Land Use Changes in Government Lands and it's Monitoring using Multi Temporal Satellite Data: A Case Study on Amadalavalasa Mandal, Srikakulam District

Ch. Manasa Reddy, T. Vani, S.S. Asadi

Abstract:--- Land is one of the vital natural resources and all the developmental activities are based on it. The migration of people from rural areas to urban is increases and population is widely changed day to day so, the land use/ land cover are also changed. In recent decades "land use" concept has evolved and it is now considered as the socioeconomic function of land. The representation of land use and land use change assessment through remote sensing still remains one of the major challenges for the remote sensing scientific community. In this study mainly we focus on land use changes in the government lands of Amadalavalasa mandal, Srikakulam district. We present a methodological approach based on multi temporal satellite data and cadastral data to assess government land use changes. IRSP6 & R2-LISS IV sensor with 5.8 meter high spatial resolution data 2012 and 2018 has been used and applied remote sensing techniques to find out the land use changes in government lands over 6 years. For this analysis software GIS (Geospatial Information System) and ERDAS (Earth Resource Data Analysis System) are used. The encroachment changes in the government land parcels are displayed by the delta cue process then the changes are visually interpreted. Therefore, the land use changes over the government land parcels of Amadalavalasa mandal, Srikakulam district was prepared.

Index Terms: Land use /Land cover, Remote Sensing, GIS, ERDAS.

I. INTRODUCTION

Land use/Land cover has two separate terminologies. Land use is the basically the utilization of the physical land and its resources by humans and their habitat for various purposes[1]. Land can used for various purposes such as residential, commercial, business, industrial, agricultural, recreational, and other relatively natural use. Land cover includes waterbodies, mountains, grass. Population is increasing day by day, to achieve the demands of people and can obviously lead to identification of land use changes. The agriculture and forest lands are transformed into urban land. These is called urbanization. The mining activities have occurred worldwide[5,6,7]. In past studies, land use/land cover changes are closely linked to changes in environment such as climate change, emissions of greenhouse gases, loss of biodiversity, and loss of soil resources. Land uses are increasing rapidly with rapid economic development and the land use types also increases. For any kind of sustainable development programme land use/land cover serves as one of the major input criteria[8]. Generally changes in land are occurred naturally or illegal encroachments. To assess the changes in the land like shifting cultivation, disasters like tsunamis, earthquakes and stroms. In this paper mainly focus on land use/land cover changes in government lands[4]. Remote sensing is the technology which is used to get information without contact with that object, area, or phenomenon. It provides a large variety of earth surface data for detailed analysis and change detection with the help of various space borne and airborne sensors. Remote sensing proved it is a best tool for land use/land cover change detection. Due to various human and environmental actions land use/land cover changes are occurred. For change detection analysis and monitoring multi temporal images are needed[3]. By using of satellite images for land use/land cover change detection depends upon interpretation and methodology employed to the aim of the analysis. In the visual interpretation map producers include many classification types. One of the classification type is interpreter's knowledge about the study area. Visual interpretation achieves accurate results than spectral based digital approaches but it needs skilled analyst and time consuming. For faster analysis automatic processes are used, but often classification errors are more than visual interpretation. In recent decades remote sensing data are the primary source for change detection and have made a greater impact on urban planning agencies and land management initiatives. Increasing amount of remote sensing data to analysis, automated methods are used. While using automated methods, the human interpretation by visual interpretation could be limited to identify changed areas.

II. STUDY AREA

In India Srikakulam is one of coastal district of andhhra Pradesh. It is boundede between 18°-20' and 19°-

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10’ N and 83°-50’ and 84°-50’ E. In Srikakulam District two rivers are there those are nagavali and Vamsadhara. Srikakulam district occupies an area of 5,837 square kilometres. The district consist of 38 mandals and 1802 villages. Amadalavalasa is one of municipality in the district. The study area is the amadalavalasa mandal with the area of 19.65 km^2. This mandal surrounded mandals are Burja, Sarubujjili, Santhakaviti, Ponduru, Srikakulam

This study area located between $83^0$48'33.498"E, $18^0$28'15.658”N and 83^0 56"35.404"E , $18^0$28'7.677"N.

