

# Geospatial ICT infrastructure for City Management in Africa: Case study of Ngaoundéré (Cameroon)

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**Abstract—** The city of Ngaoundere is experiencing an accelerated and unplanned urban growth. Abundant rainfall accelerates flooding and erosion. Given its location near the Sahel, Ngaoundéré is also very exposed to the effects of climate change. With support from the World Bank, through the Global Mechanism for Disaster Reduction and Disaster Recovery Program and the Open Data for Resilience initiative of the Ministry of Housing and Urban Development (MINHUD) and the Urban Community of Ngaoundéré, we have undertaken to create and/or collect and disseminate open space spatial data on the built space, critical infrastructure and natural hazards centered on floods and rock fall. This is to promote new ideas and develop new tools that allow the city to take good decisions in order to increase its resilience based on smart parameters. A GIS database was built with open source QGIS software. A copy of this geospatial information has been uploaded to OpenStreetMap with matching TAGs or attributes. This is a georeferenced mapping project focused on the user. And, the flagship product that reconciles the needs of the main users is the digital Atlas.

**Keywords –** Ngaoundere, QGIS, City Management

## I. INTRODUCTION

The world's population has changed rapidly. From 2.5 billion in 1950 to 7.3 billion in 2015, representing a growth of 291% and an average growth of 74,565,140 people per year. This average growth in 2017 is 83 million a year. An urban population grew from 30% of the total population in 1950 to 54% in 2016. The cities of Asia and Africa will house the 90%, or 2.3 billion city dwellers expected between 2015 and 2050. This urban growth results from: natural population growth, migratory flows and, rural exodus. It is accompanied by a strong demand for urban needs in various fields. Spaces that fulfill the urban functions will have to adapt to be able to satisfy these multiple needs of this population. African cities are "*overwhelmed by the speed at which they are spreading*" (Anna Kajumulo Tibaijuka quoted by Harsch, 2001). Thus, "the key challenge that Africa will face in the coming decades is the massive growth of its population in a context of widespread poverty that, when the two acts together, generates complex and closely linked threats, for the future (Joan Clos, 2014). This, combined with field observations, justifies our contribution to this International Conference and refers to a key issue, that of urban regulation at the local level. However, urban governance, in Ngaoundéré, refers to two dimensions. The first, of a socio-political nature, concerns the arbitration between economic competitiveness and social equity. The second, of a geographical nature, deals with spatial dimensions and the control of processes in progress. How to georeference and transform into a smart one this urban space in order to increase its resilience in case of natural disasters which are here centered on floods and rock fall and in order to ease the daily life of the inhabitants? The answer to this question structures our communication. Thus, we spoke about terms of smart city and smart government, present the methodology and the results we achieved.

## II. METHODOLOGY

### A. Geographic Frameworks

Ngaoundere in Cameroon (Fig.1) is experiencing accelerated and unplanned urban growth. Between 2005 and 2016, its population has grown from 180,763 to almost 270,000 inhabitants and the area of its urban perimeter almost quadrupled from 3,648 ha in 2006 to 11,924 ha in 2016. The urbanization was largely spontaneous, resulting of the increasing occupation of many wet areas, especially for neighborhoods like Sabongari III, Sabongari America, Baladji 1, Djalingo and Gadamabanga. These flood zones are partly squatted by the populations who build temporary houses there. Abundant rainfall, concentrated during the rainy season,

objects at a given moment in time and space, on the distribution and evolution of the actors of this dynamic. This makes it possible to locate objects and make rational forecasts in terms of layout, equipment and even traffic.

## VI. CONCLUSION

Within the Open Cities Africa project, we produced an ICT infrastructure for assessing the Ngaoundéré's City Management in the context of flooding and rock boulders risks.

Based on the cartographic data compiled in a Geographic Information System, we made available to the city of Ngaoundéré decision-makers tools for the prevention and implementation of education plans, strengthened the capacities of local people in the perception and management of flood and rockfall risk in the city of Ngaoundéré, and forged new partnerships between the different stakeholders.

The resulting Geospatial ICT infrastructure is a useful policy instrument for collective decision-making on natural and risk management that meets social demand and determines appropriate action plans to preserve the integrity of the urban environment or the necessary degree of restoration of ecosystems and urban environments for a better life together. It brings together the conditions for a search for increasing the standard of living in the city (economic development) while preserving and enhancing socio-economic and cultural living environment in Ngaoundéré.

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