SPACE ANALYSIS AND THE DETECTION OF THE CHANGES FOR THE FOLLOW-UP OF THE COMPONENTS SAND-VEGETATION IN THE AREA OF MECHERIA, ALGERIA.

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ABSTRACT:

The Algerian steppe has become for a few years the theatre of an ecological and climatic imbalance. The intense degradation for this fragile medium (stranding wind erosion, overgrazing, clearing, salinisation ….) inducing the turning into a desertification require a better comprehension in order to see how to fight against this plague and to adapt an adequate installation to him. Thus, this work lies within the scope of the follow-up of the phenomenon of the turning into a desertification on a space with the heart of the high Oranian southem steppe plains, in fact the area of Mecheria.

Techniques of numerical cartography, since the satellite image processing until the geographic information systems (SIG) for the realization of the charts sets of themes, being able to highlight this calamity. The use of the approaches based on the exploitation of the satellite data multi dates (1998 & 2004) of the sensor Thematic Mapper (TM) of Landsat 5 permitted us to obtain a gathering of an interpretative photo maps and vegetation index which , in their turn , helped us to see the changes arrived in the medium , copiously regressive that progressive.

INTRODUCTION

The degradation of the dry and semi-dry ecosystems in Algeria has become a fact which shows down the progress of rural development (Haddouche et al, 2004). In these milieus, the lack of vegetation is apparent and the eolian erosion predominates. The ecosystem has a long hot season and a weak rainfall. In these areas, the phenomenon is called desertification. The emergency of the struggle against this phenomenon is imposed by the process itself, when man's intervention doesn't come on time; it creates situations forbidding the possibility of arranging these areas (Halem, 1997).

In the case of the steppes located north of the Sahara, the degradation process of the soils, has been studied: the covering rate of the vegetation decreases, and hence gives birth to dunes.

The sensitiveness of the desertification appears as a set of indicators synoptic adapted to the evaluation scale. Hence, an indicator may be defined as a tool which enables to characterize the milieu, the constraints and the answers.

The pictures sent by the observation satellites of the earth, are an important source of information. They allow us to collect the information about the resources of earth (Scanvic, 1983). Taking this advantage for granted, it is useful to conduct a map survey with the help of a tool "remote sensing" as an applying help over a dry area, located in the heart of the high plains south of Oran, called Mecheria.

1. THE MILIEU STUDY

1.1 The geographical setting

As far as the administrative point of view is concerned, our area of study is located the commune of Mecheria, wilaya of Naama. It's geographically bordered in the North and the West by the commune of El-Biodh, in the East by the wilaya of El-Bayadh and in the South by the commune of Naama.

The main physical sets of the area of study are as follows:

- A dune in the North; The city of Mecheria lies in the centre of the area at the bottom of Djebel Antar which is 30 km long and 1712 m of high point.
- The "sebkha" of Naama, in the South. It could be collected on a topographic map at 1/100.000^{eme} with following coordinates (fig.1):
- Longitude: 0° 3'00" à 0° 25' 00" West (Greenwich meridian);
- Latitude: 32° 40' 22" à 32° 51' 52" N

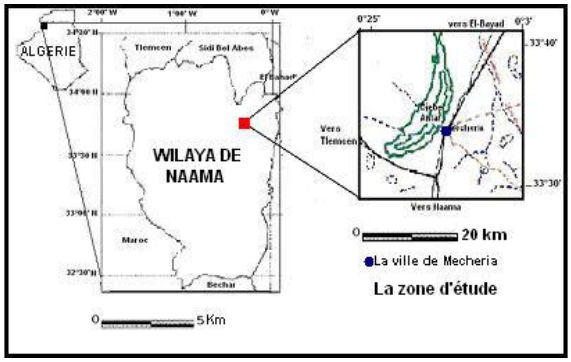

Figure 1. Localization of the zone of study

1.2 The natural milieu

The climate of the area of Mecheria is Mediterranean climate dry with cold winters (Halem, 1997) and (Haddouche et al, 2001). It is characterized by two (02) contrasting seasons. The first is cold and wet, and goes till the end of October until early May with an average temperature of 10,05°c and a rainfall of 147 mm, the other is dry and hot and runs from mid May to mid October with an average temperature of 21,77°c and a rainfall of 86,49mm.

