



Monitoring Vegetation Growth of Spectrally Landsat Satellite Imagery ETM+ 7 & TM 5 for Western Region of Iraq by Using Remote Sensing Techniques.

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Abstract:

Landsat-5 Thematic Mapper (TM) has been imaging the Earth since March 1984 and Landsat-7 Enhanced Thematic Mapper Plus (ETM+) was added to the series of Landsat instruments in April 1999. In this paper the two sensors are used to monitoring the agriculture condition and detection the changing in the area of plant covers, the stability and calibration of the ETM+ has been monitored extensively since launch although it is not monitored for many years, TM now has a similar system in place to monitor stability and calibration. By referring to statistical values for the classification process, the results indicated that the state of vegetation in 1990 was in the proportion of 42.8%, while this percentage rose to 52.5% for the same study area in 2002.

Keyword: Remote sensing, vegetation cover, Landsat satellite image.

مراقبة النمو الخضري بواسطة الأطياف المنعكسة من القمر الصناعي لاندسات 7 ETM+ و 5 TM لمنطقة غرب العراق باستعمال تقانة الاستشعار عن بعد.

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الخلاصة

يصور القمر الصناعي لاندسات 5 نوع (الراسم الغرضي TM) سطح الأرض منذ آذار عام 1984 وكذلك القمر الصناعي لاندسات 7 نوع (الراسم الغرضي المحسن ETM+) الذي أضيف إلى سلسلة القمر الصناعي لاندسات في نيسان 1999. استخدم في هذا البحث المتحسين لمراقبة الظروف الزراعية وكشف التغيير في مساحة الغطاء النباتي. وقد تم رصد استقرار ومعايرة ETM+ على نطاق واسع منذ إطلاقها على الرغم من عدم رصدها لسنوات عديدة، أما TM فلديها الآن نظام مماثل لمراقبة الاستقرار والمعايرة. أشارت النتائج إلى أن حالة الغطاء النباتي في عام 1990 كان في نسبة 42.8٪، في حين ارتفعت هذه النسبة إلى 52.5٪ لمنطقة الدراسة نفسها في عام 2002.

الكلمات المفتاحية: الاستشعار عن بعد، الغطاء الخضري وصور القمر الصناعي لاندسات.

1-Introduction:

1.1-Landsat-7

The Landsat-7 program is a joint effort between USGS and NASA. The program has two features new to Landsat that have eased monitoring the calibration and making changes when necessary; the Calibration Parameter File (CPF) and the Image Assessment System (IAS). The Calibration Parameter File contains all information relevant to the radiometric and geometric calibration of ETM+ data. This file is issued with every data product and is used in processing each product from raw to calibrated data. CPFs are issued on a quarterly basis, for individual quarters, for all quarters since launch. Each scene is processed with a CPF issued for the specific quarter in which the scene was acquired. This allows for time-dependent calibration coefficients. In this paper are the Band 6 gains, offsets, and view coefficients, all calibration parameters contained in the CPF. [1].

1.2-Band 1: 0.45 - 0.52 μm (blue)

Provides increased penetration of water bodies as well as supporting analyses of land use, soil, and vegetation characteristics. The shorter wavelength cut off is just below the peak transmittance of clear water, while the upper wavelength cut off is the limit of blue chlorophyll absorption for healthy green vegetation. Wavelengths below 0.45 μm are substantially influenced by atmospheric scattering and absorption, [1].

1.3- Using remote sensing technique to determine land cover.

Knows the Land cover that the ground cover is landmarks above the earth's surface, such as lakes, trees, crops and water [2]. The use of the land is intended by the

human activities that are practiced in a site such as agricultural use, residential, industrial and tourism. The knowledge of land use/Land cover is essential for the activities of planning and land management. [3] has been define the land cover as a measure essential to describe the surface of the ground and this measure is important to understand the change in the surface of the ground cause the activities of human and physical environment. [4] Explain the possibility of identifying the vegetation of the soil and the state of erosion and grazing areas and by using the Combs imagine digital multispectral MSS and the demarcation of the land use maps. Also [5] able to demarcation of the land use maps in the Greek Messima is mediated by the satellite Landsat TM sensors by the Institute of demarcation and classification of soils.

2-Methodology:

The main objective of this paper is to study the vegetation case in the study area, and detect the changes in the spectral band to determine the vegetation condition in two deferent years (1990 and 2002).

2.1- Area of study.

The location of study area is in Iraq, west of Baghdad within longitude (37.36) (36.87) northwards and latitude (41.10) (39.50) eastwards, Studied area has been dominated by agriculture, Irrigation channels, drainage, besides bare land. Fig.1.

2.2- Data sources.

