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RESEARCH ARTICLE

Normalized Difference Vegetation Index (NDVI) Applications in part of South - Eastern Dry Agro-climatic Zones of Karnataka Using Remote Sensing and GIS

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Abstract

The Normalized Difference Vegetation Index (NDVI) is a simple graphical indicator that can be used to analyze Remote sensing measurements and to understand the vegetation of Chintamani Taluk area, this area covering under the South –Eastern part of Dry agroclimatic zones of study area. Compared between total Chintamani area and within the forest area analyzed. Basically the NDVI is a numerical indicator range from −1 to +1 that uses the visible and near-infrared bands of the electromagnetic spectrum. In the part of study area grouped into different NDVI ranges -1 to +1. Chintamani taluk and Chintamani Forest area from LISS III data. Tanks area ranges between -1 and -0.05, Agricultural land between -0.05 and -0.16, Open land (Scrub Land) between -0.16 and -0.22 and Vegetation cover -0.22 and 1. Built up areas and impermeable surfaces which comes under very poor vegetation category had values less than 0.01009. Water areas have the lowest NDVI values.

INTRODUCTION

The Normalized Difference Vegetation Index (NDVI) is a simple graphical indicator that can be used to analyze Remote sensing measurements, typically but not necessarily from a space platform, and assess whether the target being observed contains live green vegetation or not in the study area. Vegetation indices are widely used for monitoring, analyzing and mapping temporal and spatial variations in vegetation structure. Among the different thematic layers studied, NDVI seems to provide best results for vegetation analysis in urban environment. The Normalized Difference Vegetation Index (NDVI) is used to transform multi-spectral data into a single image band which represents vegetation distribution was computed for LISS III Satellite imageries using in present study. T. V Ramchandra et. al, 2013 stated that "NDVI value ranges from -1 to +1, where -0.1 and below indicates soil or barren areas of rock, sand, or urban built-up. NDVI of zero indicates the water cover. Moderate values represent low density vegetation (0.1 to 0.3) and higher values indicate thick canopy vegetation (0.6 to 0.8)."(1).The NDVI is sensitive to changes in plant canopy and provides unique change information over red and NIR wavebands that compose the NDVI. Basically the NDVI is a numerical indicator range from −1 to +1 that uses the visible and near-infrared bands of the electromagnetic spectrum, and can be calculated as a ratio of red and NIR bands of a sensor system and are represented by the following equation [2-4] . NDVI = NIR -R /NIR+R where, NIR and R are the pixel values of near infrared and red band of the satellite image, respectively. The red waveband tends to be most sensitive to land cover change and exhibits the greatest contrast between vegetation and soil. The near-infrared waveband is sensitive to leaf area and structure, and facilitates detection of changes in plant health, phenology and vegetation cover [5]. Land cover is also used as interchangeably with land use. This term describes the biophysical state of the earth surface and immediate subsurface and includes soil material, vegetation, and water (Prakasam, 2010) [6].

METHODOLOGY

Data Collection and Preparation The study involved a number of steps used to analyses The Chintamani (Kolar District) part of the study area of satellite imagery LISS III data The study has adopted NDVI technique to find out the types of vegetation in the study area and analysis the data ERDAS 14 Imagine and Arc GIS 10.2 has been used. The Normalized Difference Vegetation Index is a numerical indicator that uses the visible and near-infrared bands of the electromagnetic spectrum, and is adopted to analyze remote sensing measurements and assess whether the target being observed contains live green vegetation or not. In the part of study area grouped into different NDVI ranges -1 to +1 (Fig 2 and Fig 3).

Creating NDVI Map Steps: LISS III Data → Erdas 14 → Raster → NDVI → NDVI Vector Map → Export to Arc GIS 10.2 → Spatial Analysis tool → Reclassify → Raster to Polygon → Add Table → NDVI values Description → Grid code → Classifications → Legends of NDVI Values → Final NDVI Maps.

