group	04	08%
Gas	00	00%
Oil	41	82%
Candle	16	32%
Lamp battery	01	02%
Solar Energy	00	00%

Source; *Spatial dynamics and environmental problems in Brazzaville, p.39*

The supply of electricity in Brazzaville is the typology of cities in developing countries where the duality of urban areas, made up of a core team well and poorly equipped suburbs where there is the focus of all urban ills. The electrical energy consumed in Brazzaville is provided by the hydroelectric dam Djoué built in 1957 with a 15 MW. Moukoulou dam built with Chinese cooperation in 1978 with 70.000KW. In 2010, the Congolese government had to build the dam Imboulou also with Chinese cooperation. Its capacity is 120 MW. There is also a gas plant M'Pila also opened in 2010, but destroyed during the explosions 2012.Regarding dam Djoué an extra coverage is provided by the Dam by Inga (Democratic Republic of Congo) .There is a growing imbalance between the expansion of the city and its ability to cover electrical equipment. In 2003 the number of subscribers of the NSE (National Society of Electricity was 49,298 (Antsoutsoula, 2004).

Faced with the increased consumption of electricity, before a very high demand and economic changes in the world today, Brazzaville imports electricity from the DRC (Democratic Republic of Congo) whose cost is estimated at 100 billion CFA francs or 200 million dollars. But the import of electricity from neighboring countries do not solve the thorny problem of electricity, especially in outlying areas that lack urban facilities. The impact of the urban population is visible on the environment of the city of Brazzaville.

### 5.3 Transportation

As in most cities in sub-Saharan Africa, transport to Brazzaville is a challenging problem. The central districts are still served, but the suburbs are missing almost all easily accessible because of the lack of roads and especially paved roads.

Indeed despite population growth, of the population of the city .i.e. 311,403 inhabitants in Brazzaville in 1974 and 1,373,382 people today, roads are only deteriorating making driving extra difficult. The means most commonly used are taxis and buses equipped, more suited to the middle and poor class. Taxis are about 70% of vehicles on the roads of Brazzaville (Nzoussi, 2014b) .These types of transport are more adapted to the level of neighborhoods. With 750km of paved roads, including 100 in 2008, the city of Brazzaville has a road network dilapidated. The paved roads are scarce from the city center to the periphery and especially in the new areas where they are almost non-existent (Xavier et al, 1992). Forcing carriers to focus on the major roads. The lack of channels and the intense activity of transport on main roads lead to the congestion phenomenon. In Brazzaville bus transit wear the green color. The arms and other taxes imposed by the State through the town hall (Nzolo, 2008).

With transport in Brazzaville, a real network of informal activity is developed. It is parking that has a particular impact on people's lives. Management of public space in Brazzaville is also a damaging issue between the actors who are responsible for managing the said space and people. Parking management in Brazzaville appears as a major event of the materialization of the economic and social crisis (Nzoussi, 2014a) .It is why the management of transport is done by individuals in precarious conditions (Priode, 2005) .The transportation system in Congo Brazzaville in general and in Brazzaville particular generates a large number of accidents due to surcharge, lack of proper driver training, not following the rules of the road, the lack of traffic signs on some arteries, lack of road traffic, the vehicles ..... unconformity table below shows the accident in February 2004 as an example

**Table; 2 Distribution of the number of accidents in Brazzaville in February 2004**

Nature of accident	number of accidents	locality	casualties
Fatalities	01	Brazzaville	01
Accidents with serious injuries	17	Brazzaville	52
Accidents with minor injuries	17	Brazzaville	36
Accident with major injuries	40	Brazzaville	43
Accidents with property damage Thin	20	Brazzaville	21
<b>Total</b>	95		153

Source, Source; *Spatial Dynamics and environmental problems in Brazzaville, P.43*

From the foregoing, it should be noted that population growth impacts on the urban environment of Brazzaville. This is justified by the extent that the extension of the city of Brazzaville causes the disappearance of nearby villages with the birth of the suburbs with the type of homes in third world countries.