Two scenes of satellite image had been used in different times, Landsat-5 Thematic Mapper (TM) 1990, and Landsat-7 Enhanced Thematic Mapper plus (ETM+) 2002. The geometric correction was done by coordinate system (WGS_1984_UTM_Zone_38N). Measure unit in meters, as shown in Fig.1.

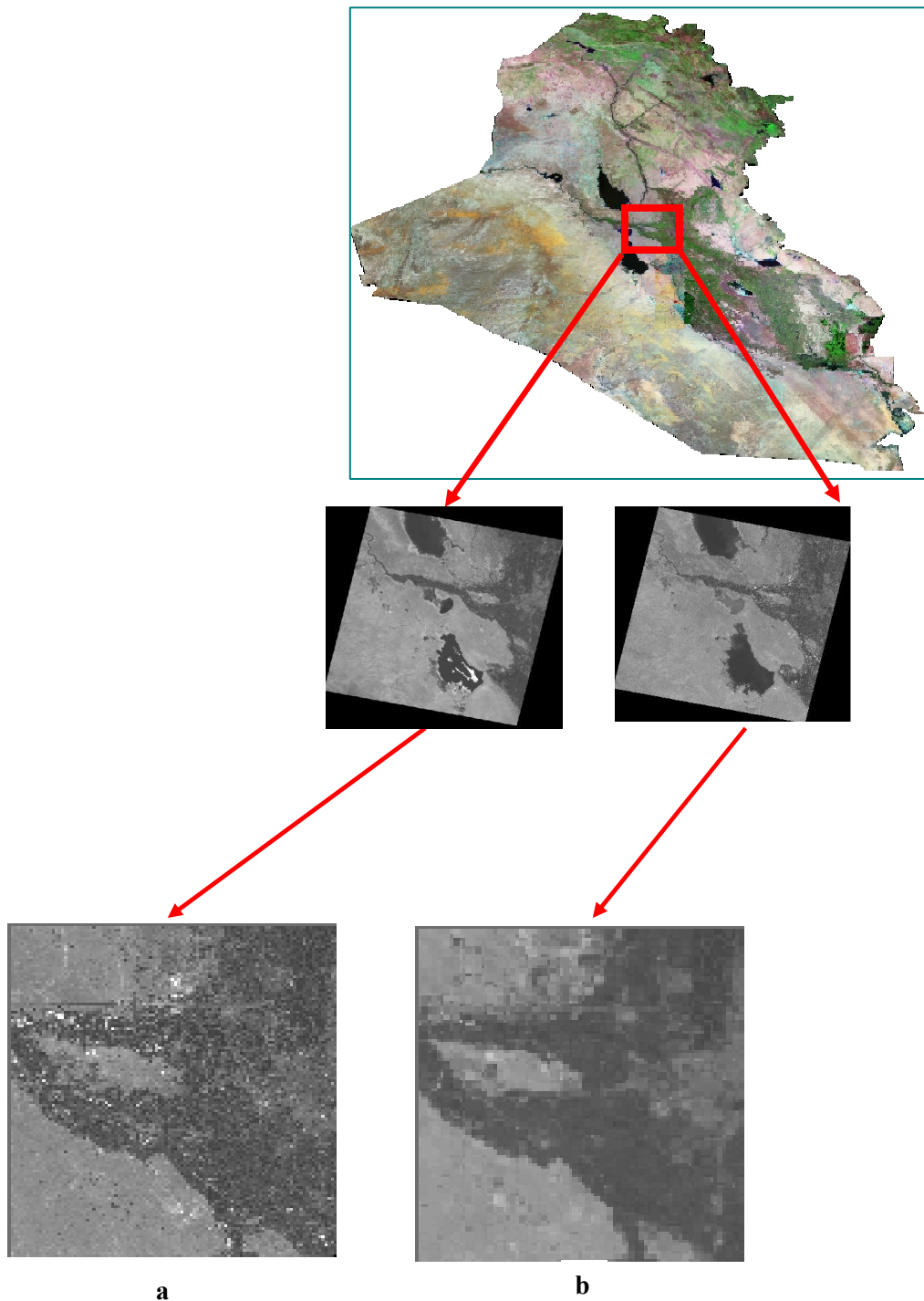


Figure 1- Representation Study Area Clipping From Original Satellite Image, (A):TM5 Band1 And (B): ETM+ 7 Band1.

2.3- Statistic Process And Data Analysis.

Classification process used as an analytical processes to identify the key components of the satellite image on the earth, according to [2] which is divided into two [2] divided into two methods (Supervised and Unsupervised). Classified the satellite images that used in this study by Unsupervised; the main purpose of the

classification process is isolate the areas covered by the plants from other areas (Uncultivated land, water, buildings, etc.). The program ArcGIS.9.3 was used to classification process, this program is characterized by its high ability to display satellite images and cutting and classification as well as a number of function calculations.

