**Land use land cover change detection of RangaReddy district**

**ABSTRACT** :

Land use and land cover change have become a central component in current strategies for managing natural resources and monitoring environmental changes. Urban expansion has brought severe losses to agricultural land, vegetation land, and water bodies. Urban sprawl is responsible for a variety of urban environmental issues like decreased air quality, increased runoff, and subsequent flooding, increased local temperature, deterioration of water quality, etc. n this work, we have taken the Rangareddy Districts case to study the urban expansion and land cover change that took place in a span of 05 years from 2011 to 2016. Remote sensing methodology is adopted to study the geographical land-use changes that occurred during the study period. Classification accuracy is also estimated using the field knowledge obtained from field surveys. Information on urban growth, land use, and land cover change study are beneficial to local government and urban planners to better future sustainable development plans.

**Introduction : Ranga Reddy district,** formerly **Hyderabad Rural,** abbreviated as **R. R. district,** is a district in the Indian state of Telangana. Ranga Reddy District occupies an area of approximately 7,500 square kilometres (2,900 sq mi).

Land Use / Land Cover (LULC) generally refers to categorizing or classifying human activities and natural elements on the landscape within a specific time frame based on established scientific and statistical methods of analysis of appropriate source materials. It has various ways of classifications. Different type of LULC elements is there like Urban or Built-up Land, Agricultural Land, Forest Land, and many more. LULC maps have wide applications like Natural resource management, Baseline mapping for GIS input, Legal boundaries for tax and property evaluation, and many more. LULC mapping is not possible without the help of other geospatial datasets.

LULC maps also help us to study the changes that are happening in our ecosystem and environment. Suppose we have an inch by inch information about the Land Use/Land Cover of the study unit. In that case, we can develop policies and launch programs to save our environment.

Land Use is a description of how people utilize the land and of socio-economic activity. Land use shows how people use the landscape, whether developed, agriculture, or mixed services.

Land Cover is the physical material on the surface of the Earth. Land cover data documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types.

Understanding landscape patterns, changes, and interactions between human activities and natural phenomenon is essential for proper land management and decision improvement. Land Cover, defined as the assemblage of Biotic and abiotic components on the Earth's surface, is one of the Earth's most crucial properties. Land cover includes water bodies, snow, grassland, forest, and bare Soil. Land Use includes agricultural land, built-up land, recreation area, wildlife management area, etc.

Remote Sensing (RS) and Geographic Information System (GIS) are now providing new advanced ecosystem management tools. For efficient planning and management, the classified data promptly obtains the ground's classified data; satellites are the best resources to promptly provide the information.

This study to map out the status of land use the land cover of Ghatkesar between 2006 and 2011 to detect the changes that have taken place in this status, particularly in the built-up land, to predict possible changes that might take place in this status in coming years using both Geographic Information System and Remote Sensing data.

**Satellite Data:** In this study, the remote sensing data in the digital mode is used and is obtained by ***bhuvan***

**Materials & Methodology:**

**Study area:** Ranga Reddy District was formed on 15th August 1978 by carving out some portion of Hyderabad Urban Taluk & the merger of the entire Rural and Urban Areas of the remaining Taluks of Erstwhile Hyderabad District. The District is located in the Central Part of the Deccan Plateau and lies between 160 30' and 180 20' of North Latitude and 77030' and 79030' of East Longitudes.