The next map allows us to distinguish 4 categories showing the geomorphologic diversity of the milieu: Category 1: 0–3% Category 2: 3–12% Category3: 12–25% Category 4: 25–88%. This information varies between 0% (the lowest points) until 88% (the highest point) that of Djebel Antar (fig. 2).

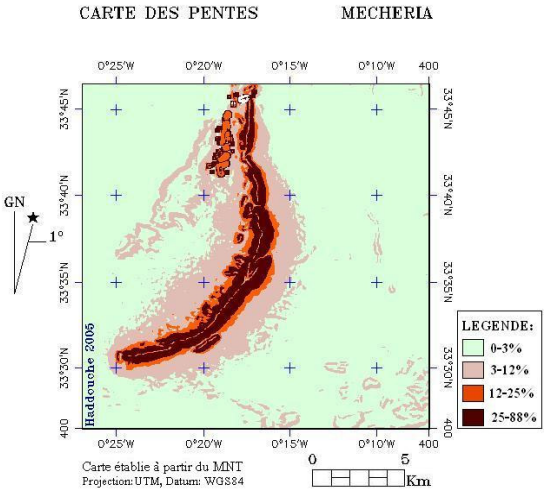

Figure 2. The slope map of the area of Mecheria .

The types of soils in the area of Mecheria are lithological, like greys types, calcareous, marne and clay. We can distinguish:

- The sand soils;
- The colluviums;
- The alluviums;
- The calcareous glacis.

2. USED DATA

For this application, we have used satellite pictures data of two different dates (fig. 3 and fig. 4):

- Picture LANDSAT 5 Thematic Mapper (scene 198/37) of October 24 1998;
- Picture LANDSAT 5 Thematic Mapper (scene 198/37) of March 27 2004.

We got interested in the spectral field of the TM captor by the combination of three bands (4, 3 and 1) for the two pictures. The picture extracts are 1000x1000 pixels.

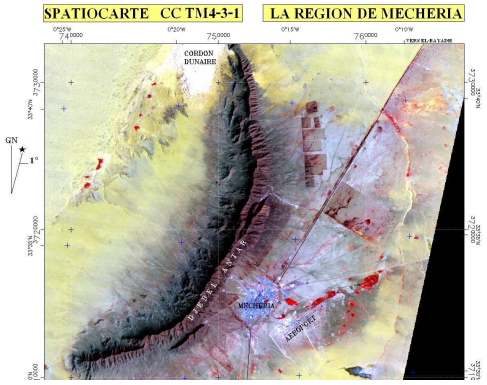

Figure 3: Picture TM 4.3.1 (1998)

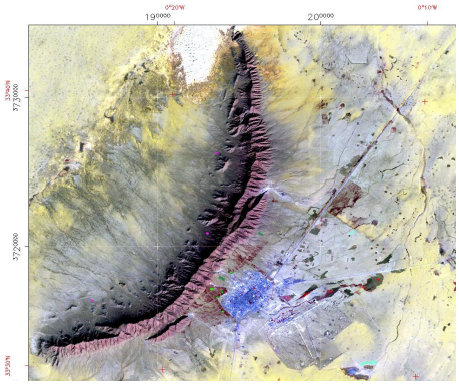

Figure 4. Picture TM 4.3.1 (2004)

3. METHODOLOGY

The work conducted on the area of study (set of treatments and photo interpretation through computer) based on the use of satellite multi temporal pictures and different software of the treatment of pictures. The approaches used are synthesized and represented in the form of an organisation diagram.

These criteria allow the recognition of the homogeneous units of the level of vegetation cover, there delimitation and there representation (Haddouche et al, 2001) and (Benhanifia et al, 2003).

Consequently, the diachronic approach contributes to the evolution of the milieu between two (02) dates (1998 and 2004). Thus, the mixing of the two NDVI will help us get a final image presenting different changes which happened in the steppic area.

4. RESULTS AND DISCUSSION

The interpretation allows providing a thematic cartography. The superposition of three bands of the TM, hence the supervised classification (fig. 5 and fig. 6) and the indices of vegetation (fig. 9 and fig. 10) have shown that there has been a very important regression during the last six years between 1998 and 2004 (fig. 11). This is due to the degradation of the vegetal cover caused by an over exploitation. The sand remains a very important factor in the area. The sand map obtained by the unsupervised classification for the two dates, showed us a reverse effect (fig. 7 and fig. 8), due essentially to the date of the two pictures, one in autumn and the other in spring.

