



# Investigating the trend of vegetation changes in the Behbahan City

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## Abstract

Knowing the quantitative and qualitative characteristics of changes in environmental planning, land preparation and sustainable development are very important. Currently, the use of vegetation maps is one of the important elements in generating information for macro and micro planning. In this research, data from the Landsat satellite bands of ETM and OLI sensors have been used to show the temporal and spatial changes of Behbahan city's vegetation cover. During the examined time periods in 1998, the vegetation cover was 1294.38 and the areas without vegetation cover was 7.46371, which indicates that human intervention in these areas was very little, but the vegetation cover in 2020,4 It was 1189.1189 and the areas without vegetation was 112.472.

Areas with vegetation cover were 12.94% in 1998 and about 11% in 2020. The ratio of vegetation cover in 1998 increased by 1.05% compared to 2020 and is decreasing in 2020. Areas without vegetation cover in 1998, the amount of the area was 0.07%, but in 2020, the areas without vegetation cover reached 1.12%, which means that the areas without vegetation cover are increasing in 2020, and the reason for this change in population growth is excessive construction. Also, the illegality of land use changes, which play a significant role in the reduction of vegetation and global warming, which are among the factors. Also, the lack of respect for the balance of livestock and pastures and excessive exploitation in many pastures of Iran, cause the destruction of these resources. and caused irreparable damage to vegetation and soil.

**Keywords:** Remote sensing, Urban areas, Vegetation, Behbahan city.

## Introduction

Knowing the characteristics of vegetation and the relationships between plant species as well as environmental factors has always been of interest to ecologists. The reason for this attention is the great importance of plant covers in terms of habitat, energy production and other important characteristics of plants on the planet. Vegetation has

changed for various reasons and over time due to natural or human factors, which affects the conditions and functioning of the ecosystem. Therefore, the need to reveal, monitor and take care of such changes in an ecosystem is very important. Vegetation in urban areas is important because it can control environmental conditions and energy exchanges by selective reflection and absorption of solar radiation. It should be introduced as an effective factor in controlling air pollution and affecting human health. One of the most important problems in the issue of investigating vegetation changes is the lack of accurate location information from the past. Satellite images and remote sensing technology provide the possibility to achieve a better plan for environmental management by relying on the information produced from it. Remote sensing is a very useful technology that can be used to obtain layers of information from soil and vegetation.

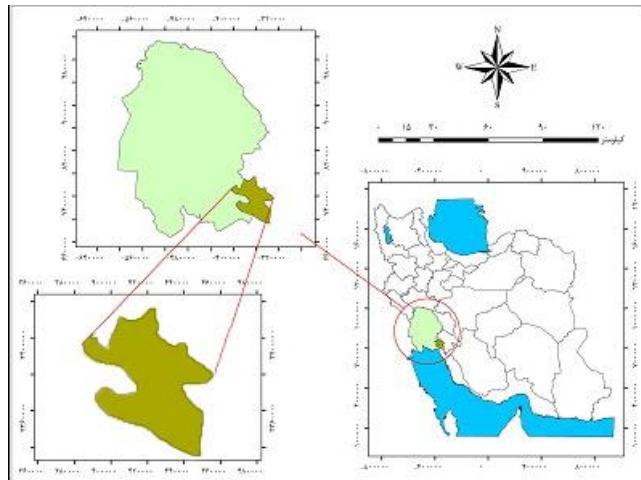
In recent years, many studies have been conducted in the field of detecting changes in vegetation cover and land use using remote sensing, which can be mentioned below. Mohammadi Golrang (1373) investigated the changes in the vegetation cover of the Karaj dam watershed during the years 1352-1372 through the preparation of the vegetation map of the region and comparing it with the previous map, and the main cause of the changes observed in the types of the region in During the mentioned period, it has been counted as excessive livestock grazing. Mokhtari et al. (2009) examined the relationship between vegetation cover and percentage of soil without vegetation cover in a watershed to other vegetation indicators such as NDVI, PVI and RVI and other remote sensing analyses. In this study, NDVI They introduced it as the best indicator in terms of correlation with vegetation. Mousavi and Aghajanlou (2005) studied the vegetation changes in the Lar dam basin in a 25-year period from 2006 to 2008 using GIS. 28.5% of the total land area covered by pasture has remained unchanged, and 14.3% of the land has been changed to classes with a lower percentage of coverage and 57.42% to classes with a higher percentage of coverage due to the application of proper exploitation management. . Yamaei and Meghazi (1378) investigated and compared the changes in the vegetation cover of the Black Desert using the remote sensing data of TM and ETM sensors for the years 1369 and 1379 and also using the NDVI vegetation index, the type and amount of cover They investigated the vegetation and studied its changes. Their results showed that the changes in the surface of the Ardakan desert during the 10-year period were partial but not uniform.