III. OBJECTIVE

1. To identify the Government lands at cadastral level in Amadalavalasa Mandal, Srikakulam District, Andhra Pradesh.
2. To prepare the land use change map of Amadalavalasa Mandal
3. To identify the land use changes in government lands, Amadalavalasa Mandal
4. To generate land use change of cadastral centroid.

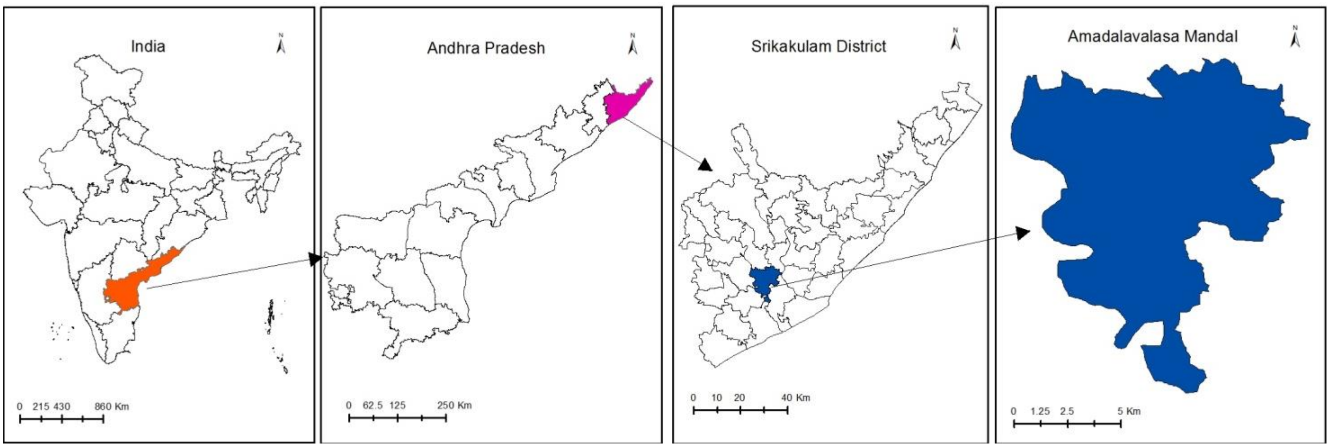

Figure 1: Location Map of Study Area

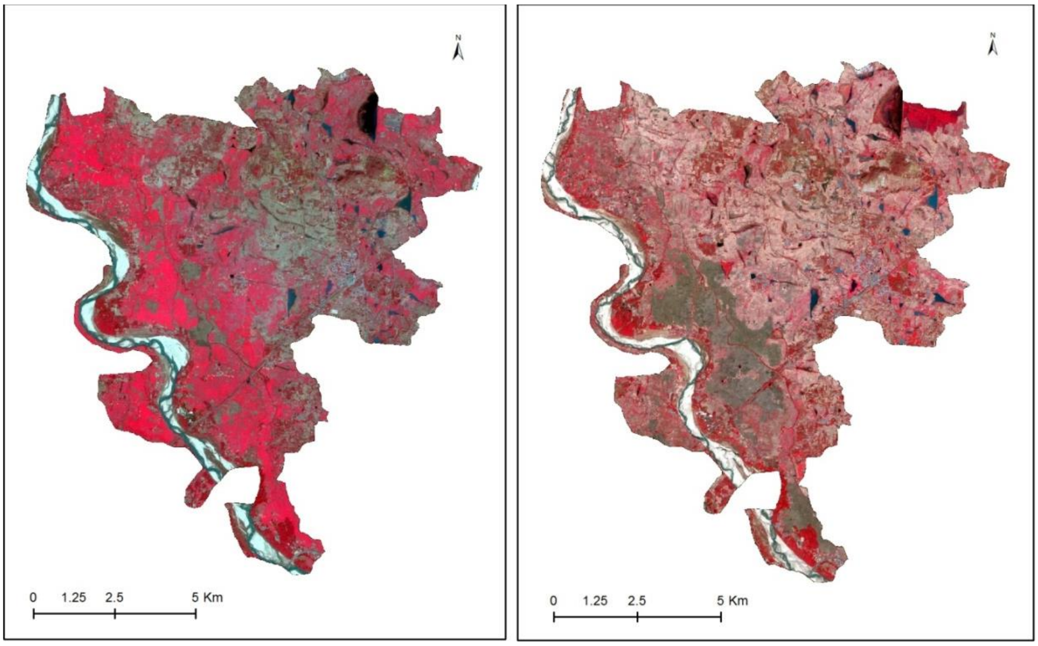

Figure 2: Satellite images of the study area 2012 & 2018

IV. METHODOLOGY

A Data Collection

The satellite data IRS-P6 , LISS-4 images are which is used in this study is collected from National remote sensing centre (NRSC). The cadastral data collected from srikakulam Government organization. 65 N/10 toposheet is used.

B. Image pre-processing

The image pre-processing is different for the different change detection methods. Firstly, the image registration is important any mis-registration occurred that create problem of change detection results. For to multi temporal image the pixel to pixel registration is important. The accuracy increased and results also very much accurate.

The IMAGINE AutoSync Workstation is a comprehensive tool for manually orthorectifying and geocorrecting images.

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Using this workstation, you can load input and reference images, select a sensor model, run automatic point measurement (APM), rectify images, create an AutoSync summary report, and output image verification. You can also manage your AutoSync project, modify parameter files and perform data visualization. Use the IMAGINE AutoSync Workstation for complex workflows since it provides more flexibility and tools for visual results inspection and manual digitizing.

C. Change detection process

In the process of image classification is to assign the pixels of a raster image to predefined land use/land cover classes. Image classification is based on visual interpretation where tone, texture, size, shape are considered. After pre-processing Normalized Difference Vegetation Index (NDVI) carried for 2012 and 2018 LISS-4 images in ERDAS. By visual interpretation assign classes to the image. To get accuracy for classification thematic recoding is done. The vital changes in study area in government lands are showed in figure:3 & figure:4 & figure:5. The flowchart shows the methodolody followed for study area.

The first level classification those are Waterbodies, Fallow land, Sparse vegetation, Dense vegetation, Crop land, Built up land.

