

ALAA GHADHBAN KHALAF.SPATIAL ANALYSIS OF DESERTIFICATION PHENOMENON IN KARBALA AREA BY USING GEOGRAPHIC INFORMATION SYSTEM.UNIVERSITYOF TECHNOLOGY .Department of Building and Construction.MSc.Supervisor : Prof .Dr. ABDUL-RAZAQTARISHZIBOON and Dr.IMZAHIMABDULKAREEMALWAN .2012.135p.

Abstract

One of the most important issues facing Iraq is the threat of continued desertification phenomenon, as result of climatic factors and human activities.Iraq has suffered from the problem of desertification for many decades. Perhaps the amount of agricultural land which is lost every year is one of the most direct results of this problem. Geographic Information System (GIS) and satellites imageries play major role in developing a global and local operational capability for monitoring desertification phenomenon in dry lands as well as in Iraq.

The process of desertification in central and southern Iraq has increased rapidly, and much effort has been devoted to define and study its causes and impacts. Therefore, this study is intending to prove the capability of Geographic Information System to monitor and study the desertification phenomenon. Where, Part of Karbala Governorate, with an area 768 km² was selected as study area.

Four cloud free Landsat MSS, TM, ETM+, and SPOT scenes covering the study area were selected for analysis. Images were acquired in years 1976, 1990, 2001, and 2011 respectively. A site area was selected from the whole study area to investigate the possibilities of image classification and extract the indices images for the MSS, TM, ETM, and SPOT respectively.

The indices used in this research are: Tasseled Cap Transformation (TCT), The Normalized Difference Vegetation Index (NDVI), Eolin Mapping Index (EMI), and The Normalized Difference Water Index (NDWI).

Normalized Difference Vegetation Index (NDVI) was used to create a map and extract the vegetation cover in the study area. Normalized Difference water Index (NDWI) was used to create a map and define water bodies in the study area. Tasseled Cap Transformation (TCT) was used to extract three indices and these indices are bare land, vegetation cover, and wetness or water bodies.

Eolien Mapping Index (EMI) was used to map the areas which are subjected to wind erosion hazard. Mapping of the vulnerability of

surface to wind erosion using EMI show the efficiency of multispectral data (MSS, TM, ETM+, and SPOT) for detecting the areas which affected with wind erosion in the study area.

In order to identify the changes which took place during the four periods, three methods are used for this purpose, Firstly; direct detection of change in indices images between different years was analyzed by using of visual interpretation in addition to statistical analysis. Secondly, differencing change detection analysis was applied to determine and to analyze the land cover changes over the four periods. Thirdly, using the supervised classification to classify the images and to analyze the land cover changes during the four periods.

Six classes of land use were delineated using supervised classification, and maximum likelihood technique was applied for the four scenes dates, Where depended on Indices, maps, and field survey to classify satellite images. The Accuracy Assessment of this classification is about 87 % for MSS 1976, 82 % for TM 1990, 86 % for ETM+ 2001 and 85 % for SPOT 2011.

The analysis showed that the study area suffers from severe desertification because it has suffered from erosion by wind and sand dunes, erosion by water, urban expansion, and lack of water resources especially in western part of it. Also the analysis showed that the desertification decreased in the period between 1976 to 2001, and increased in the period between 2001 to 2011 due to the increase in sand dunes to about $8.78 \text{ Km}^2 \cdot \text{year}^{-1}$, the appearance of water logged area problem and which is increased to about $0.65 \text{ Km}^2 \cdot \text{year}^{-1}$, the increase in urban area to about $0.38 \text{ km}^2 \cdot \text{year}^{-1}$, and The effect of the bad climatic conditions.

Keywords: Iraq, desertification, GIS, Karbala, Landsat, SPOT