Raushi and Nikjo (1389) using satellite images and GIS technologies, as well as using NDVI vegetation cover index and field studies, vegetation maps of Bojoshan Chai watershed in Ahar city were prepared in two time phases from 1372 to 1386. Result They showed that the harvesting capacity of vegetation in both time periods was more than 2.5 times the allowed capacity and the density of vegetation has decreased drastically. Shafiei and Hosseini (2012) studied vegetation cover using satellite data in Sistan region and evaluated the changes in vegetation cover in the period from 1990 to 2006. The results showed that the vegetation cover level for 1990 was equivalent to It is 101247 hectares, which decreased to 26475 hectares in 2006. Pourkhabaz et al.(2013) used ETM+ and OLI sensors in two years from 1378 to 1392 to show temporal and spatial changes in the vegetation cover of Behbahan city and calculated the value of NDVI index for two years. Their results showed that small changes.

### **Geographical location of the desired area**

Behbahan city is located in the southeast of Khuzestan and borders with the provinces of Kohgiluyeh, Boyer Ahmad and Bushehr, and with an area of 3715 square kilometers, it

is the tenth city in terms of size in Khuzestan province. From the north and northeast, it is bounded by the mountain range of Kohgiluyeh and Dehdasht city, from the east and southeast to Gachsaran city in Kohgiluyeh province, from the south to Dilam port in Bushehr province, and from the northwestern to Ramhormoz city. The city of Omidyeh and the port city of Mahshahr are located in the west and southwest of it. Its geographical length is 50 degrees and 14 minutes east longitude and 30 degrees and 36 minutes north latitude and its height is 313 meters above sea level.



**Figure 1.** Geographical location of Behbahan city

### **Research method**

In this chapter, the satellite images received from Landsat 5 in 1998 and Landsat 8 for 2020 are analyzed. In order to obtain changes in the vegetation cover of Behbahan city over a period of 22 years, after pre-processing the image, powerful NDVI indices are used to check the amount of vegetation cover and its changes.

### **Vegetation index**

In order to investigate the qualitative changes of vegetation during 22 years, the NDVI output maps have been classified into two vegetation classes, i.e. areas with vegetation and areas without vegetation. NDVI vegetation cover index is one of the most widely used vegetation cover index whose useful performance has been reported in many studies by different researchers. The numerical value of this index fluctuates between the numbers +1 and -1, and it has been proven that as the number approaches +1, the amount of vegetation increases.

### **Analysis of the results**

By checking the numerical value of the NDVI index in the software, according to the table, the green parts have larger positive values than other parts, which indicates denser vegetation. Then, the percentage of the area allocated to each class is calculated for each year and the resulting numbers are compared. The vegetation area of Behbahan city in 1998 and 2020 has been investigated in a 22-year period according to the table in terms of vegetation in Behbahan city. In 1998, the area of vegetated areas was 1294/38 and the

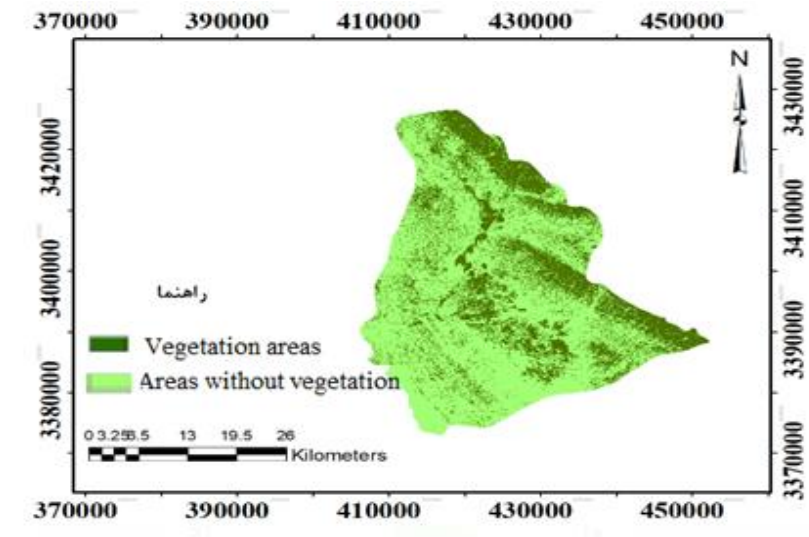
area of non-vegetated areas was 7/46371 and in 2020, the area of vegetated areas was 1189/4 and the area of non-vegetated areas was 112/472.