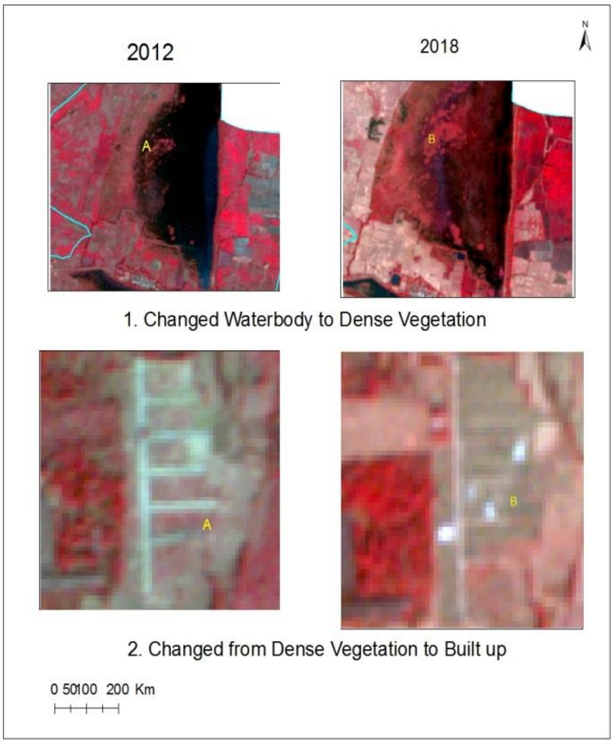

Figure 3: Changes in Government lands of study area

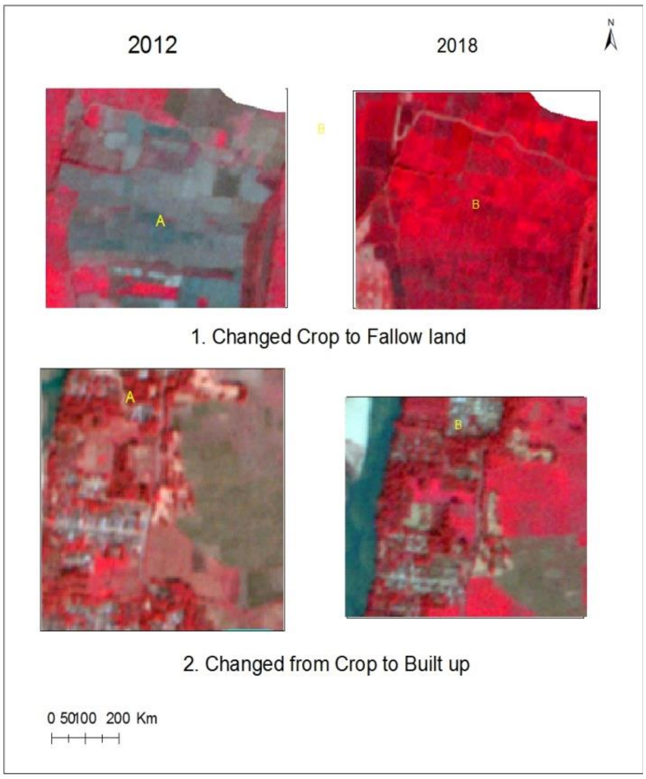

Figure 4: Crop changes in Government lands of study area

