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Use of remote sensing and GIS in mapping the environmental sensitivity areas for desertification of Egyptian territory

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Abstract. Desertification is defined in the first art of the convention to combat desertification as *"land degradation in arid, semiarid and dry sub-humid areas resulting from climatic variations and human activities"*. Its consequence include a set of important processes which are active in arid and semi arid environment, where water is the main limiting factor of land use performance in such ecosystem . Desertification indicators or the groups of associated indicators should be focused on a single process. They should be based on available reliable information sources, including remotely sensed images, topographic data (maps or DEM'S), climate, soils and geological data. The current work aims to map the Environmental Sensitivity Areas (ESA's) to desertification in whole territory of Egypt at a scale of 1:1 000 000.

ETM satellite images, geologic and soil maps were used as main sources for calculating the index of Environmental Sensitivity Areas (ESAI) for desertification. The algorism is adopted from MEDALLUS methodology as follows;

$$ESAI = (SQI * CQI * VQI)^{1/3}$$

Where SQI is the soil quality index, CQI is the climate quality index and VQI is the vegetation quality index. The SQI is based on rating the parent material, slope, soil texture, and soil depth. The VQI is computed on bases of rating three categories (i.e. erosion protection, drought resistance and plant cover). The CQI is based on the aridity index, derived from values of annual rainfall and potential evapotranspiration. Arc-GIS 9 software was used for the computation and sensitivity maps production.

The results show that the soil of the Nile Valley are characterized by a moderate SQI, however the those in the interference zone are low soil quality indexed. The dense vegetation of the valley has raised its VQI to be good, however coastal areas are average and interference zones are low. The maps of ESA's for desertification show that 86.1% of Egyptian territory is classified as very sensitive areas, while 4.3% as Moderately sensitive, and 9.6% as sensitive.

It can be concluded that implementing the maps of sensitivity to desertification is rather useful in the arid and semi arid areas as they give more likely quantitative trend for frequency of sensitive areas. The

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integration of different factors contributing to desertification sensitivity may lead to plan a successful combating. The usage of space data and GIS proved to be suitable tools to rely estimation and to fulfill the needed large computational requirements. They are also useful in visualizing the sensitivity situation of different desertification parameters.

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