

Monitoring the Water Cover in Al-Hiwza Marsh: Iraq by Landsat for Different Periods

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Abstract: Multi spectral satellite images of the landsat by three sensitive Thematic Mapper (TM), Enhancement Thematic Mapper Plus (ETM+) and Thermal Infrared Remote Sensor (TIRS) which cover Al-Hiwza marsh situated South-East of Iraq. In this study has been used different bands, especially, the 6th thermal spectral band for landsat 5, 7 and 10th thermal spectral band in landsat 8 for study the water cover in Al-Hiwza marsh that located within the provinces of Mesan and Basra. We purpose to study the cover case of the marsh, used satellite images discern the status of region through the period from 1986-1995, 2003 and 2017. From this study, we showing that cover the water of this marsh change in series case to decrease from 1986 until March 2003 and to increase from 2003-2017.

Key words: Al-Hiwza marsh, University of Kufa, Thematic Mapper (TM), Enhancement Thematic Mapper plus (ETM+), Thermal Infrared Remote sensor (TIRS), thermal spectral band, Mesan and Basra

INTRODUCTION

In the modernist years different remote sensing methods in addition geographical information practices have been vastly used (Pijanowski *et al.*, 2009). Varied area coverage, digital storage, timely delivery, low price, repeated information obsessive also in area beside narrow accessibility is of the benefits of remote sensing. The structure, land cover and descriptions of earth surface elements is basic information for multiple policy and scientific purposes and for continuable management activities (Aldagestane, 2003). While land cover drawing is one of the first applications of remote sensing, however, the influence of a thermal band on classification precision and differentiation of earth cover kinds still is underdone explored (Richards, 2013). Thermal sensors in principle calculate the surface temperature and emitted radiation of bodies but reflective bands calculate the spectral reflectance of the surface at various wavelengths (Almashhadane and Alkubasee, 2014). Thermal bands of landsat 5 and 7 is measuring the reflected solar radiation of electromagnetic radiation from 10.4-12.5 μm (Ehsani and Quiel, 2010) and the thermal band of landsat 8 is measuring it by two thermal bands the first from 10.3-11.3 μm and the second thermal band measure EMR from 11.5-12.5 μm (Lillesand and Kiefer, 2000). The images of thermal infrared add another measurement to reactive remote sensing methods they give information around surface temperature beside the thermal characteristics of surface matters (Kuenzer and Dech, 2013). Various purposes of thermal infrared pictures are probable including drawing rock kinds, soil, monitoring vegetation

state, moisture changes, ocean current patterns and sea ice. Also, can be use thermal images in more excitable environments to monitor rare heat sources, for example, volcanic activity, wildfires or hot water spirals freed into lakes or reverse by power plants (Campbell and Wynne, 2011). Often thermal infrared pictures are acquired in range between 8 and 14 μm , a range that includes the peak emissions. The brightness actual values in a thermal image calculate the quantify of energy emitted through different characteristic named emissive. Emissive explains how a material emits energy compared to a presumable perfect emitter and absorber, named a black body. Emissive is explained as the ratio of the quantity or radiant energy radiated by actual material at a known temperature to the quantity radiated by a black body at similar temperature. Emissive is depending on wavelength, so, matters can be categorized by an emissive spectrum only as they are by a reflectance spectrum. Often natural materials are fairly strong emitters. Rate emissive amount for the wavelength scope from 8-12 μm variation from 0.815 intended from granite rock to 0.993 for clean water (Lillesand and Kiefer, 2007).

Main objectives:

- Observing the water case in the study area
- Compare the allocation of water area in four variation periods (1986, 1995, 2003 and 2017)

MATERIALS AND METHODS

Study area: The study area (Al-Hiwza) marsh is situated in the South-East of Iraq as a segment of provinces of

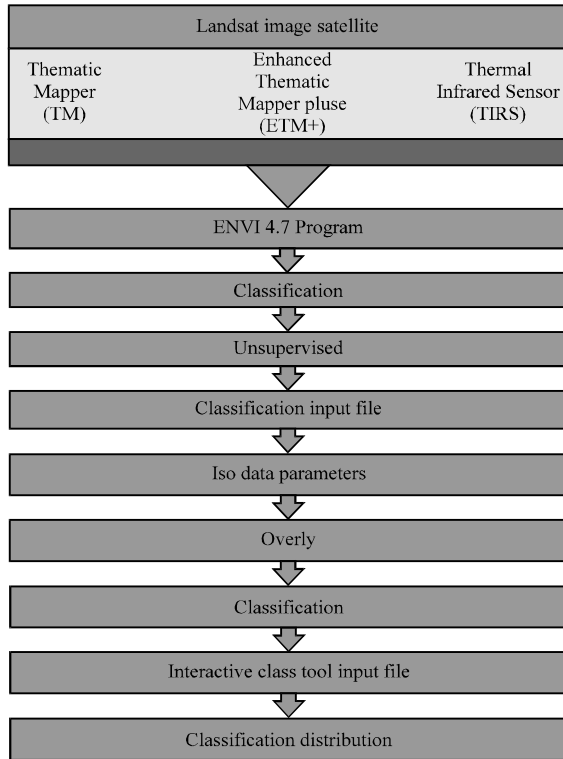


Fig. 1: Explains of steps of analysis

Mesan and Basra. Geographically within coordinates. (Path 166 and Row 38). It's area nearly 3000 km as maximum.

Data sources: Four pictures of Landsat (TM, ETM+ and TIRS) image pick up on 1986, 1995, 2003 and 2017 (path 166 and Raw 38) was useful in this study were used to observe the patterns of yearly changes in water cover using ENVI4.7 Program.

Image classification method: One of the most often used techniques for obtaining information from satellite images by computer is classification process (Li *et al.*, 2009). It termed as the method by which every image pixel is appointed to definite class or region inside the treated image (Canty, 2007). This method has designed an important segment of the ground or remote sensing (Wang, 2010). Anyhow classification process is usually used to examine the remotely sensed picture of the land cover and then obtaining beneficial thematic information image classification is acted by two ways, i.e., supervise and unsupervised methods (Lillesand *et al.*, 2004) (Fig. 1 and Table 1). This study concentrates on the specification of the basic stages that may be included in image

Table 1: Classification of thermal band images

Years	Thermal bands image	Classified thermal bands image
1986		
1995		
2003		
2017		

classification, through conversion the image records into information. The method of multispectral classification is a tool in this study to isolate a wanted area from images. Discern the unsupervised classification stages are show by the streamline chart.

RESULTS AND DISCUSSION

The unsupervised classification technique was used on satellite images applying a geographical information program for the four periods to the spectral thermal bands. For segregate the area of water and observing the area canobied by water. Next compared the effects of classification for every year in sequentially with the another year, the classification effects denoted the existence of a serial reduction in the water area of Al-Hiwza marsh for 1995 and 2003 and increasing in 2017. The main reason of this decrease in water of study area is geopolitical, the ruling party at past time desiccate the marshed in the South of Iraq but after 2003 back filled for all marshed.

In relative term the percentage of the water area to the land area of Al-Hiwza marsh was 41.648% in 1986, 27.617% in 1995, 21.233% in 2003 and 34.121% in 2017.

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