

**Determination and analysis of the trend of
desertification through
the use of Alsat-1 satellite data and Landsat
in the Algerian steppe**

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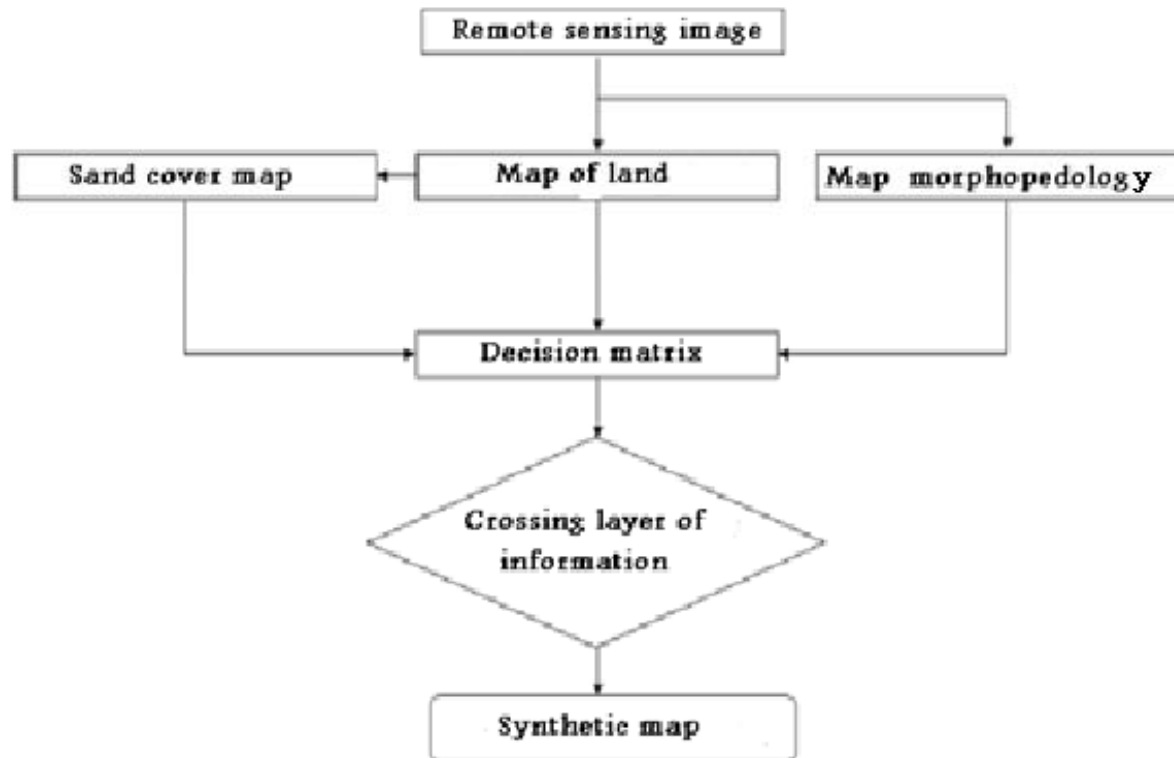
Centre of Space Techniques" **ALGERIA**

PRESENTATION OF THE AREA OF STUDY

The Djelfa region belonging to the semi-arid bioclimatic, has a fairly large area of land described the phenomenon of desertification. Having a texture usually dominant sandy soils used for agricultural development (as in the great plain of Djelfa syncline), which once denied the permanent cover, will be subject to severe wind erosion. Overgrazing is a second cause of degradation and loss of land. The forested areas like the case of Djebel Sahari Senalba and consisting primarily of older forests of Aleppo pine are in a state of degradation.