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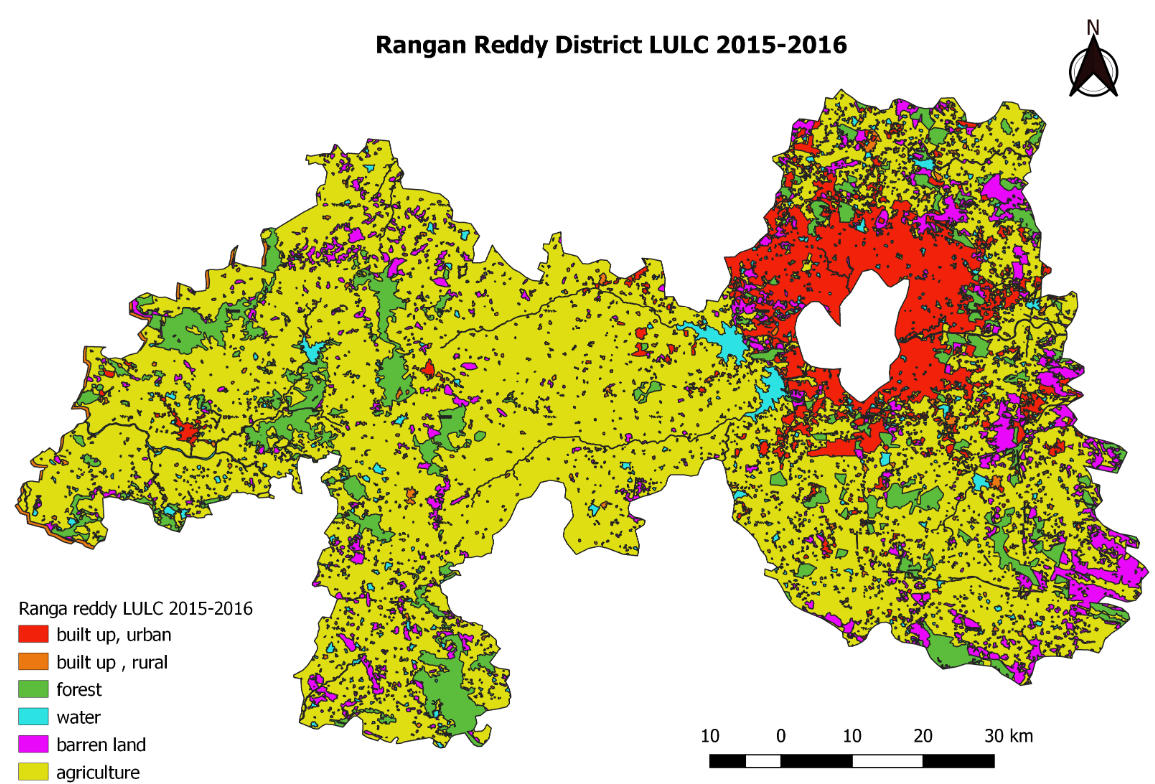
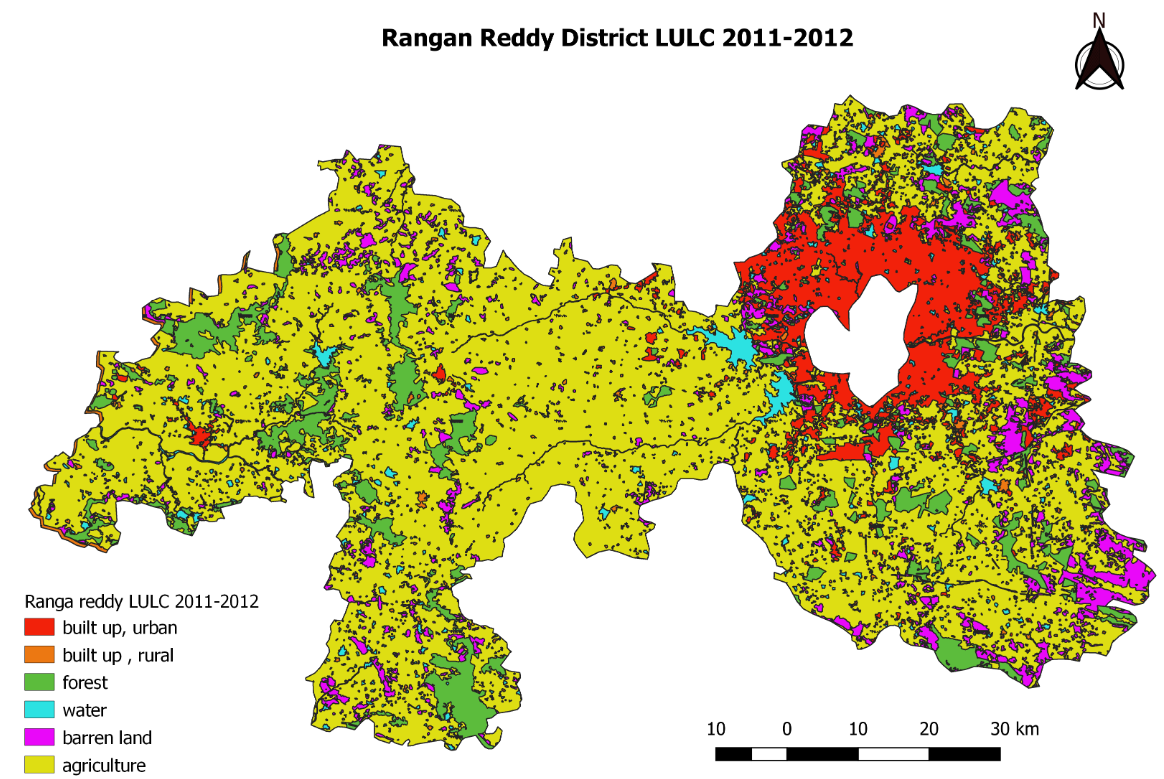
**Objectives**

* To develop a land use land cover map of the study area.
* To see the applicability of merged data of IRS-ID LISS-III satellite data for delineating various land use/ land cover categories through digital image analysis and processing (i.e., unsupervised classification) as well as visual interpretation techniques.
* To study land use land cover dynamics of the study area.
* The land use map will be utilized as a primary database, which provides information for allocating new land-use practices.
* It will incorporate demographic, economic, and environmental impacts, which have occurred in an area.
* Land use land cover classification system as devised by NRSA was used.
* Not only will the information indicate where intensive development has already taken place and where there is open land suitable for future expansion, but it will also make it possible to determine particular areas, such as prime agricultural lands.