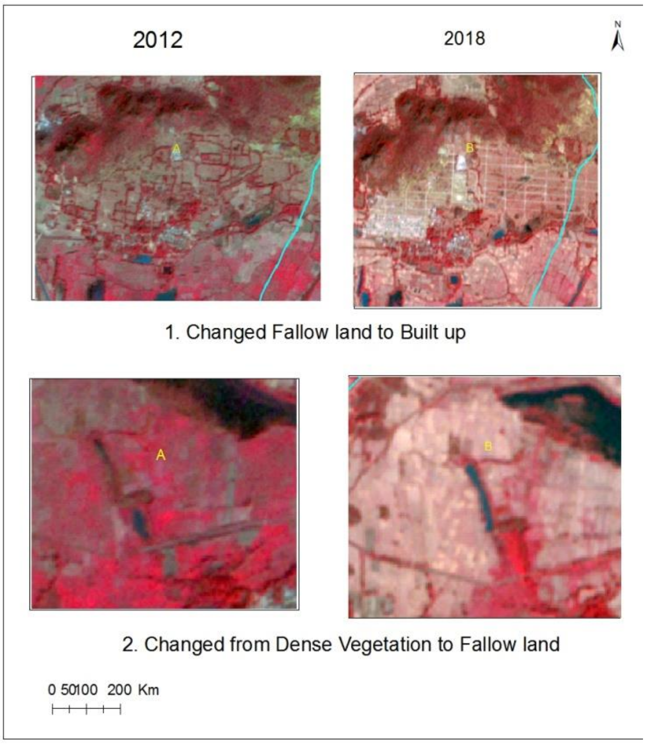

Figure 5: Built up changes in Government lands of study area

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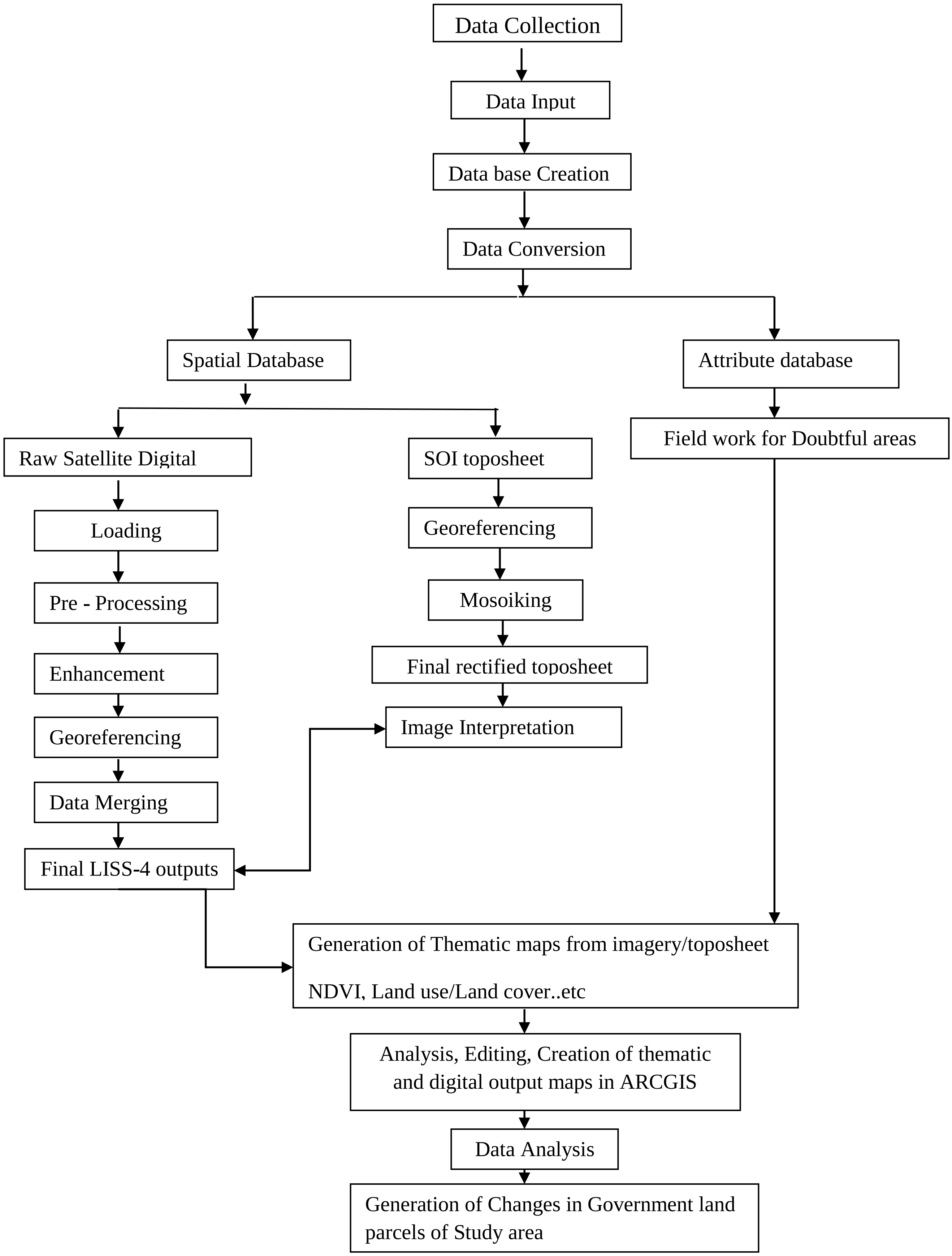

