

## EVALUATION OF THE SPATIAL DYNAMICS OF GREAT ORAN (ALGERIA) USING SPATIAL IMAGERY AND GIS

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In a first part, our paper deals with the study of the evolution of Great Oran through analysis of the various censuses. This study shows that, in a first period, 1970-1977, several economic development plans were launched and had very little impact on the extension and urbanisation of Oran. In second period, 1980-1984, the city began to experience significant spatial dynamics, as a consequence of the launch of the first four-year plan, the instigation of the Great Oran urban master plan (PUD reinforced by the urban modernisation plan (PMU).

These changes were expressed by the implementation of large-scale town planning operations that had the effect of fundamentally changing the city's immediate peripheral areas.

However, the creation of large housing projects in the form of ZHUN was translated by a considerable land consumption in Oran laid out in a ring around the city. The ZHUN led to deterioration in the quality of the environment as well as an anarchic densification. The result was the complete opposite of what had been enacted by ministerial decision (concerning the ZHUN) and whose intention had been to remedy inefficient land use.

The city intra-muros was saturated by the priority given to the ZHUN programmes while subdivisions, whether or not formal, found themselves as a result of this situation in the periurban space. As a result, the number of unregulated slums increased. This resulted in a dual process: an urban sprawl in central and peri-central spaces and a differentiated spread over the city's peripheral areas.

In the second part of this paper, we tried to answer the following questions, using GIS and satellite imagery:

Has Oran's spatial organisation remained unchanged since the 1990s or are we seeing a new dynamic? How has Oran's spatial dynamic been expressed over the last two decades? Is it possible to identify its rhythm, modalities and characteristics? Is it possible to detect predominant spatial forms? Have these new urbanised areas modified Oran's initial radioconcentric layout?

Three satellite images taken at different dates (1991, 1998 and 2003) were integrated into the GIS to measure the temporal development of Oran's urban space between 1991 and 2003. To do this, we digitised the built fabric on each of the images. The urban fabric at different dates (1991, 1998 and 2003) was extracted by photo-interpretation using GIS-ArcView. For the photo-interpretation, we based ourselves on our knowledge of the area and the input specifications that we had defined on the basis of the French geographic institute's topographical data base.

To measure the growth of the built fabric between two dates, we examined the different layers of the corresponding built fabric to obtain the urban extension between these two dates.

The results show that the urbanised space of Great Oran in 2003 was estimated at 6,173 hectares, being an additional 1,830 hectares when compared to the urbanised space in 1991. Great Oran became increasingly urbanised over this period with annual growth rates of around 3%. The growth of urbanised space in Great Oran over the last decade has essentially occurred in the slum districts and outlying metropolitan areas. This has taken place in three main ways:

- The filling of residual voids within the city's 1991 perimeter, essentially in the districts around the centre of Oran.
- New buildings especially in the north-west of the city on the flank of the Murdjadjo Mountain (Douar Bouakeul, les Amandiers, El Hassi, etc.). After the analysis, our visit to these places showed that these new buildings are in the form of illegal slums.
- New urban extensions concentrated in outlying metropolitan areas. Our analysis has been completed by a visit to these places which showed that these urban extensions are in the form of one-family housing subdivisions for working and middle class population. These houses do not respect town planning standards (sites without land servicing and facilities). This particularly applies to the extensions to outlying metropolitan areas (Ain Beida, Nedjma, Es Senia, Sidi Maarouf, Sidi Bachir and Bir El Djir).

The used methodology has proven itself efficient for evaluating and monitoring spatial dynamics in a regional metropolis such as Oran, Algeria's second largest city after the capital (Algiers), which is subject to strong land development pressure.