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Journal of Remote Sensing & GIS

Reaserch Article

"Lulc and change Detection and its Impacts on Forest ecosystem in Yellapur Taluka using Geospatial Techniques"

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ABSTRACT

The geospatial technology is used to identify the variation of the impact on forest ecosystem and mapping the land use and land cover for different classes and assess the impacts of rainfall on forest in Yellapur Taluka, which lies between latitude of N14° 4´ 3´´ and N15° 6´ 40´´ and longitude of 74° 1´ 10´´ and 74° 5´ 8´´ E with total area of 131171 hectares. The land use and land cover map was processed with ground truth data using satellite images using ERDAS software. An attempt was made to identify the impact of rainfall, temperature and relative humidity on forest ecosystem. To analyze the impact on forest ecosystem, NDVI analysis was carried out using MODIS TERRA data and NCEP reanalysis, Relative Humidity were used. The results shows that the dense forest area is decreases because it may changes from dense to sparse forest and other classes such as agriculture is decreases, and rainfall decreases and relative humidity increases annually from 1998 to 2017.

Key Words: climate change, Modis data, NCEP Reanalysis data, Forest ecosystem, LULC and NDVI map.

INTRODUCTION

Forest play an important role in water balancing, by holding the rain water, reducing the runoff, helps in infiltration and increases the ground water table. The natural forest as such maintains the ecological balance in terms of soil, water and vegetation. Anthropogenic pressure on forest leads to degradation and deforestation, which in-turn accelerates the erosion, loss of natural resources and final affects on climate change. Weather change and forest are interrelated to each another due to several criteria. Due to change in the land use and land cover change detection it affects forest ecosystem in a number of ways (Chilar, J.2000). Such as including through changes in average temperatures, rainfall and other parameters. Weather is depends on the air pressure, temperature and moisture differences between one place to another place. It is measured by assessing the patterns of variation in temperature, Relative humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods of time. (Pavithra .CJ. 2013) The Grid Analysis and Display System (GrADS) is an interactive desktop tool that is used for easy access, manipulation, and visualization of earth science data. The format of the data may be either binary, GRIB, NetCDF, or HDF. Relative humidity is expressed as percentage; if the Relative Humidity percentage is increases then the air–water mixture is more humid. The Relative Humidity is a ratio of the actual amount of water vapour in the atmosphere compared to the saturation amount of water vapour. the relative Humidity will increases as temperatures decrease.

MATERIALS AND METHOD.

STUDY AREA

The study was conducted in Yellapur taluk, the map of Yellapur taluka is given in fig. 1. Resource-sat Series satellites Landsat-5 1998 and IRSP6 LISS-4 data with spatial resolution of 30m and 5.8m was used for assessing the Landuse/Landcover classes and data is used These data sets were imported in ERDAS Imagine version 10.1. (Chilar, J.2000). Satellite image processing software to create a false colour composite (FCC). Normalized difference vegetation index (NDVI) was mapped to know the vegetation

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Received date:march 10, 2021; **Accepted date**: september 7, 2021; **Published date**: September 17, 2021

Citation :"lulc and change detection and its impacts on forest ecosystem in yellapur taluka using geospatial J Remote Sens GIS .10: p325

chlorophyll were used to classify the Landsat- 8 and LISS-4 images using the formula (Kachhwala, T.S. 1985)

Figure.1: howing the study area of Yellapur Taluk

PROCESSING netCDF DATA IN GRADS

The data sets obtained from MODIS (TERRA), NCEP/NCAR etc are in NetCDF formats. The commands used in Grads in windows 7 for processing NetCDF datasets are presented below

Write commands "grads" in terminal to open the grads window

Use "sdfopen" command to open the file

To see what variables and their name type "q file "

To display the image type "d var name and result"

d aave,(varname,lat=x,lat=y,lon=u,lon=v,)

(Dr. K.C Gouda.et.al 2018)