### 5.4 The Waste

The waste management is not a priority for most governments; they focus on education, the collection of taxes, agricultural services, water supply and health services (Onibokun, 2001). The drainage systems have become increasingly inadequate and defective because of urban growth and spatial extension (Ndinga-Okina, 2008). Brazzaville each day produces about 400 tons of garbage that is 1200 tons per month. (Ziavoula, 2006) All these above factors lead to real environmental problems in the city of Brazzaville. And develop many diseases such as typhoid fever, tuberculosis, cholera (Nzoussi, 2014d) ... However, all countries aspire to sustainable development. Registration time for this type of development objectively mask the impossibility of equal development in space (Pourtier 1992, Gaud, 1992 Deleage, 1991). At the end to put the waste in a broader

context of sustainable development, the need to build a new base of knowledge and methods arises (Le Bozel, 1994). As in most cities of the world, in Brazzaville, waste management falls under the municipal authority through its health service (Dornier-Apprill, 2002) but the town has very tiny ways to cope. In some districts of Brazzaville, access remains very difficult because there are almost no roads. People who have no means of management and garbage collection are abandoned or provided waste at their discretion. A household pays over the amount and volume it produces financial incentive is to reduce production and increase source separation (Miranda et al, 1994). If he pays a fee (this is the case in some parts of Brazzaville center accessible to companies including waste management and transportation of the boiler), it will have no incentive to reduce and does not develop the attitude respect of tri (Reschovsky et al, 1994). Impact of the urban population on the city of Brazzaville would compel the government to take to heart the issue of waste management especially in public places, as are the case in markets (Figure 5), and some streets in the city. Structures no longer meet current infrastructure to a population that is growing at a dizzying pace. In other words, we are witnessing an increasing demand for structures, infrastructure and basic facilities, enhancing the concentration of poverty and social exclusion dilapidated neighborhoods and outlying areas, the extension of precarious habitat the marginalization of African youth, economic crisis, a market reduced employment (Badiane, 2004).



*Fig5; waste lying on the ground in a market in Brazzaville*

### 5.5 The pollution

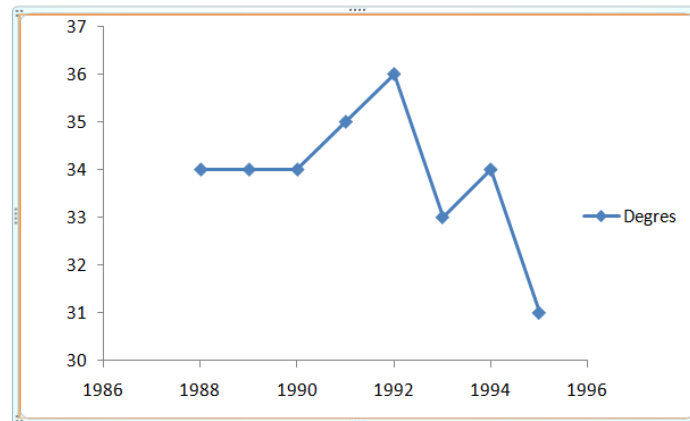
Pollution can be defined as the degradation of the environment by chemicals, industrial or household waste. The population growth of the city of Brazzaville also has adverse effects on pollution. This pollution is of two forms.

The first concerns the sewage produced by the resorts, hospitals, households.... These waters are discharged and thrown into parcels, streets, where they eventually evaporate depositing rubbish they contain (Vennetier ,1993 ). Indeed, the discharge of wastewater in different streams in Brazzaville (Dredging, the Cooler, Mfilou, Madoukou ...) can be done without prior treatment. Thus, removal of the water by heavy rain in a tropical world where rainfall is very strong, with temperature between 1400 and 1600 mm of water / year contribute to land degradation in older neighborhoods .With the rainfall spatial extension of the city, the piping system and evacuation unresponsive in older neighborhoods in this case Ouenzé, Poto Poto, Baongo, Mougali ... and the poor condition of pipes, aging singularly structures dating from the 1960s and 1980s do not respond in any way to a growing population. This causes significant damage during rainy seasons (flooding). Because of the lack of companies that can manage household waste, people have resorted to new practices, those of incineration and land filling of waste into the ground. This contributes to the environmental pollution. Added to this is cooking over a wood fire heater.

The second is industrialization. In the 1960s, Brazzaville had achieved remarkable industrialization .These polluting industries so as little air with the emission of gases such as SO<sub>2</sub>, CO or CO<sub>2</sub>. It also included imported goods from Europe such as: cars that emit the different gases into the atmosphere. The damage to the environment becomes a very important issue to the extent that it threatens the health of populations.