METHODOLOGY

To accomplish this work, we have used remote sensing imagery satellites ALSAT-1 and IRS (2009) and Landsat TM (2001) combined with ground surveys. The result of this combination has allowed us to infer the impact of the semi arid ecological diversity of steppe formations. This longitudinal study based on the use of remote sensing data is to analyze the evolution of steppe ecosystems. Satellite data used allowed us to establish thematic maps. These are the land use map, the map soil morphology and sand cover map (extracted from the map of land) that constitute the basic maps that will serve to establish map sensitivity to desertification

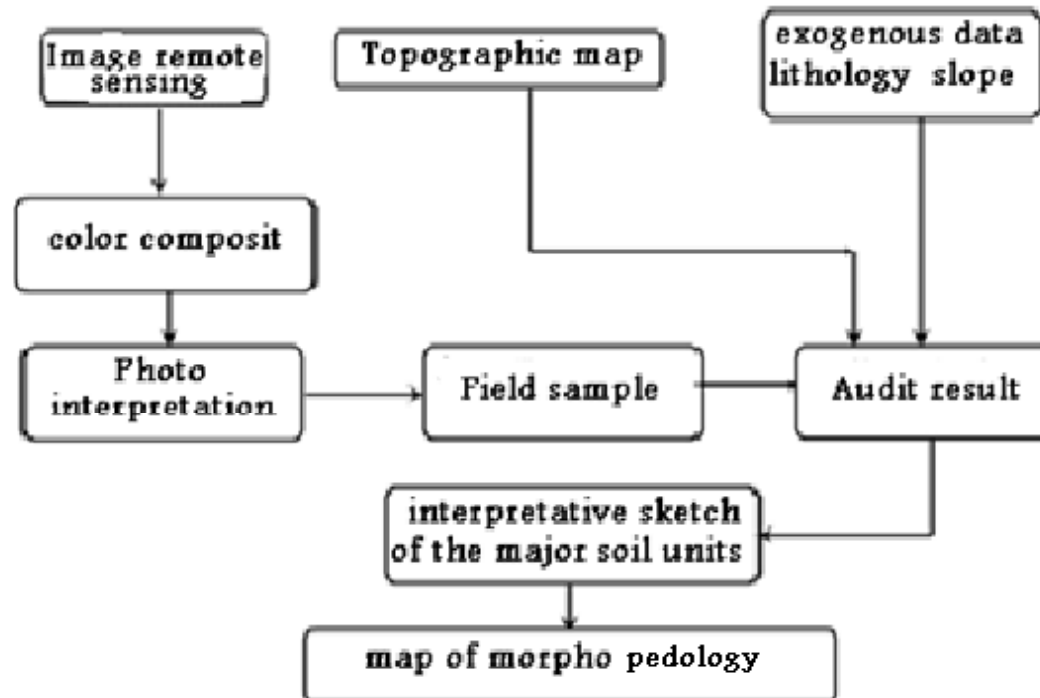


Flowchart of implementation of the sensitivity map to desertification



Image IRS Djelfa 2009

For this study we chose images of the TM Landsat 5 (2001), sensors ALSAT-1 (2009) and those of the sensor (IRS 2009), covering the study area with a landscape exposed to the phenomenon of desertification