FORMULAS = NDVI=NIR-RED/NIR+RED NDMI=RED-NIR/RED+NIR

NDWI= GREEN-NIR/GREEN+NIR

RESULTS AND DISCUSSION

Figure.2: Land use and Land cover map of Yellapur Taluk 1998

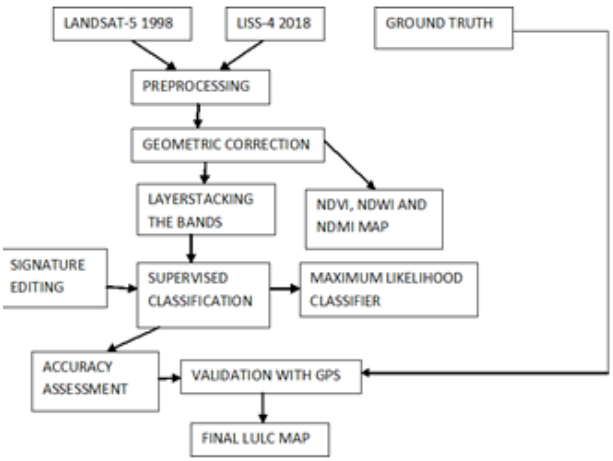


Figure.3:Land use and Land cover map of Yellapur Taluk 2018

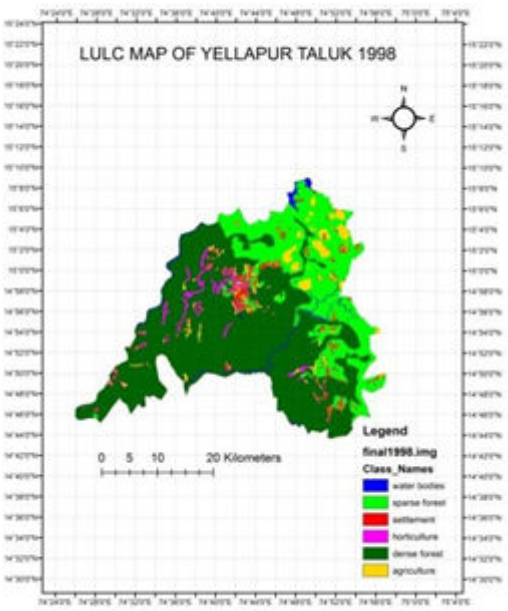


Table.1. Land use and Land cover different classification area

LULC Classes	Area (ha)	% Area
Dense forest	79188.67	60.34
Sparse forest	35531.5	27.07
Agriculture	5852.34	4.45
Water bodies	2534	1.93
Horticulture	3641.13	2.77
Settlement	4479.14	3.41
Total	131226.78	100

Figure.4: Land use and Land cover map of Yellapur Taluk 2018

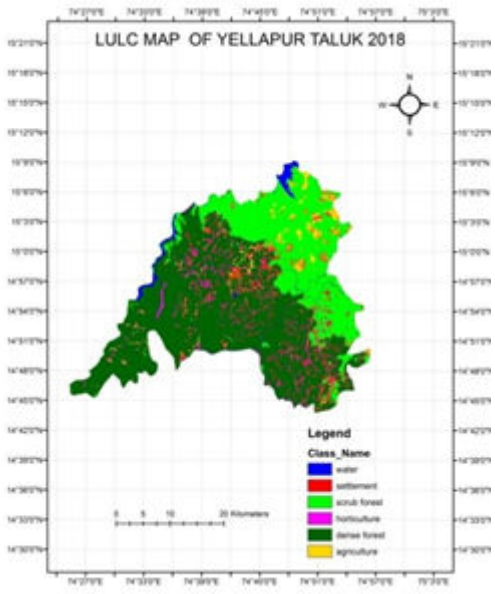
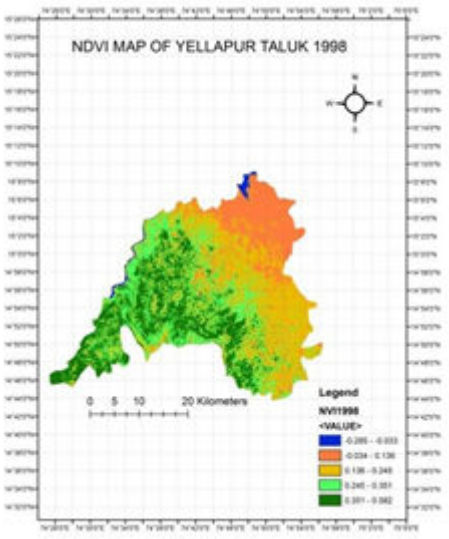