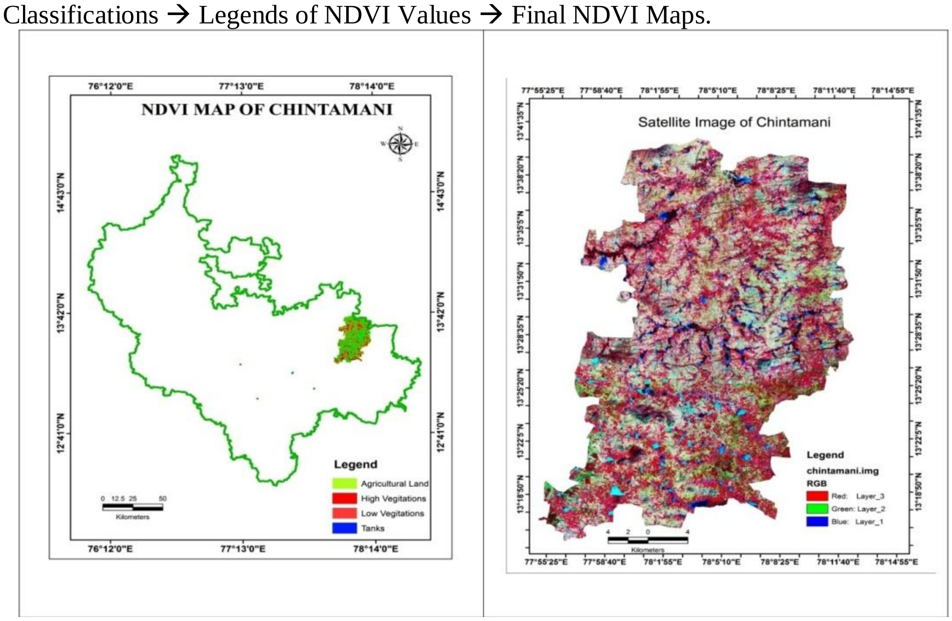


Fig1.NDVI Map and Satellite image of Chintamani

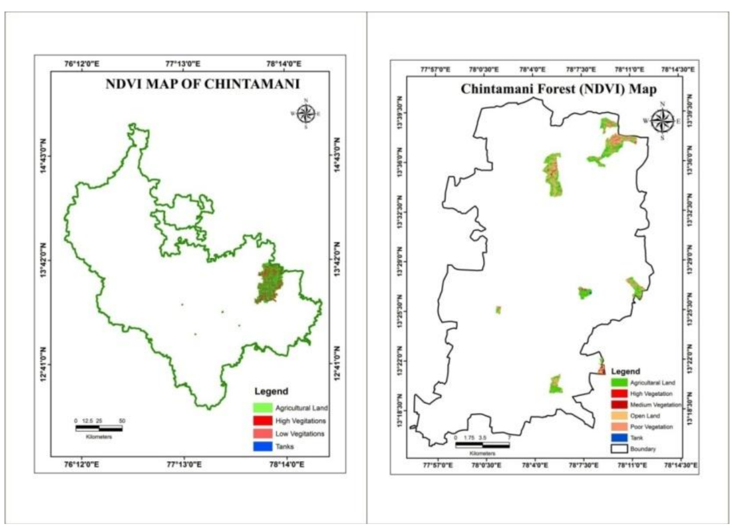


Fig 2: NDVI Map Chintamani and Chintamani Forest

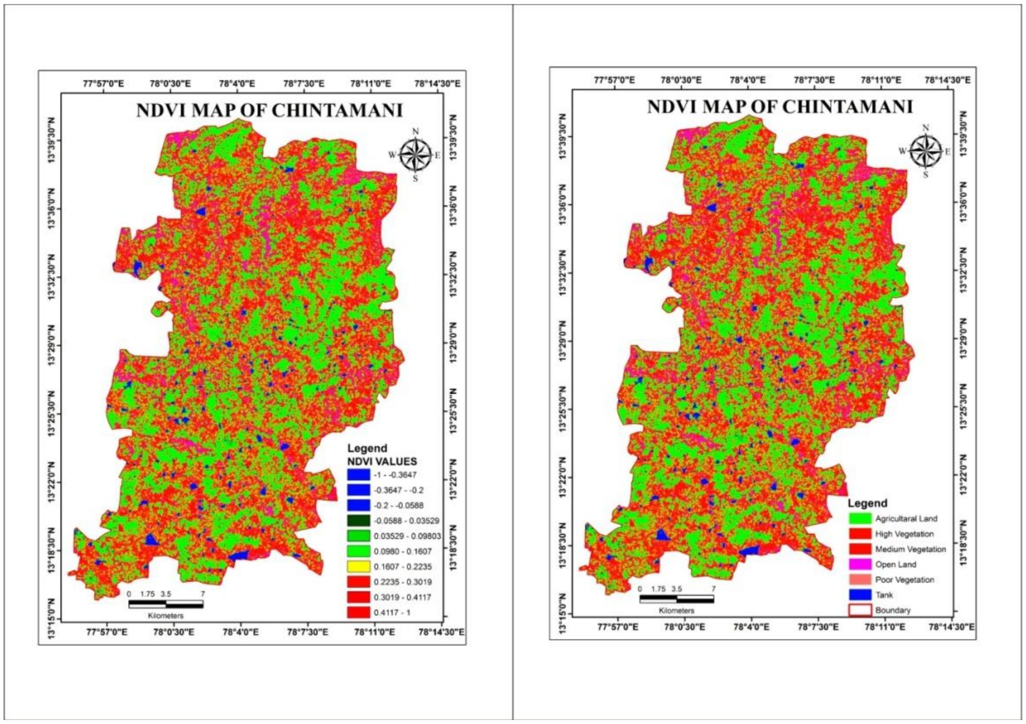
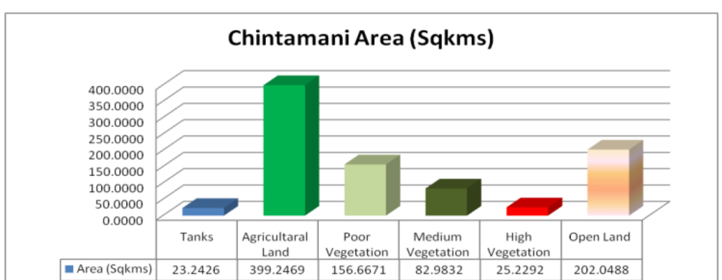