**Table 1.** Vegetation area of Behbahan city in 1998 and 2020 in km

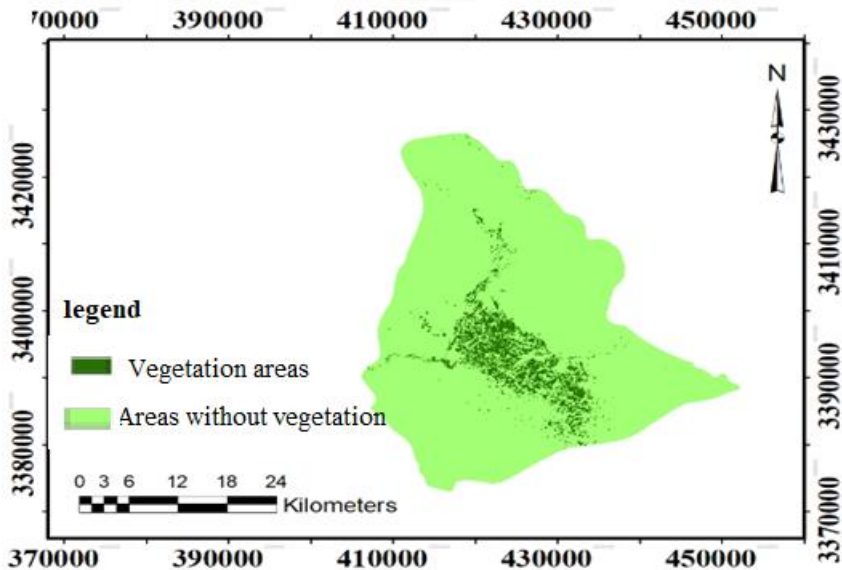
2020	1998	Vegetation	Row
1189.4	1294.38	Vegetation areas	1
112.472	7.46371	Areas without vegetation	2

The results of the comparisons have shown that the area of vegetation has increased in 1998 and the areas without vegetation have decreased. In 2020, the area of vegetation has decreased and the areas without vegetation have increased. After the vegetation map was prepared, the changes were revealed and the changes were investigated, and during the period of time, these changes were studied, including decreases and increases for each floor.

During the time period from 1998 to 2020, the studied area has undergone many changes, according to map no. 2. In 2020, the vegetation cover is decreasing and the areas without vegetation cover are increasing.



**Figure 2.** Vegetation map of Behbahan city in 1998



**Figure 3.** Vegetation map of Behbahan city in 2020

According to the map of 1998, areas without vegetation that have decreased in area include pasture lands, the destruction of these lands will have many environmental and economic consequences. In this way, by destroying a piece of pasture land, however small, a living part of nature is lost.

One of the problems facing Behbahan city is the indiscriminate exploitation and beyond its capacity, which causes a decrease in quality and quantity. Changing the use of pastures, in addition to overgrazing, which has always been a serious threat to pastures, mass transfer and The changes in their use is also one of the important problems that threaten the existence of the pasture ecosystem, which has happened in Behbahan city in recent years.

The results of this research consider the NDVI index as the most general index in the evaluation of vegetation cover.

### Conclusion

The use of satellite images in this regard provides accurate information on how to exploit and apply management. Vegetation indices are one of the most widely used examples of band calculations, which are used to calculate the percentage of vegetation, investigate the types of vegetation and the state of greenness of an area during different periods. The amount of vegetation from 1998 to 2020 according to the calculations made during the 22-year period has decreased by about 2%, and the areas without vegetation have increased by nearly 1.5%, which indicates that the vegetation cover that has been under the influence of climatic factors for many years. Soil, living beings have evolved; In the past, without human intervention, the balance between livestock and pasture has been maintained, but gradually with the increase in population, its need has also increased,

leaving more or less positive and negative effects, and in places where the interference is unreasonable, it has upset the balance. between animals and plants and has caused the destruction of plant communities and soil.