Flowchart of implementation of Morpho pedology map

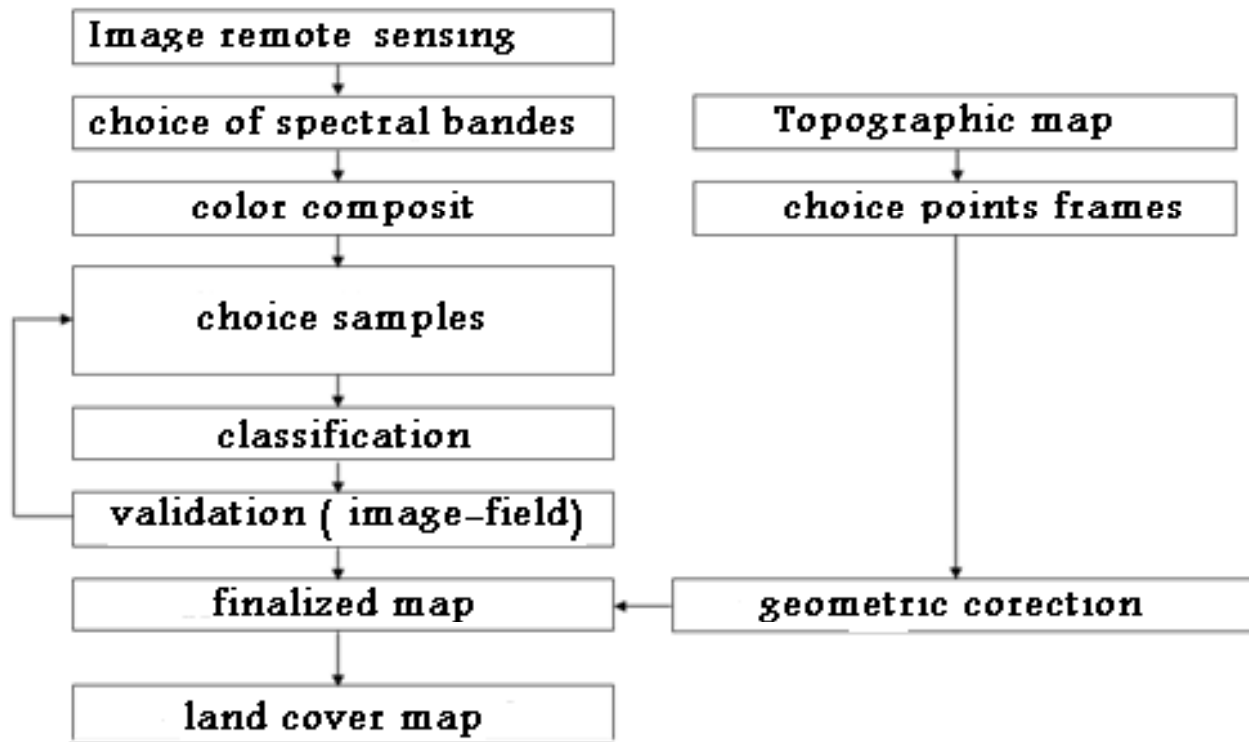


Figure 4: Organizational methodology for carrying out the land cover map

Calculation of the Index of Sensitivity to Desertification (ISD)

The methodology adopted for the study of sensitivity to desertification mapping and is based on a combination of three main factors involved in this phenomenon, namely the morphological soil science, land use and encroachment. Hence the desertification sensitivity is determined by an index (ISD Sensitivity Index Desertification) obtained from the product of two indices of quality of the selected factors: ILC (index land cover) and IMP (morphological index soil).

$$ISD = (ILC * IMP)$$

Morpho pedology + Sand	Land Cover	VS	S	MS	LNS
Very Sensitive		VS	VS	S	MS
Sensitive		VS	S	S	MS
Moderately Sensitive		S	S	MS	MS
Little or no Sensitive		MS	MS	MS	LNS