We have compared the physiognomic types of the units in 1998 and those of 2004 where there is a change for the elements on the surface of the ground.

The rate of recovering of Alpha (*Stipa Tenacissima*) group has a decrease from 11,18 to 2,37%. It's a species which regenerates because of the problems of overexploitation. Unlike the Alfa, the "psammophites" species have known a high increase of their recovering rate from 1,42 to 40,66%.

The appearance of species of *Peganum harmala*, *Salsola vermiculata* and *Noea microphila* is the sign of the degradation of the vegetal cover. this is due to the impact of the human actions on our milieu principally with an increase of the urbanisation rate 0,38 to 2,52%.

However, other mutations less significative are due to the shade effect, considering the difference between the angles of elevation and also the dates when the images were taken.

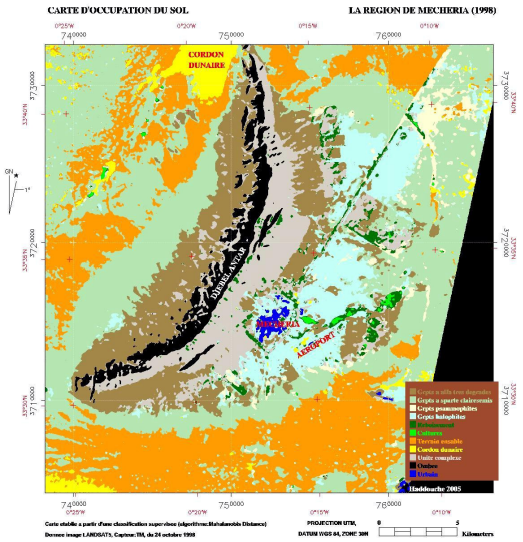

Figure 5: classified image by Maximum Likelihood (1998).

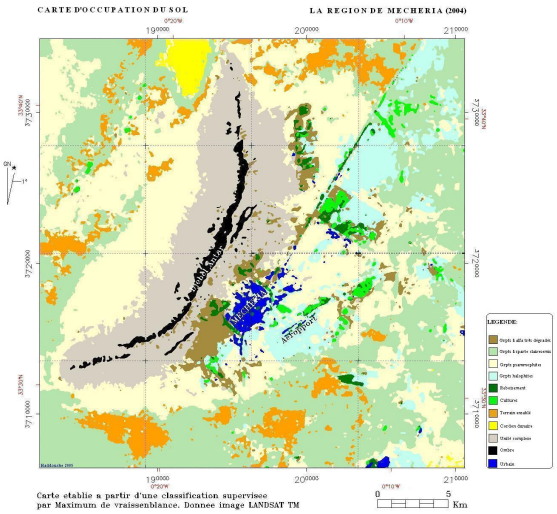

Figure 6: classified image by Maximum Likelihood (2004).

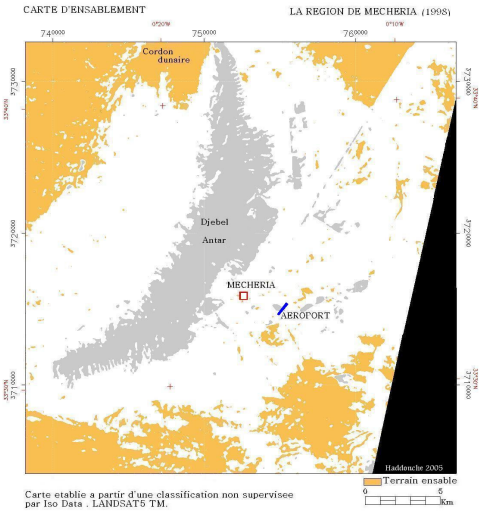

Figure 7 : Sand map (1998)

