

Remote sensing and GIS for combating desertification

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1. Abstract: Remote sensing and GIS for combating desertification: case of study area Oudia , Tunisia

2. Introduction

The desertification constitutes one of the major concerns of the country of the Sahel and North Africa. This phenomenon is responsible for the degradation of the natural habitat and for the arable land disappearance. With the development of remote sensing and GIS techniques, it became possible to study this phenomenon through several scales and to analyze the interaction between the various elements of the environment in relation with the dynamics of soil and the human activity. The desertification mapping by GIS and remote sensing occupies an important part. The methodology used is the simultaneous approach of geomorphological and digital analysis of high resolution satellite data for defining and mapping the desertification landscape.

3. Objectives

The present cartographic survey will permit to give the present limits of the geomorphological structures, the description of the plant formations, the use of soil and the state of sensitization to the desertification while using the visual interpretation and the digital analysis. These maps should be used as source data to the operations of planning and definition of a global strategy allowing the government and the authorities concerned to make measurements to minimize the impact on soil.

4. Materials and Methods

The zone of study is located at the north of Tozeur, Chott El Gharsa constitutes a real closed depression. This depression represents the basic level of the whole of the hydrographic network which drains the Atlas chains. The continental character very pronounced of the region of Tozeur is represented by a thermal regime very contrasted and very important annual and diurnal amplitudes. The annual precipitations are between 50 mm and 100 mm. The data used are: Two Quick bird images acquired in February 2006 and an image landsat of resolution 15 m. The fieldwork as one of the most important steps was carried out. We identified on the satellite image a series of representative training sites which allow us the recognition of the objects on ground.

Therefore data about soil and plant have been collected with the aid of the Global Positioning System (GPS) and Quick Bird images using as base map. All this data are used to produce a spatio-map of the study zone.

5. Results and discussions

The spatio-map constitutes a good tool of surveillance and operational intervention on the terrain. It permits to direct the teams on the ground and to prepare the plans of action on the struggle against the desertification by taking into account the characteristics of the zone. This work makes a contribution in the field of fight against the desertification by the use of the geographical information. The Morphodynamic map has been established by an approach based on the photo-interpretation satellite images Quick Bird. This interpretation permitted to study the units in relation with the soil morphology. Such a detailed geomorphological cartography can contribute to better understand these dynamic and also to better evaluate the techniques of combating desertification

and sand encroachment control. The study area contrasts currently with its environment; this aspect is related mainly to the origin of its soils and due to the acceleration of the wind action. The study area is used as grazing for the camels. The desertification sensitivity map provide support for the local decision-makers for better understanding the processes in progress and planning the interventions of attenuation of the desertification and direct the follow-up of their efficiency.

6. Conclusions

The applications of the remote sensing and the geographical information systems constitute good means of investigation to help the decision-makers to combat desertification and the optimal management of natural resources. These techniques allow us to measure the impact of the phenomenon on the people as well as on the natural environment, The elaboration of the Vulnerability map to the desertification needs of harmonizing to standardizing the approaches and the methods used everywhere in the world. It is necessary to revise the current models concerning the physical, ecological and socioeconomic aspects of the degradation of lands, for their integration in a framework of dynamic modelling and instruments of support for the decision.