Monitoring of Vegetation Changes by Using NDVI Index Using Landsat during the Years 2000-2009: a Case Study

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Abstract: Evaluating vegetation changes in every area is very important because if the monitoring of vegetation changes over time in each area be examined, changes of human pressure and environment would characterize. Thus, proper planning can be done to preserve the life of a region. Today for the vegetation evaluating the remote sensing and different indicators are used; NDVI is one of the most important indices in this field. In order to assess the vegetation of Eskandari watershed area in Isfahan province the Land sat TM sensor images were used. The vegetation of this area was prepared by NDVI index for the years 2000 and 2009. The results of this study showed that the vegetation in this area has increased. The changes of the urban areas are also notable. It is necessary that experts pay attention to the area in order to prevent damage to the vegetation due to the suitable climatic conditions that prevailed in the region in recent years.

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1. Introduction

Some of the phenomena and effects, such as ground cover plants, various natural factors or human causes has changed over time and conditions that affect ecosystem function. Therefore, detection, prediction and monitoring such changes in an ecosystem is of great importance. In addition to gaining knowledge about the vegetation and soils plays an important role in managing their health. Today, the production of a vegetation map precisely one of the important tools in planning and development are considered. In order to monitor and assess global and regional scale vegetation data access at the field or the field is usually difficult and limited. Because such data for traditional small places and at different intervals are collected (Pettorelli, 2005). Vegetable cover during the years under the influence of climatic factors, soil, organisms have evolved. One of the main problems in the study of vegetation changes there is a lack of precise location information from the past. Satellite images and remote sensing technology allows the lack of precise location information from the past. Satellite images and remote sensing technology enables provides a (Malmir, 2004). And integrated features such as satellite imagery provide broad vision of a region, Reproducibility, the easy availability of information and the accuracy of the data and save the time of the soil properties The use of such information to evaluate and change control vegetation gives it priority over other methods. Accordingly, many researchers to study vegetation using remote sensing data and the appropriate technique such studies Have evaluated (autonomous, 2000: 2004, Huete). The main objective analysis of remote sensing is often used to study plant cover the main objective analysis of remote sensing is often used to evaluate vegetation (Drysdale and Metternicht, 2003).

2. Materials and Methods

2.1 The geographical location of the study area

Eskandari watershed is located in the West of Esfahan province in Iran and having an area of over 1649 square kilometers and a weighted average height of 2626 meters above sea level and coordinates 02 ° 50 to 30 ° 50 'east longitude and 42 ° 32' to 11 ° 33 north latitude and Located in the catchment of the is Zayandehrood dam. Plasjan River that emanates from the highlands of Fereydunshahr city in Isfahan province and current in the Eskandari watershed.

Three branches of the river, Dehaq, damaneh and stream Khalaj riders join together in a nearby savaran village. Eskandari runoff measure in the Hydrometry station with longitude 25 ° 50 ° East and latitude 49 ° 32 ° N and measured height of 2130 meters above sea level.

The average annual discharge is 131 million cubic meters and annual precipitation of watershed Eskandari is 339 mm. Plasjan River after Zayandehrood is the most important branches of zayanderood catchment and is near the village of Aliabad in the end part of the West of Dam Zayandehrood Lake joins to Zayandehrood. Figure 1

position of the Eskandari basin in the land Isfahan in Iran is shown.

2.2 NDVI Index

To study the vegetation of the area was carried Land sat TM sensor images. This research is part of the following steps. Pre-processing and increased image resolution: In this stage first, geo-referenced satellite image and atmospheric and geometric corrections were done on the raw images to increase resolution. Land use mapping using satellite imagery: preparing and using supervised classification of NDVI maps at this stage vegetation index were prepared. Evaluation of classified images: To assess the accuracy of maps with ground truth from random points during harvest in the region that have been used by terrestrial positioning device. Compare the different decades vegetation and analyzing them to determine the level changes during two different decades periods of GIS and ARCVIEW software was used (shojaei et all, 2014). The index was used to determine changes in vegetation. So that NDVI index Obtained for the images of 2008 and 2000 years, and then Statistics calculation for this two images after calculation of NDVI indices were calculated using the ENVI software finally, a classification map of vegetation changes was prepared (Figure 1).