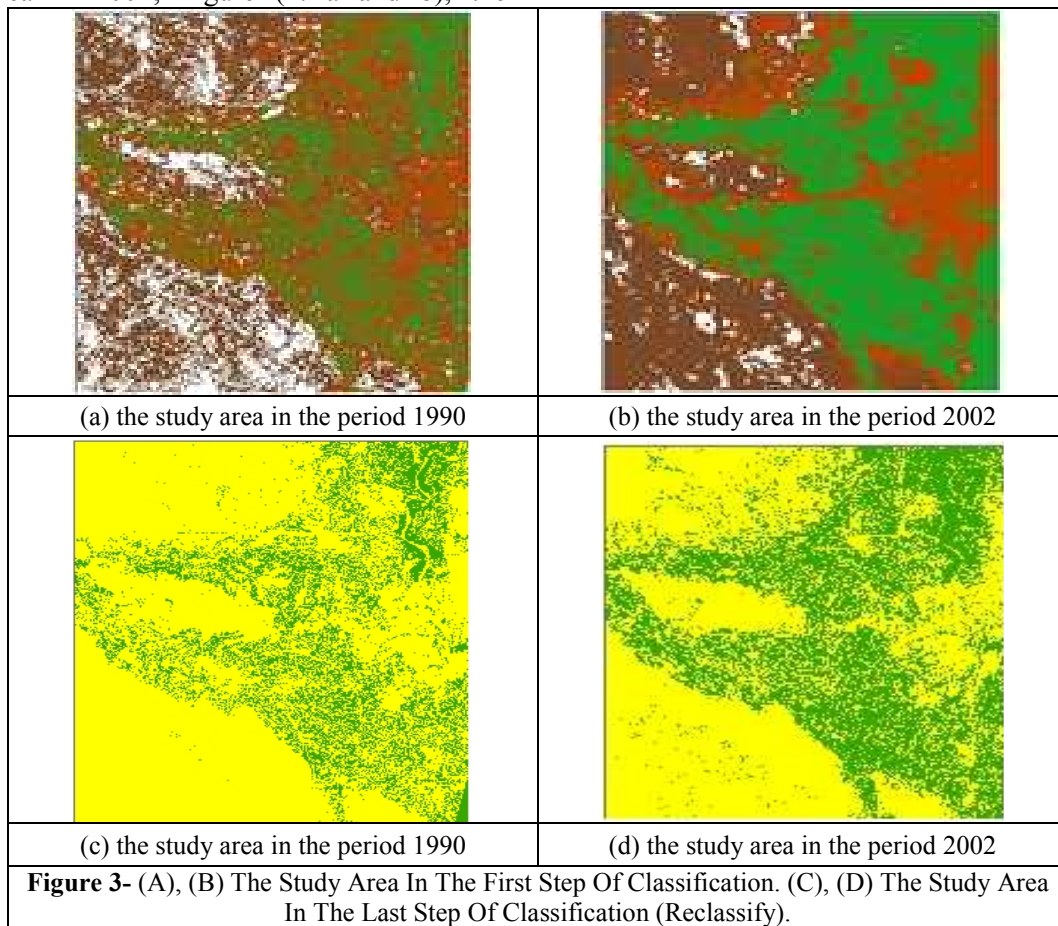
3- Result and Discussion.

Image Interpolation And Classification..

The uncensored results rated satellite images in a category using the program ArcGIS V:9.3. Indicate the presence of several types of land cover after comparing it with the results of the survey using Google Earth, to study area to make a necessary integration with other varieties of plants in a single category, as a result of this classification into two categories in general are a type of vegetation and land cover, as shown in Figure (3.A, b, c, d).

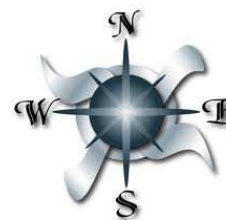
By referring to statistical values for the classification process, the results indicated that the state of vegetation in 1990 was in the proportion of 42.8%, while this percentage rose to 52.5% for the same study area in 2002, Figure (4. a and b), the

difference in the amount of vegetation in the two periods by reference to the climate data showing the lack of rain that fell in that period as well as the high temperatures in the summer, to create conditions unsuitable for plant growth and expansion in the area of the desert, on the other hand, the country is generally the conditions of the economic blockade, which led to the loss of all the tools, such as farm machinery, the destruction of agricultural irrigation canals, and drainage channels clogged and decline in business which impact on the import of seeds and pesticides. These findings are consistent with the [6] as the researcher used the mathematical relationship between the package and red spectral near-infrared in NDVI mathematical equation.