Flowchart: Flow chart showing methodology

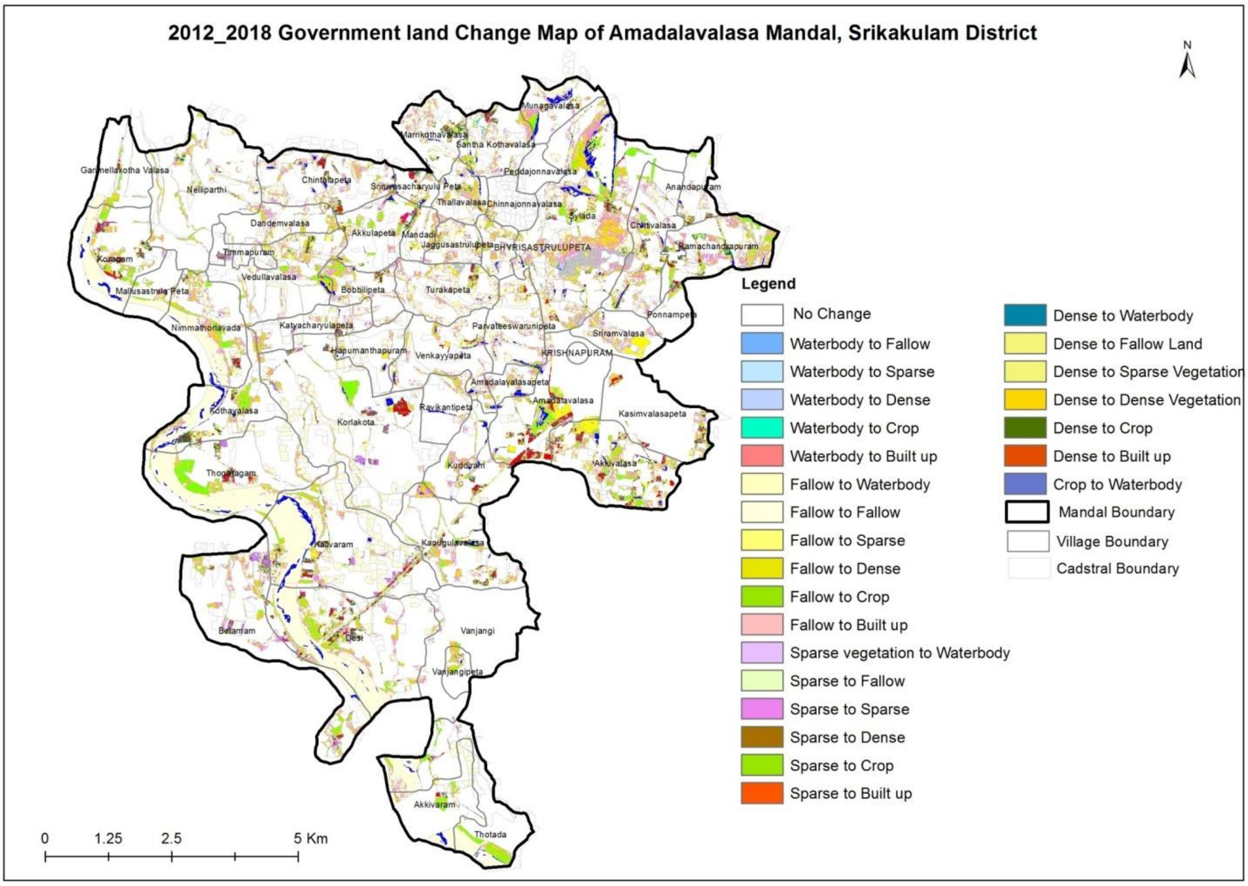

Figure 6 : Government land changes in amadalavalsa mandal, Srikakulam District

V. RESULTS AND DISCUSSION

In this present study image is classified into six classes those are waterbody, Fallow land, Sparse vegetation, Dense vegetation, Crop, Built up. After the classification of image, change map run for 2012 & 2018 classified images. Clip the Change image with the cadastral data which is adopted from Srikakulam Government agencies. Here, fallow land and crop are interchange classes .Then the statistics are generated according to class to class changes in image. The government land changes are showed in figure:6

VI. CONCLUSION

Detection of Changes in images are very important for management and monitoring of activities on earth. In this study mainly focus on the Government lands of Amadalavalasa mandal, Srikakulam District of 2012 & 2018 LISS-4 Images. The results shows that in figure:5 and the 87.15 hectors of land changed to Built up Land and 23.36 hectors of crop land changes to Built up. There is no significant changes in Waterbodies. 7.15 hectors of sparse vegetation land to Built up Land. There is only 1.7 hectors of sparse vegetation changed to Fallow.

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