3. Results and discussion

Table 1. Changing the area (kilometer) land use and land cover in the study area by year

The area of land changes in 2009 (kilometers)	The area of land changes in 2000 (kilometers)	area
34.8	4.3	Irrigated agriculture
1.6	0.0	Garden land
46.3	46.3	Dry farming
12.5	2.4	Fallow land
0.9	0.0	Good pasture
147.5	42.8	Mixed irrigated agriculture
91.8	22.1	Pasture with poor coverage
44.0	36.4	Average pasture cover
0.3	0.0	Rock outcrop
5.2	1.0	City

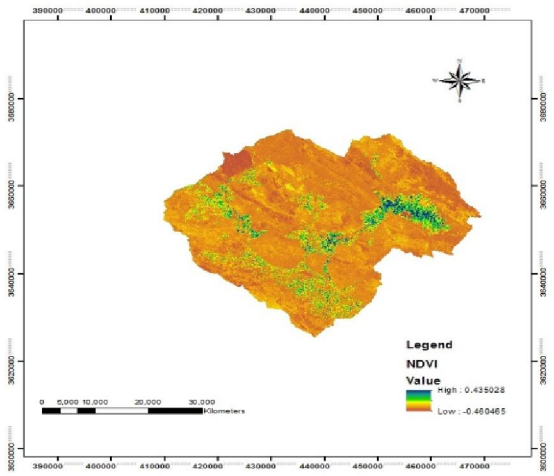

Fig 1. Map of vegetation change of NDVI Index 2000

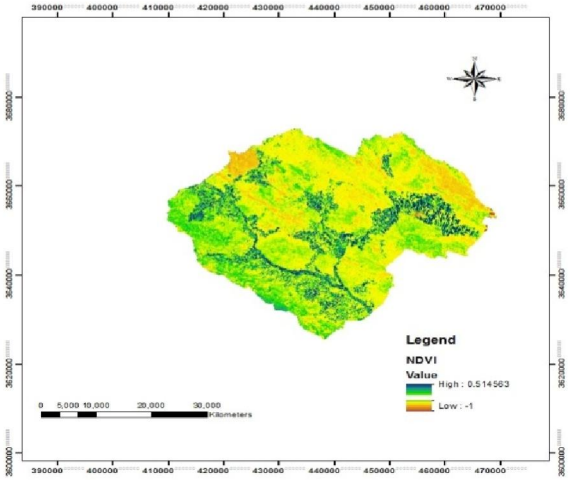

Fig 2. Map of vegetation change of NDVI Index 2009

Map of vegetation change in a period of 9 years of the study area were prepared. Table 1 shows changes over time of a change that has happened in this area shows. In the study area because of the rain that has fallen in recent years and given that the next area Elevations were more rains improved growing conditions for plants. Thus, since 2000, has been expanded over vegetated areas (Table 1, forms 1 and 2). Hosseini and colleagues at the Center's 2011 study concluded The vegetation changes in this area in recent years has been due to improved rainfall (Hosseini, et al., 2011). Also according to the results of urban growth in this region because conditions were available for the restoration and production (Table 1). Overall results showed that NDVI data obtained from satellite imagery Land sat very good performance in

study And changes in vegetation of the show itself. Which is consistent with the findings of other researchers (Laidler et al., 2008: Cabacinha, 2009: Pickup, 1993: Akingbogun et al., 2012). Coverage of live plants, vegetation, biotic and physical components (rocks, gravel and soil) are three primary components to determine the reflectance of vegetation in the meantime, live vegetation is very important (Goldsmith, 1991). Ding and colleagues (2007) also concluded that the sensitivity to changes in rainfall evergreen forests are less pasture areas.

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