Legend

	Plant
	Soil



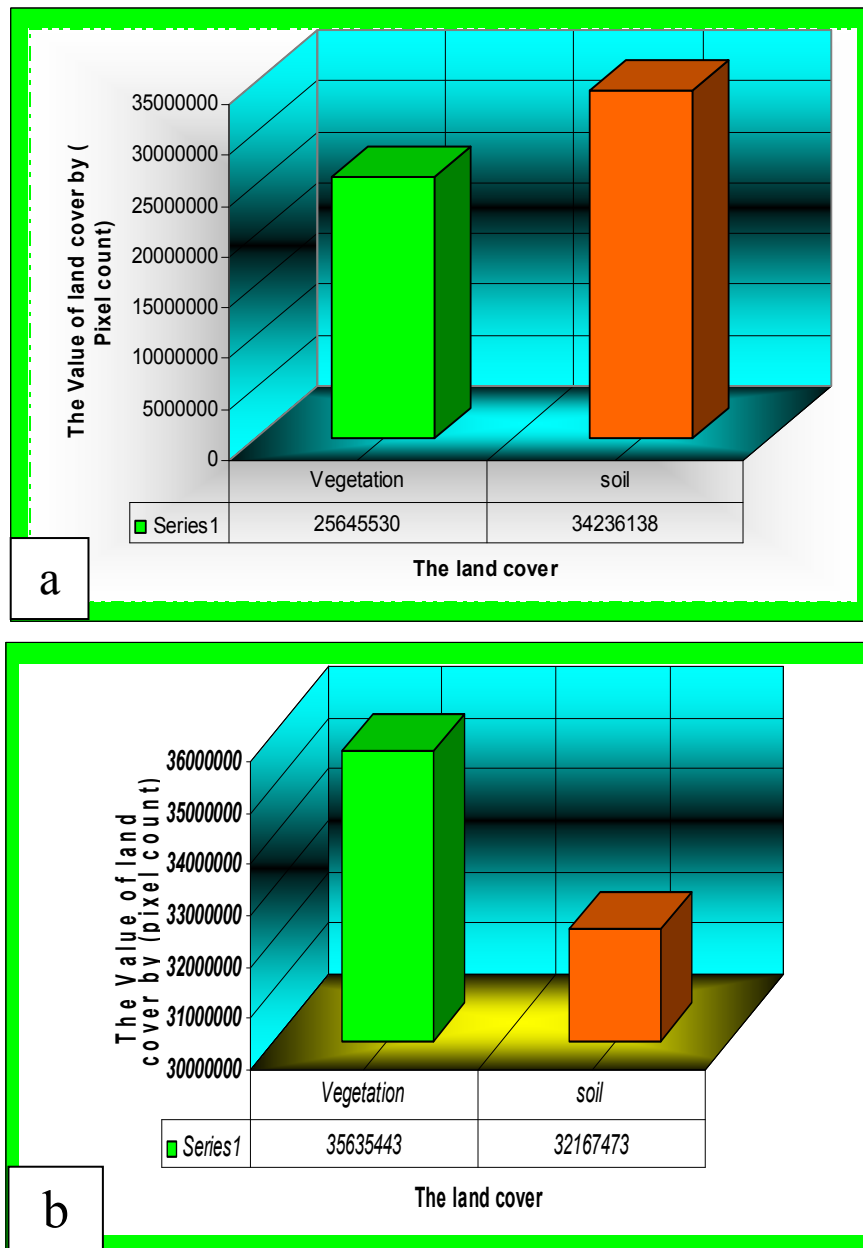


Figure 4- (A, B): Chart Representing The Relationship Between The Land Cover And The Value Of Pixel Count At Period 1990 And 2002.

4- References.

- [1] Julia A. Barsi, Simon J. Hook, Frank D. Palluconib, John R. Schott, Nina G. Raqueno, **2006**, Landsat TM and ETM+ thermal band calibration. MySPIE ToDo, 6296-16 V. 4, pp. 1-9.
- [2] Lillesand, T.M. & Kiefer, R.W. **2000**. Remote sensing and Image Interpretation 4th .ed. by John Wiley and Sons .Inc. USA.
- [3] Foody, P. M., **2002**. Status of land covers classification accuracy assessment. Remote Sensing of Environment, 80, pp.185-201.
- [4] Oneil, A.L. & D.J.Eldridge.**1990**. Satellite impact in the semi arid region, ecological Soc. of Australia,pp.441-447.
- [5] Toulouose, L.G. & Yassoglou.N.J., Moutsoules.M, **1990**. Landuse mapping in west messianic, Greece, using satellite imagery Int .J. of remote sensing (U.K) 11, 9, pp.1645-1661.
- [6] Najeeb, A.A. Zaeen. **2009**. Estimation of the Normalized Difference Vegetation Index (NDVI) Variation for Selected Regions in Iraq for two Years 1990 & 2001 J. of University of Anbar for Pure Science: Vol.3, no.3.