Identification of Vegetation for Change Analysis of Bhandardara Canal Command Area from LISS-III Satellite Image Using NDVI Techniques

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Abstract:-

Remote sensing and GIS is the important tool for land cover analysis. This paper presents an improved method for the analysis of satellite image based on Normalized Difference Vegetation Index (NDVI) using temporal multispectral data of LISS-III data. Different GIS softwares were used to detection of vegetation cover of Bhandardara canal command area of January 2013, January 2016 and February 2019. The main aim of this work was to study the spatial distribution of Land Surface vegetation. For land cover classification, some band combinations of the remote sensed data are exploited and the spatial distribution such as road, urban area, agriculture land and water resources were easily interpreted by computing their normalized difference vegetation index. From output of NDVI data classification of five different class of vegetation group according reflectance value detected from LISS-III sensor and DN value from same image. According to results, values of one to three classes which represent mostly agricultural region has been increased during 2013 to 2019, but fourth and fifth classes were decreased, which is represent mostly natural vegetation. The vegetation analysis can be used for the situation of unfortunate natural disasters to provide humanitarian aid, damage assessment and furthermore to device new protection strategies.

Keywords:- Remote sensing and GIS, NDVI, Vegetation

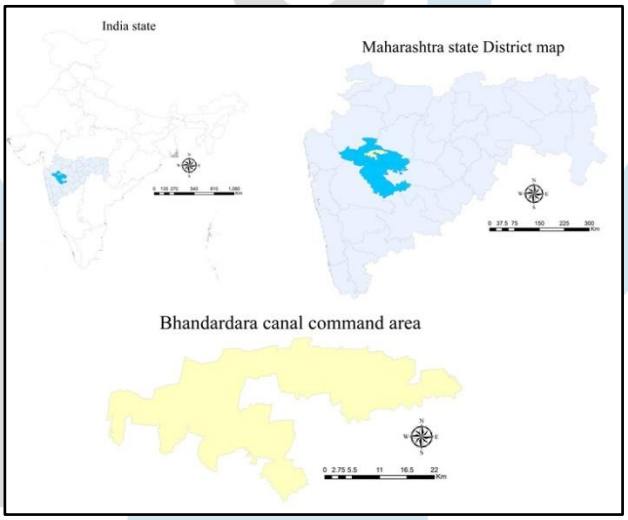
Introduction:- Remote sense Satellite data of repetitive or temporal multispectral image data have capabilities for mapping and monitoring the land surface changes in several field with the help of geospatial techniques. that satellite data capture using different characteristics of earth surface and emittance properties in different parts of the electromagnetic spectrum with the help of different satellite sensor GIS is a powerful tool to analyze and map the satellite data. The main aim of this work to study the spatial distribution of Land Surface vegetation cover using Normalized Difference Vegetation Index (NDVI) from use LISS-III data. The study area was belonging to rain shadow zone and irrigated by Bhandardara canal command area of western Maharashtra having average rainfall 476mm green vegetation play an important role for maintain the temperature humidity and soil surface evaporation in the study area have highest concentration of sugarcane farming. Remote sensing techniques have demonstrated its potentiality in providing information of the characteristics and spatial distribution of natural resources including agricultural resources because of their unique advantages of providing multispectral, temporal and multi resolutions. NDVI is unsupervised classification type of image classification which is useful for

land cover analysis for vegetation cover analysis as well as water body and open land surface in this paper highlight change detection of vegetation in Bhandardara canal command area .which extended in Sangamner, Rahuri, Rahata and Shrirampur tehsil

Objective:- This study established the methodology for spatial analysis vegetation cover. It is now envisaged to create remote sensing based detection of vegetation area Analysis for Bhandardara canal command area

Keywords:- Remote sensing, Multispectral LISS-III, unsupervised classification of NDVI, vegetation area identification.

Study Area:-The study region of the Bhandardara canal command of Ahmednagar district located in western Maharashtra is located between $19^0$36' to$19^0$66' North Latitude and $74^0$30'to $74^0$95' East Longitude. In Study areas there is



Map no1

Pravra basins as well as canal command area so most of area is under the agriculture land, deciduas forest as well as seasonal grassland and hilly or rocky region.