Decision Matrix

12 <= ISD <= 16

VS



6 <= ISD <= 9

S



2 <= ISD <= 4

MS



ISD = 1

LNS

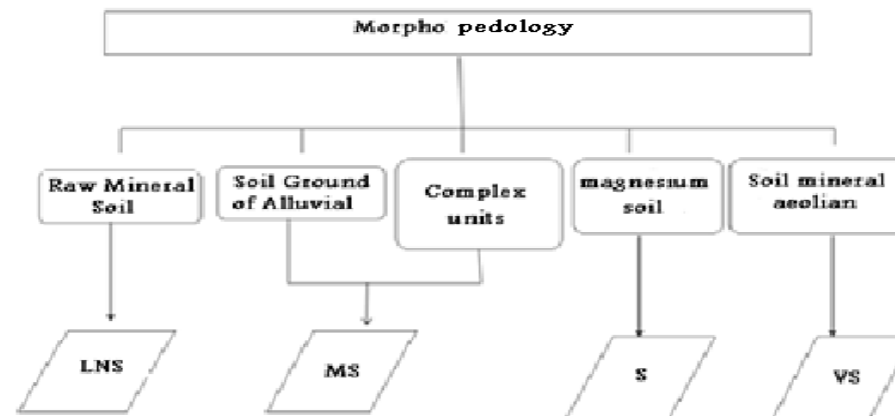


ILC*IMP		VS	S	MS	LNS
		4	3	2	1
VS	4	16	12	8	4
S	3	12	9	6	3
MS	2	8	6	4	2
LNS	1	4	3	2	1

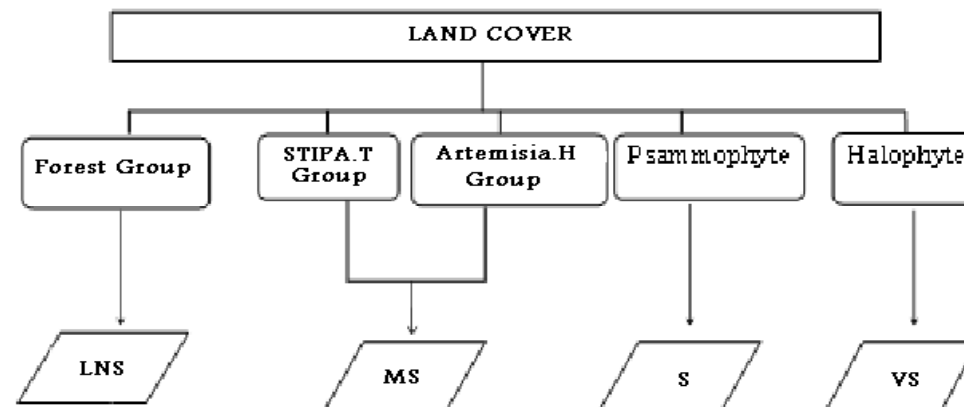
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Determination of degrees with their respective code.

Determination of the sensitivity of physical parameters



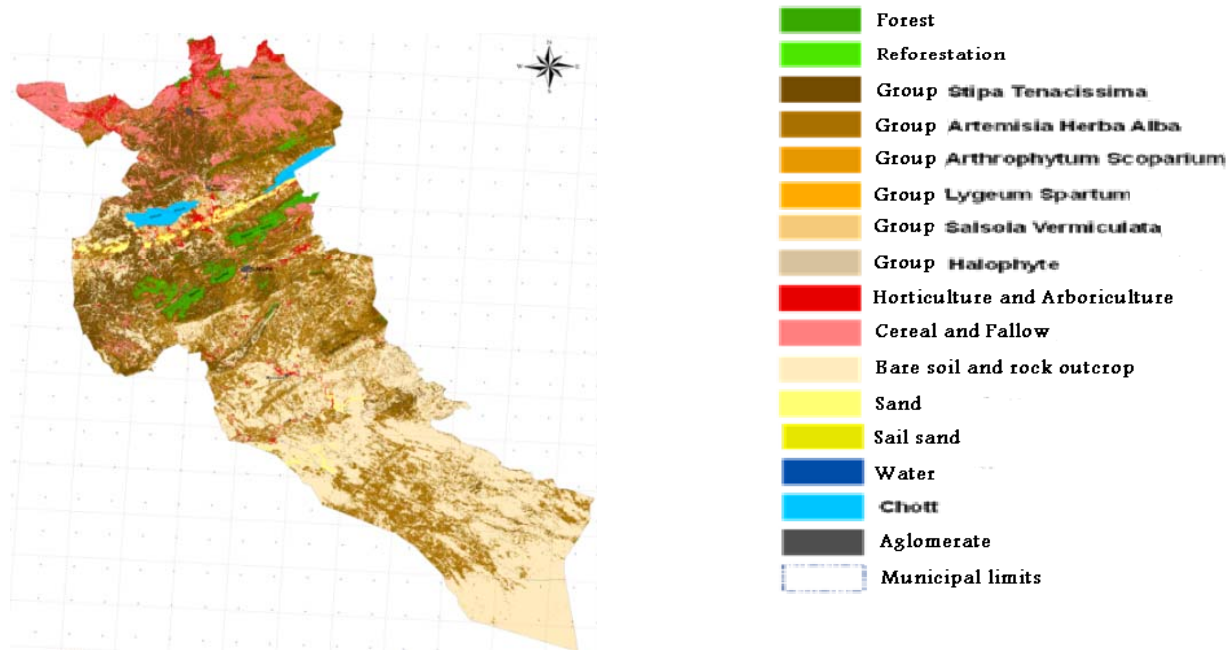
Degree of sensitivity of the Morpho pedology.