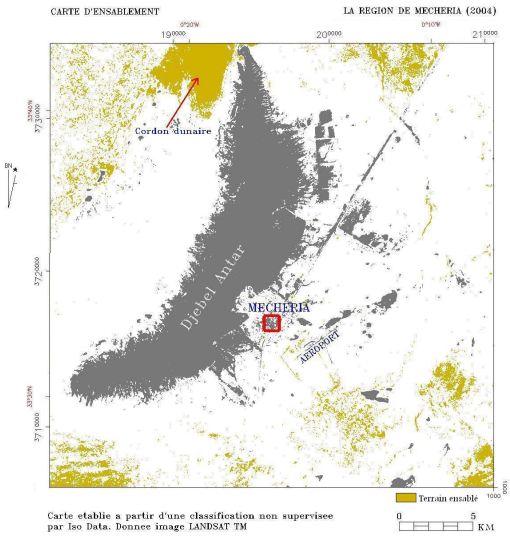

Figure 8 : Sand map (2004)

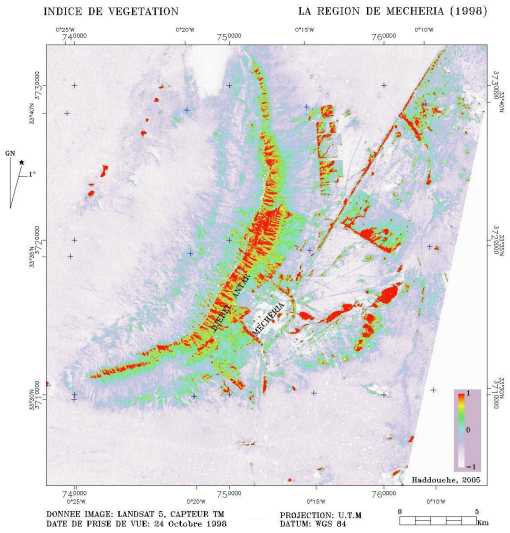

Figure 9: Vegetation index « NDVI » (1998)

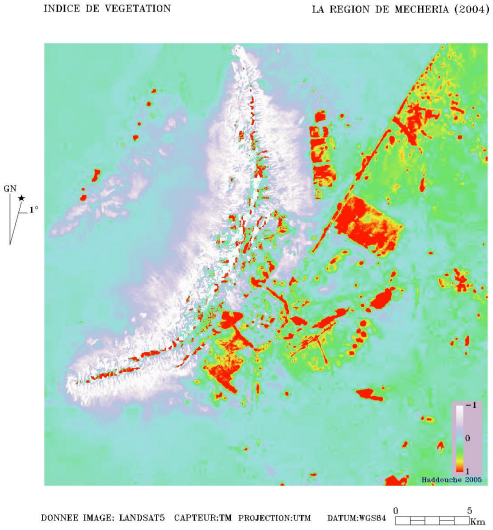

Figure 10: Vegetation index «NDVI » (2004)

5. CONCLUSION

The use of these approaches based on the exploitation of the satellite data (1998-2004) of the captor Thematic Mapper (TM) of the Landsat 5 allowed us to obtain a set of maps photo interpretative and signs of vegetation which helped us to see the changes which happened in the milieu. Hence the movies of the degradation of the milieu in the area of Mecheria.

The area of Mecheria identified as degraded on the whole, is the result of human actions. If urgent measures are not taken, this degradation, stressed by the phenomenon of dryness, may engender one or many processes of desert advance, endangering the natural milieu and the sustainability of the resources (soil, fauna and flora).

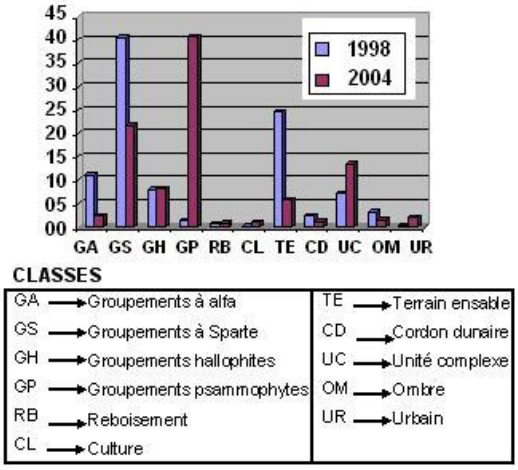

Figure 11: comparison between the physiognomic types (1998 – 2004)

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