Database and Methodology:-

Use of Multispectral and Multi-temporal Images:

Multi-temporal and Multispectral remote sensing systems detect variation using radiation in a small number of broad wavelength bands. The multispectral satellite remote sensing technologies have been utilized as a widespread source for the purpose of remote classification of vegetation cover. Depending on geographic area, vegetation diversity, field size, and vegetation condition there deepness growth using different band ratios of multispectral data and Classifications schemes have been applied Using a multi-date IRS LIIS-III dataset of Bhandardara canal command area to map vegetation distribution area Multi temporal data improve the accuracy of classification. Have used LISS-III Data for identification different vegetation classification of month of January 2013, January 2016 and February 2019 dates data using unsupervised classification method spatial resolution & spectral band selection are affects on the classification results depending on spectral s digital number value. In study of this area used multi date IRS

LISS III data for multi vegetation class identification and for difference estimation of each class of study area (Sangamner thesil). The unsupervised classification of NDVI perform varies class vegetation group identification using this group of temporal data generalizes changes of an area of study area using comparison of NDVI of all the results and with same class of image. For the conclusion is the use of histogram of output data of unsupervised classified image of IRS LISS III data it was possible to identify various vegetation area in the study.

Visual Interpretation of Satellite Imagery:

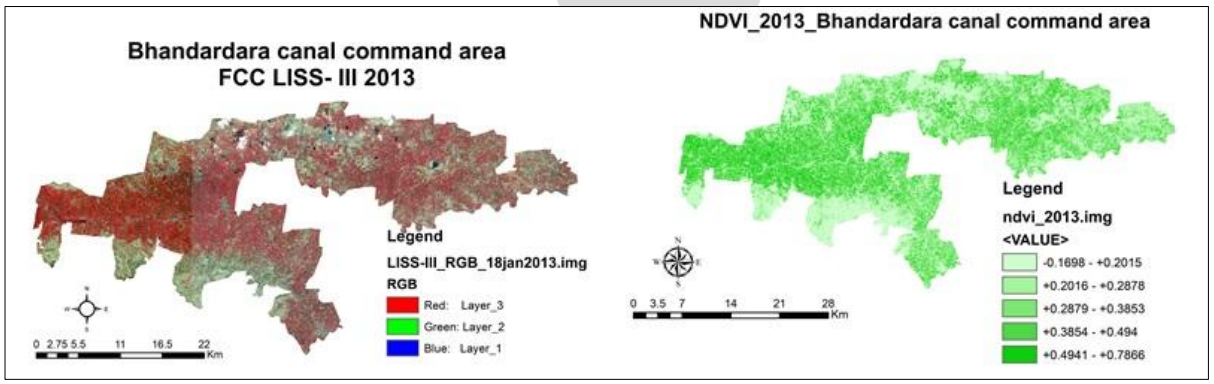
There are certain fundamental photo-elements of image characteristics seen on image whichaid in visual interpretation of satellite imagery. Although, there is a difference of opinion on the number of elements to be included, there is however general consensus on the Tone or colour, size, shape, texture, pattern, location, association, shadow, aspect, resolution. In that for tis research Tone or Colour Texture Pattern and Shape are use for identification of vegetation cover

Normalized Difference Vegetation Index

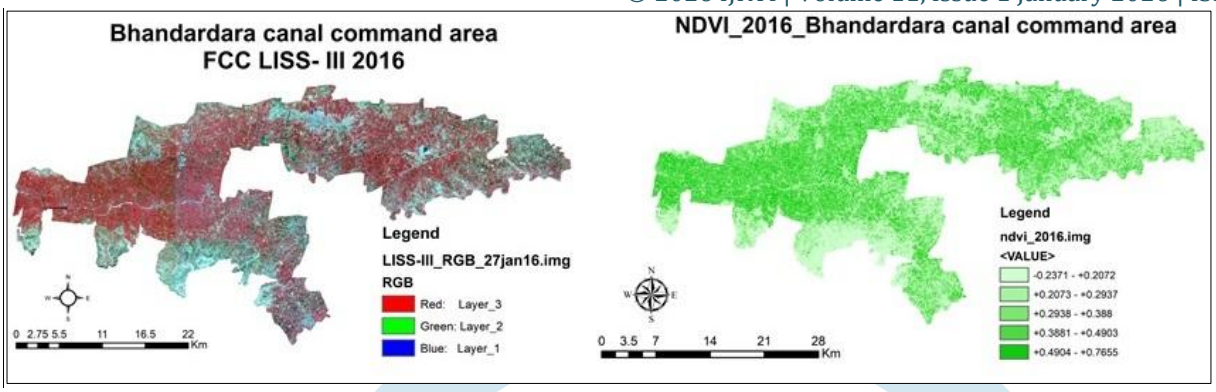
The Normalized Difference Vegetation Index (NDVI) is an index of plant "greenness" or photosynthetic activity, and is one of the most commonly used in vegetation identification. Vegetation indices are based on the observation that different surfaces reflect different types of vegetation cover like dense forest or grassland. Photo synthetically active vegetation, in particular, absorbs most of the red light that hits it while reflecting much of the near infrared light. Vegetation that is dead or stressed reflects more red lights and less near infrared light. Likewise, non-vegetated surfaces have a much more even reflectance across the light spectrum. By taking the ratio of red and near infrared bands from a remotely-sensed image; an index of vegetation "greenness" can be defined. The *(*NDVI*)* is probably the most common of these ratio indices for vegetation. NDVI is calculated on a per-pixel basis as the normalized difference between the Red and near infrared bands from an image.