Table.2. Land use and Land cover different classification area details in Ha 2018

LULC Classes	Area (ha)	% Area
Dense forest	73126.43	55.72
Sparse forest	38353.03	29.22
Agriculture	5127.93	3.9
Water bodies	2634	2
Horticulture	5670.43	4.32
Settlement	6314.96	4.81
Total	131226.78	100

The NDVI map for 1998 is shown in Fig.4 indicating the higher vegetation density with higher NDVI value towards open land and water body, the NDVI value ranges from -0.285 to 0.582.

Figure5: Normalised difference vegetation Index map of Yellapur Taluk 1998



The NDVI map for 1998 is shown in Fig.4 indicating the higher vegetation density with higher NDVI value towards open land and water body, the NDVI value ranges from -0.285 to 0.582.

The NDVI map for 2018 is shown in Fig.5 indicating the higher vegetation density with higher NDVI value towards open land and water body, the NDVI value ranges from -0.083 to 0.509. (Mehta, et.al) 2012

Figure.6:Normalised difference vegetation Index map of Yellapur Taluk 2018

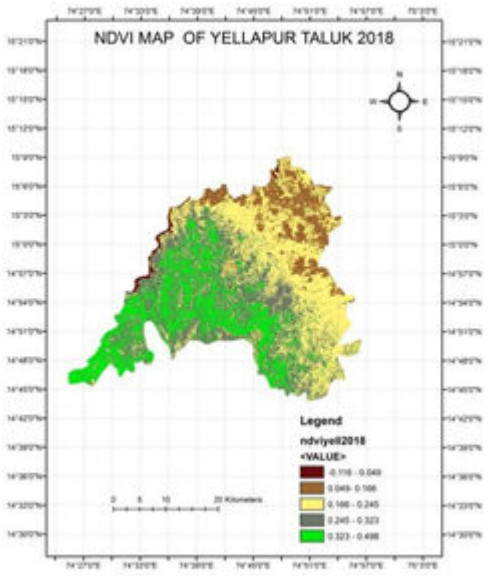


Table.3. Change detection in Land use and Land cover of different classification area details in Ha

LULC Classes	1998	2018	Change detection

	Area (ha)	Area (ha)	Area (ha)
Dense forest	79188.67	73126.43	-6062.24
Sparse forest	35531.5	38353.03	2821.53
Agriculture	5852.34	5127.93	-724.41
Water bodies	2534	2634	100
Horticulture	3641.13	5670.43	2029.3
Settlement	4479.14	6314.96	1835.82
Total	131226.78	131226.78	

Weather data analysis from KSNDMC data:

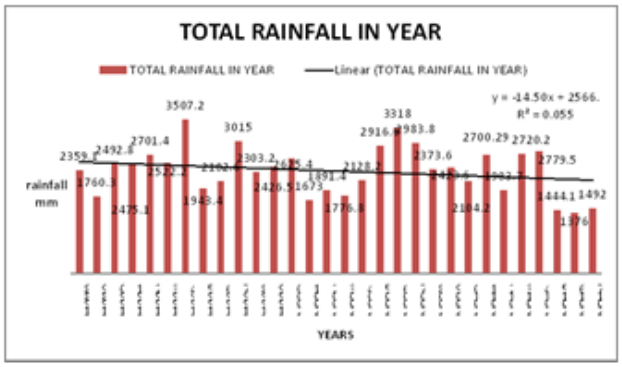


Figure.7: Total rainfall in mm for Yellapur Taluk from 1998-2017

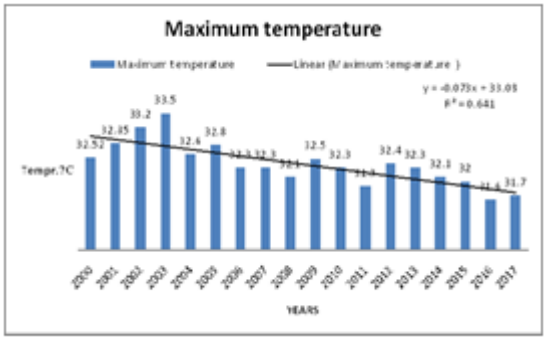


Figure.8: Average maximum temperature for Yellapur Taluk from 2000-2017

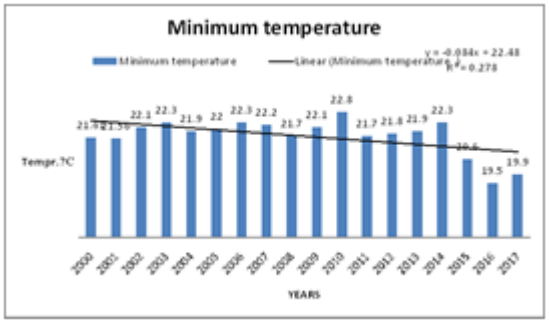


Figure.9: Average minimum temperature for Yellapur Taluk from 2000-2017

Weather data analysis from NCEP-Reanalysis data:

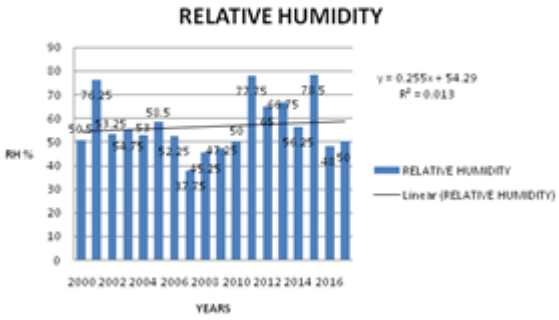


Figure.10: Average RH in mm for Yellapur Taluk from 2000-2017

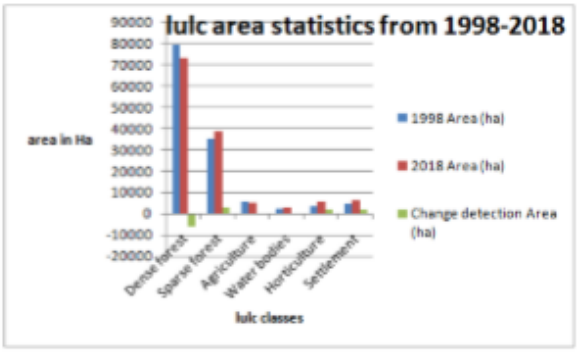


Figure11: LULC area statistics in Yellapur Taluk from 1998-2018

CONCLUSION

Change detection of LULC from 1998 and 2018 indicated that there is increase in sparse forest, water bodies, horticulture and settlement whereas dense forest and agriculture as shown decreases in area, the change was due to the anthropogenic activities. Therefore this is impacted and resulted there is strong variation in rainfall has shows decreases indicated that the negative sign in the regression coefficient equation r2= 0.055. So that due to increase in the relative humidity, the maximum and minimum temperature is decreases in trend line from 1998 to 2017.

REFERENCES

1. Chilar, J.2000 Land cover mapping of large areas from satellites: status and research priorities Inter. J. Rem. Sen., 21 (2000), pp. 1093-1114
2. Kachhwala, T.S. 1985 Temporal monitoring of forest land for change detection and forest cover mapping through satellite remote sensing Proceedings of the 6th Asian Conference on Remote Sensing, National Remote Sensing Agency, Hyderabad ,pp. 77-83
3. Mehta, A., V.K. Sinha, G. Ayachit 2012 Land use/land cover study using remote sensing and GIS in an arid environment Bull. Envi. Sci. Res., 1 (3–4) pp. 48

4. Dr. Gouda, Dr. Laxmikantha, Malini, Ravikumar (2018) climate change and climate variability for mysore Taluk Using RS and GIS. IRJET.05- 02-2018 pp(1182-1193)

5. Pavithra .CJ. 2013, Climate change and agricultural sustainability study using RS and GIS , M.Tech thesis, VTU-EC, KSRSAC, Bangalore.