**Methods of QGIS:**

* Firstly the data was taken from the Bhuvan thematic services.
* In selecting the theme, we have taken the land use/land cover data from the years of 2011-2012and2015-2016.
* In this, we have taken the Bhuvan data from WMS(web map services )as a layer.
* We have downloaded the Indian district shapefile for the ranga reddy district shapefile.
* Then we get data from WMS as state-wise, then the raster data from WMS and vector data of District has been clipped by using clipper tool.
* Then we get ranga reddy district LULC data as in raster form.
* Now we create a vector file of ranga reddy district LULC, which is in raster form.
* We use the Semi-Automatic Classification Plugin in Qgis for the classification of raster form data.
* We select the raster layer in-band sets, and we input in training file for taking a sample of data from the raster layer.
* We divide the sample into micro classes for classification.
* We classified the sample in the training file, then we do the band processing classification, and we run the file.
* We get the raster data of classification according to our format then we style the layer.
* Take the raster unique report values that will give you the pixel information (area, pixel count, etc.)
* Note the raster report values in excel, then calculate the area and change detection.
* Then we convert the raster to vector format.
* We get the vector file then classify unique values in the symbology.
* We get vector shapefile of lulc classification of ranga reddy district
* Do the same thing for another raster data of 2015-16.
* Now, we get the two vector DATA.
* We do the map composer for both the vector shapefile.
* In map composer, we add the title to the shapefile.
* We add legend and scale bar to the shapefile.
* The grid is the crucial thing for the map.
* We do for the two vector shapefile.
* And we finally export has jpeg or pdf format.

**Complexities**: The Semi-Automatic Classification plugin, which I used in the qgis, is the project's complexity. The explanation has given in the method of qgis



|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 2011-20112 | |  |  | 2015-2016 |  |  |  |  |
|  | Value | Pixel count | Area (deg²) | sq.meters |  | Pixel count | Area (deg²) | sq.meters | change% |  |
|  | Built up, Urban | 744727 | 0.0575558 | 670254300 |  | 825693 | 0.0638115 | 743123700 | 11% |  |
|  | Built up,Rural | 105861 | 0.0081814 | 95274900 |  | 159484 | 0.0123253 | 143535600 | 51% |  |
|  | Forest | 885909 | 0.068467 | 797318100 |  | 767004 | 0.0592758 | 690303600 | -13% |  |
|  | Water | 262018 | 0.0202499 | 235816200 |  | 260507 | 0.0201326 | 234456300 | -1% |  |
|  | Barren Land | 657170 | 0.050789 | 591453000 |  | 623036 | 0.0481497 | 560732400 | -5% |  |
|  | Agriculture | 5644542 | 0.4362352 | 5.08E+09 |  | 5664754 | 0.4377853 | 5.098E+09 | 3% |  |

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**The Potential application of the map:**

The problem statement is LULC Change with hotspots using LULC maps from Bhuvan. We have taken the two raster data for the five-year gap. We observe the changes in the agriculture, forest area, water bodies, and built-up area. Land Use / Land Cover (LULC) generally refers to categorizing or classifying human activities and natural elements on the landscape within a specific time frame based on established scientific and statistical methods of analyzing appropriate source materials. We see change detection that the human activities which cause the change in the natural phenomenon. the observation gives the result over the damage control on nature and the development of human activities.

**RESULT AND DISCUSSION:**

Change Detection Analysis (2006-2011): Change detection in Ranga Reddy District(2011-2016)

There is an increase in Built up ,urban (11%), Built up ,rural (51%) and

decline in forest (-13%) ,waterbodies (-1%), Barren land(-5%) and agriculture land (0.06%)

references:

* BHUVAN DATA <https://bhuvan.nrsc.gov.in/>
* Qgis software <https://www.qgis.org/en/site/>
* Qgis: FOSSEE-QGIS tutorials[**https://spoken-tutorial.org/tutorial-search/? search\_foss=QGIS&search\_language=**](https://spoken-tutorial.org/tutorial-search/?search_foss=QGIS&search_language=)
* Letures from IIRS ,Dehradun <https://www.youtube.com/user/edusat2004>
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