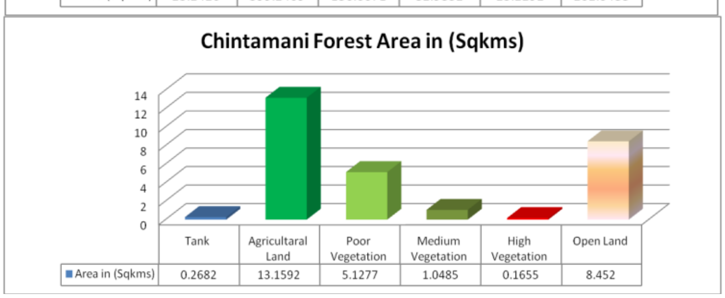
Fig 3. Ranges and Thematic Maps of NDVI Map of Chintamani

Table1. NDVI Values of Chintamani Area and Chintamani Forest Area.

Thematic layers	Area (Sqkms)
Tanks	23.2426
Agricultaral Land	399.2469
Poor Vegetation	156.6671
Medium Vegetation	82.9832
High Vegetation	25.2292
Open Land	202.0488
Grand Total	889.4179

Thematic layers	**Area in (Sqkms)**
Tank	0.2682
Agricultaral Land	13.1592
Poor Vegetation	5.1277
Medium Vegetation	1.0485
High Vegetation	0.1655
Open Land	8.452
Grand Total	**28.2214**





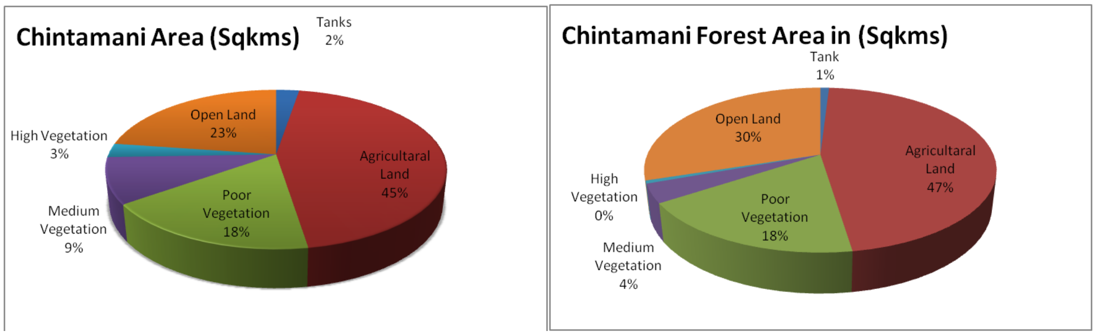


Fig 4.Graphical Representation of Chintamani and Chintamani Forest Area

Results

In the present study area Chintamani taluk area and Chintamani Forest area grouped into two thematic layers in Chintamani taluk total area is 889.41 Sqkms and Chintamani Forest area 28.22 Sqkms these areas are covered in the part of study area used LISS III data. In the present study LISS III IRS used for comparative study of NDVI within the Chintamani taluk area. The FCC (False Color Composition) of the study area is prepared using. 3, 2, 1 bands of IRS LISS III. In this concept important role for image classifications using Erdas- 14 and Arc GIS 10.2 software's (Fig 3).

Data transformed raster to vector layer using by LISS III data of Chintamani area. Grouped into six classes depending upon NDVI Values (Ranges). Values ranging between -1 and +1. The majority of thematic layers are Agricultural land, poor vegetation, Medium vegetation, High Vegetation, Open Land and Tanks are observed in the Chintamani taluk and Chintamani Forest area from LISS III data. Tanks area ranges between -1 and -0.05, Agricultural land between -0.05 and -0.16, Open land (Scrub Land) between -0.16 and -0.22 and Vegetation cover -0.22 and 1(Fig 4). Built up areas and impermeable surfaces which comes under very poor vegetation category had values less than 0.01009. Water areas have the lowest NDVI values (Table1).

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