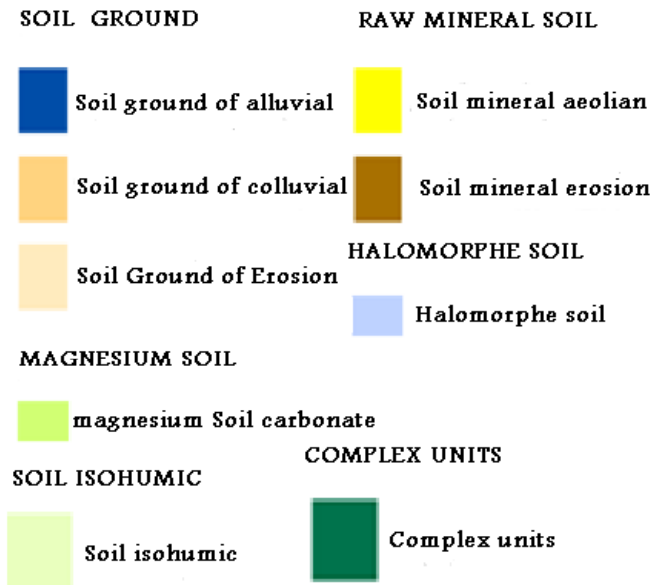
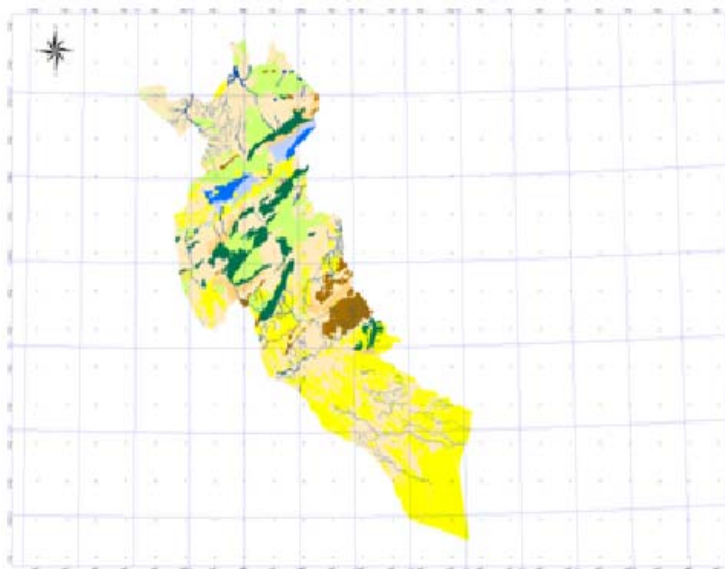
Degree of sensitivity of land Cover

RESULTS AND DISCUSS

We have carried out for the Djelfa region the basic maps (morphological soil , land cover map, and sand cover map), and synthetic map is that of sensitivity to desertification.