NDVI= (Near Infra-Red –Red)/ (Near Infra-Red+ Red).

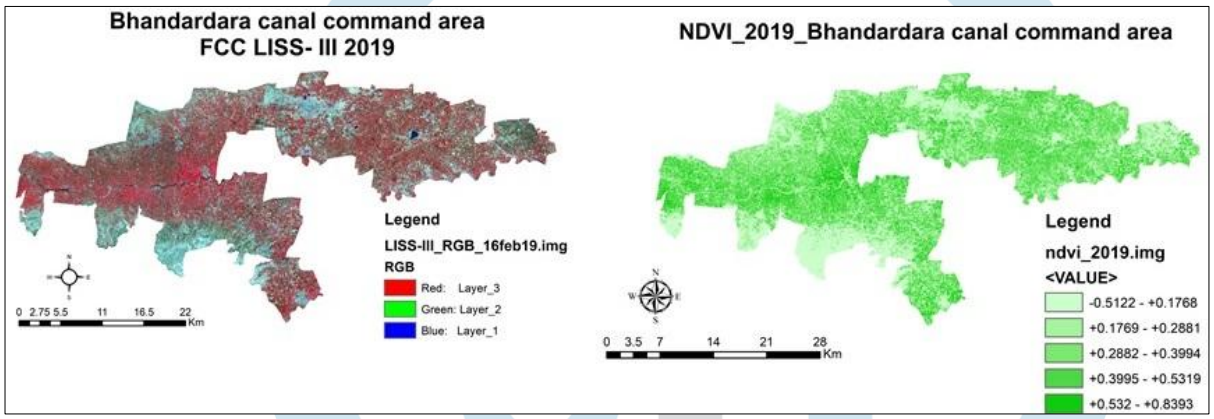
Result and Dissection:-



Map no 2



Map no 3



Map no 4

In Map no2,3,and 4 Shows spatial distribution of Vegetation land cover Bhandardara canal command derived from Liss-III data of rabi season temporal data of February 2013 February2016 and March 2019 using NDVI unsupervised classification. The study area is under canal command area and most sugarcane production area Comparative interpretations of NDVI and false colour composite (fig.2, 3&4) the NDVI value for February 2013 image vegetation cover area is mainly from 2, 3, 4 and 5 class of in February 2013 ranges between 0.2073 to 0.7655 in that 0.2073 to 0.388 area is harvested crop land area and from 0.388 to 0.7655 area is under dens crop area like sugarcane and maize crop in first class -0.2371to 0.2072 have water body fallow land and rocky platform is also Comparative interpretations of February2016 ranges between 0.2015 to 0.7866 in that 0.2015 to 0.3853 area is harvested crop land area and from 0.3853 to 0.7866 area is under dens crop area like sugarcane and maize crop in first class -0.1698 to 0.2015 have water body fallow land and rocky platform

For verification of comparative interpretations both the images with temporal variation in march 2019 image also got same result of ranges between 0.1769 to 0.8393 in that 0.1769 to 0.3995 area is harvested crop land area and from 0.3995 to 0.8393 area is under dens crop area like sugarcane and maize crop in first class -0.15122 to 0.1768 have water body fallow land and rocky platform from of all three temporal images class second to fifth class area are belongs to agriculture area because it have a particular texture, pattern, and shape using this element ease to identify area of agriculture zone in the study area there are to river *Pravra* along this river there most of area under sugarcane it have highest reflectance in red this area belong to the class mean value of 0.2850 to 0.7971 finally using this we will ease to subtract this area using manual digitalization Changes in the composition, morphology and density of green biomass can be assessed by class value of study area NDVI index value of image. Higher NDVI values are associated with greater density, large leaf area and large green biomass of the canopy

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Mr. Dongare S.B. & Mr. Wabale R. L. Supervised By Dr. S. A. Patil Head, Mrsac Pune Branch Office

Field Work

A rapid reconnaissance survey of the study area was conducted for the ground truth sites during the field visit to understand and determine the verification of agriculture area of each class. Sample GPS point were collected in study regain for verification of class way that maximum number GPS point are correctly much on FCC image as well as on NDVI.