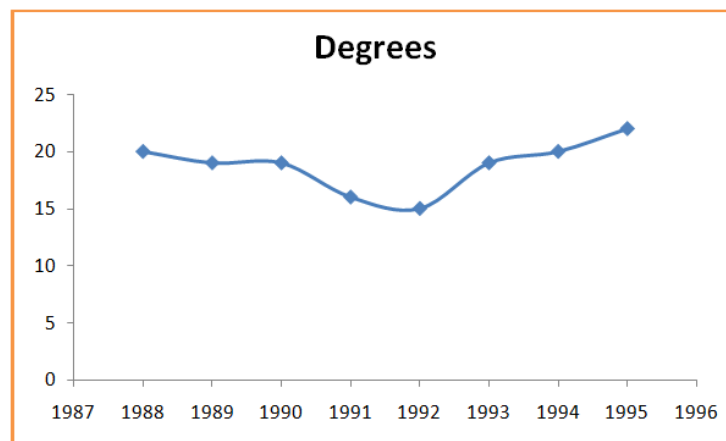
### 5.6 The global warming

Global warming is also one of the crucial problems of the XXI Century. With an unprecedented exponential growth, the city of Brazzaville and other cities of Africa is experiencing a climate change compared to previous years. Located in the tropics, Brazzaville has a tropical climate inter. Maximum temperatures are around 35 degrees .To see this, it suffices to observe the following --Bra Figure (Figure6).



**Figure 6; Maximum temperatures in the city of Brazzaville 1988-1995**

During the rainy season the temperatures are around 33 degrees, against the dry season temperatures reach parfois 15 degrees. The figure below illustrates this. (Fig 5 )



**Figure 7; Minimum temperatures in the city of Brazzaville from 1988 to 1996**

Global warming in Brazzaville is the corollary of the rapid urbanization of cities. In fact; the occupation of land causes the air pollution, loss of green space. Human activities negatively affect the climate. They emit radiation absorbing gas in the thermal infra. This is particularly carbon dioxide (CO<sub>2</sub>), ozone (O<sub>3</sub>), methane (CH<sub>4</sub>) that has an impact on climate. Climate change causes the greenhouse effect and permanently alters the usual climate of the earth in general and Brazzaville in particular, and leads to disastrous consequences.

### 5.7 Erosion

The environment of the city of Brazzaville is affected by several problems, including that of water erosion that has grown because of the illegal occupation of land, lack of pipes and especially climate change. The reserve of Tsiemé for example with 1818ha hardly exists after several subdivisions. Thus, the spectacular forms of erosion sites have taken the momentum in the entire city of Brazzaville. The figure below illustrates the water erosion in Brazzaville. It should be noted that the city of Brazzaville is built on a rock that is soft sand. Runoff, missing pipe drainage of rain and other pre cited factors cause very significant erosive activities. This becomes a recurrent erosion site in the city of Brazzaville in neighborhoods such as (Kinsoundi, Makazou, Mikalou, Kombo, Massengo ...)





*Fig 8 ; An erosion site in a district of Brazzaville (M'filou)*

## VI. CONCLUSIONS AND RECOMMENDATIONS

This article answers the question we posed above: the impact of the urban population on the environment of Brazzaville. As we have previously served the city of Brazzaville is experiencing rapid urban population growth in recent years due to its political and social stability. Its growth was less than 4% in previous years was revised upwards particularly passing more than 5% per year. Known to harbor a relatively small population compared to its first urbanization 1934, the town of Brazzaville suffered the brunt of a growing population due to its features it occupies (political, administrative, academic...) and its proximity to the neighboring Congo, the Democratic Republic of Congo or Congo-Kinshasa. In 2014, after the operation known as the slap of seniors, more than 500,000 DRC nationals were expelled from Congo Brazzaville. Population growth impacts on the spatial extension contributing significantly negative at birth and peripheral neighborhoods are born a disproportionate manner and anarchic. Thus, environmental problems and a lot of their consequences appear to be regularly touching the vulnerable and needy population. The current state of the urban environment of Brazzaville requires some recommendations.

These recommendations will certainly fight against environmental pressures become a major concern for the government, to save the people of hazards and improve their lives. The state must; define a new urban plan for the city, trying to create conditions in regions and villages to stop the rural exodus that contributes to the increase in urban population. Develop a good policy and a law of the land. Prohibit the import of used cars in poor condition contributing to global warming. Build urban roads that meet international standards while taking into account the quality of the rock on the ground. Establish a good policy to waste management by devoting large budgets .Augment the budget for the city hall while avoiding the financial mismanagement that hampers the management of the urban structure to consolidate the city.

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