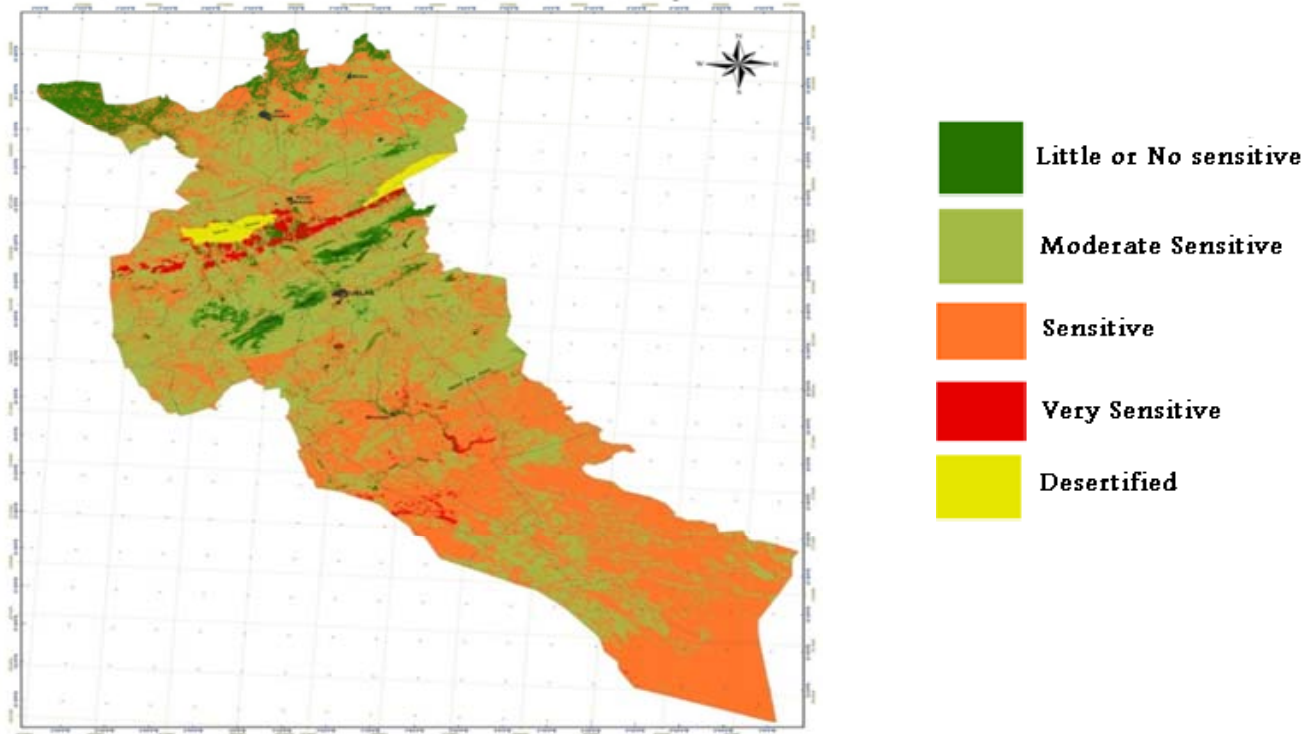


Land Cover Map of Djelfa region



Map of Morpho pedology of Djelfa region

Map of desertification Sensitivity of Djelfa Region



Map of sensitivity to desertification of Djelfa region.

The interpretation of the results identified five classes of sensitivity to desertification are:

- Areas little or less sensitive to desertification: These are forest areas and forest occupying the in djebels. The soils are of two types: raw mineral soils and soil erosion unsophisticated mountain (rendzinas) under forest and scrub.
- Areas moderately sensitive to desertification: The soils are calcareous-magnesium and soil erosion has advanced, through a canopy (group Alfa and Artemisia).
- Areas sensitive to desertification: These are areas characterized by a vegetation gradient in much degraded (some groups to Psamophytes and bare soil), which concurrent on soil type and advanced unsophisticated.
- The areas very sensitive to desertification: These are mainly areas of Sand dune vegetation and soils Psamophytes highly degraded steppe.
- The desertified areas: These are the salt-pans (salt lakes and salt pans).

Classe	%
Little or less sensitive	6,37
Moderate sensitive	42,49
Sensitive	48,43
Very Sensitive	1,49
Desertified	1,21
Total	100

Table representing % of the classes of desertification sensitivity

CONCLUSION

The objective of this study was to apply a methodology combining multiple data sources to understand the phenomenon of desertification. The treatments performed on the data, have yielded the different thematic maps (land use, soil morphological). The integration of map data in a Geographic Information System and their intersection by a decision matrix, allowed us to produce results showing the area's most exposed to the problem of desertification. The final synthesis map that represents the sensitivity to desertification at time t 1/200.000ème to serve as a tool for decision support for potential development projects in the steppe. It will also enable the monitoring and supervision of the steppe ecosystem. The multi-temporal analysis allows the identification of ecological change in relation to changes in land use in these sensitive areas.