Considering the increasing growth of urbanization and the drastic change of land use in these areas, studying the temporal changes of vegetation in urban areas is one of the important solutions in applying proper management to these areas. In order to prevent the destruction of urban vegetation and change their use, and to advance the development of urban borders in such a way that the vegetation is not destroyed. Also, considering the size of such areas, the use of remote sensing to do this work is an unavoidable necessity that should be given special attention.

Increasing NDVI means increasing the frequency of vegetation and more homogenous and homogenizing the land cover. But the reduction of NDVI represents more diverse phenomena (water, open space, bare soil, construction, etc.) and the more heterogeneous mosaic of the land. With the increase of NDVI (unification of land cover), the correlation between LST and NDVI becomes stronger. The results of this study also showed that the surfaces covered with plants have a lower surface temperature and the plant cover has a cooling effect on the environment.

## Reference

- 1- Abdullahi, Jalal, Rahimian Mohammad Hassan, , Sawaqabi; Mohammad Hossein; (2006) Limitation of vegetation map creation by Landsat+ETM satellite images, Iran Pasture and Desert Research Quarterly, year 14, pages 289-310.
- 2- Arzani, H., Fatahi, M. and Ekhesi, M. R., 1378. Investigating the quantitative and qualitative changes in the vegetation cover of Pashtkoh pastures, research and construction, - Yazd during the last decade (1365-77), research and construction 31-35
- 3- Delaware, Mohammad; (2017), draft guide for the use of spatial information systems and remote sensing in extracting the effective parameters of hydrological studies of watersheds, Ministry of --Goward, S. N., G. D. Cruickshanks, and A. S. Hope , (1985) Observed relation between thermal emission and reflected spectral radiance of a complex vegetated landscape, Remote Sensing of Environment, 18, 137-146.
- 4- Energy, Deputy Water and Aquifer Affairs, publication number 395.
- 5- Khajahuddin, Pourmanafi; Seyed Jamaluddin, Saeed; (2006) Determining the level of paddy fields on the side of Zayandeh River in Isfahan region with IRS satellite data, Journal of Agricultural Sciences and Techniques and Natural Resources, pages 513-527
- 6- Huete,A, (2004) Remote Sensing for Natural Resources Management and Enviromental Monitoring: Manual of remote sensing Univercity of Arizona.
- 7- Mousavi, S. M., 1380. Investigating the effect of mud on vegetation and soil changes in the semi-steppe pastures of Reza Abad, Semnan. Proceedings of the Second National Pasture and Pasture Management Conference in Iran, February 2010.
- 8- Magee, T. K., P. L. Ringold, and M. A. Bollman .2008 Alien species importance in native vegetation along wadeable streams, John Day River basin, Oregon, USA. Plant Ecol. 195: 287-307.
- 9- Rafiei, Alavi Panah, Malek Mohammadi, Ramezani Mehrian, Nasiri; Yusuf, Kazem, Bahram, Majid; (2017) Preparation of land cover maps with the help of remote sensing using decision tree algorithm (case study of national park and wildlife

- sanctuary, Bakhtegan), Journal of Geography and Environmental Studies, year 23, number 3, pages 93-110.
- 10- Rouse. J.W., Haas. R.H., Schell. J.A., Deering. D.W .1973Monitoring vegetation systems in the great plains with ERTS. Third ERTS Symposium, NASA SP-351 309-317.
  - 11- Shafii, Hosseini; Hamed, Seyyed Mahmoud; (2012), investigation of vegetation cover using satellite data in Sistan region, journal of plant ecophysiology, third year, pages 91-105.
  - 12- Weng, Q., D.,Lu, J.,Schubring .(2004). Estimation of land surface temperature–vegetation abundan relationship for urban heat island studies. Remote Sensing of Environment. 89, 467–483.
  - 13- Wagrowski, D. M., and R. A. Hites, (1997) Polycyclic aromatic hydrocarbon accumulation in urban, suburban and rurual vegetation, Environmental Science & Technology, 31, 1, 279-282.