A Review of Remote Sensing Techniques For Land Use Land Cover Change Detection Techniques

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Abstract - Change Over the previous decades, Remote Sensing (RS) has assumed a substantial part in contemplating land use/land cover change detection. Land Use Land Cover change detection thinks about are getting to be requesting undertakings with the accessibility of a suite of wide range sensors working at different imaging scales what's more, extent of using different techniques and in addition expanding roads for checking powerful what's more, precise Land Use Land Cover change. Significant research has been coordinated at the different segments of Land Use Land Cover change including the exactness appraisal which is drawing an equivalent consideration by researchers these days.

This paper begins with outline of prime issues in remote sensing technology; survey the basic procedures of progress discovery taken after by the ongoing article situated techniques for change detection. Study featured the specialized soundness of the showed approaches.

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Keywords: Land Use / Land Cover, Change Detection, Remote Sensing, Classification, Accuracy Assessment

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I. INTRODUCTION

Remote sensing is characterized in different routes in the literature, yet with comparable meaning. For instance, United Nations (1986) [1] characterized remote sensing as *the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves produced, reflected or diffracted by the detected objects, to improve natural resources management, land use and the security of the earth'*

Lillesand, et al. (2008) [2], characterized remote sensing as: *'the science and art of getting data of an object or any location / area through the analysis of data obtained by a tools that isn't in contact with the object or any location / area under observation'*

So, remote sensing is the investigation of satellite images or topographic images which are equipped for separating earth's land use and land cover writes by variety in their electromagnetic mark. Then again, Geographic Information Systems (GIS) allude to any logical exertion that fuses land data to envision, break down, and investigate topographically referenced data of an area.

Remote sensing innovation have been using since 1950's. Topographic images have been in across the board use for six decades and satellite images for three decades. These images have been used for various researches in planning and land management [4]. Planning discipline requires diverse expertise together, for example, social researcher and computer science and engineering researchers. As planning concerns both human being and spatial data, it requires interdisciplinary research. Along these lines, planning is concerned with "why things happen" as well as "where things happen" and the connection between these. In any case, these two unique inquiries in some cases cause reasonable conflictions. Their languages, epistemological methodologies and speculations are varying. The critical point is the means by which interdisciplinary approach could cooperate.

II. REVIEW ON REMOTE SENSING TECHNIQUES

Sarma et al (2005) [5] have carried out his research on coal mining and its impact on land use/land cover in Jaintia region of Meghalaya, India using remote sensing and GIS used LANDSAT data of 1975, 1987, 1999 and 2007 to analyze that there was four crease increment in mining region from 1975 to 2007 joined by three overlay diminish in forest territory. Visual understanding method was used for land use/land cover mapping for the distinctive data of four years.

Another investigation was completed by Anil et al (2010) [6] on the effect of open cast coal mines of Chandrapur region on Land Use Land Cover using remote sensing and GIS. The research was done using multi-temporal satellite data (IRS-P5 data of 2009 and 2010 and LANDSAT-5 data of 1990) to make a land use/land cover mapping of the territory; and announced a 67% expansion in mine zone.

Keeping in mind the end goal to use land optimally, it is important to have the data on existing land use land cover. It is additionally essential to have capacity of observing the progression of land use coming about out of both changing requests of expanding populace and powers of nature acting to shape the landscape. Land is in a constant condition of change because of different natural and man-made procedures. The investigation of spatio-temporal intra and inter urban structure and analysis of the development of urban systems are as yet essential objectives in urban research. Along these lines, the change is fundamental for analyzing land cover maps and natural resources management (Xiaomei and Rong Qing, 1999) [7].

Land use/land cover change detection procedure of distinguishes the distinctions in the condition of an object by analyzing it at various circumstances (Singh, 1989) [8]. Change detection is a critical procedure in observing and overseeing natural resources and urban advancement because it gives quantitative information of the spatial conveyance of the number of inhabitants in intrigue. Macleod and Congation (1998) [9] list four parts of change detection which are essential when observing natural resources. They incorporate; right off the bat, recognizing the changes that have happened; furthermore, distinguishing

the idea of the change; thirdly, estimating the region degree of the change and finally, surveying the spatial example of the change. The premise of using remote sensing data for change detection is that changes in land cover result in changes in brilliance esteems which can be remotely detected.

Ordinary ground methods of land use mapping are work escalated, tedious and are done rarely. These maps before long wind up obsolete with the progression of time in a fast evolving condition. In current era of research, satellite remote sensing techniques have been produced, which have ended up being of massive esteem for getting ready to exact land use/land cover maps and observing changes at normal interims of time. In spite of spatial and spectral heterogeneity difficulties of urban conditions, remote sensing is by all accounts an appropriate wellspring of dependable data about the numerous aspects of urban condition (Jensen and Cowen, 1999; Herlod et al. 2003) [10]. Along these lines, the investigation of sensational changes of land use/land cover at worldwide, mainland and neighborhood levels and further to investigate the degree of future changes, the current geospatial data on examples and patterns in land use/land cover are assuming an essential part.

Remotely detected imageries give a proficient means of getting data on fleeting patterns and spatial dissemination of urban territories required for comprehension, demonstrating and anticipating land changes (Elvidge et al. 2004) [11]. If there should arise an occurrence of blocked off areas, this system is maybe the main strategy for acquiring the required data on a cost and time compelling premise (Olorunfemi, 1983). Satellite imagery can give more incessant data accumulation all the time not at all like topographic images. Albeit airborne images may give all the more geometrically precise maps however is constrained in regard to its degree of coverage and costs. The significance of remote sensing strategy was acknowledged by Olorunfemi in 1983 [12] while using customary technique for looking over i.e., aerial photographic way to deal with screen urban land use in creating nations with Ilorin in Nigeria as the contextual analysis.

A remote sensing gadget records reaction which is based on numerous attributes of the land surface, including natural and counterfeit cover. A translator uses the component of tone, surface, design, shape, estimate, shadow, site and relationship to infer data about land cover. The age of remotely detected data/images by different kinds of sensor flown on board unique stages at different statures over the territory and at various circumstances of the day and the year does not prompt a basic classification framework. It is frequently trusted that no single classification could be used with a wide range of imagery and all scales. The fruitful endeavor in building up a universally useful classification conspire perfect with remote sensing data has been completed by Anderson in 1976 [13], which is likewise alluded to as United States Geological Survey (USGS) classification plot.

As far back as the dispatch of the principal remote sensing satellite (Landsat-1) in 1972, land use/land cover contemplates were completed on various scales for various users. For example, squander land mapping of India was done on 1:1 million scales by NRSA using 1980-82 Landsat multi spectral scanner data. Around 16.2% of waste lands were assessed based on the study. It has been noted after some time through arrangement of concentrates that Landsat Thematic Mapper is satisfactory for general broad succinct coverage of substantial territories. Accordingly, this diminishes the requirement for costly and tedious ground reviews directed for approval of data.

The State of Maryland Health Resources Planning Commission used Landsat TM data to make a land cover data set for incorporation in their Maryland Geographic Information (MAGI) database. In 1985, the U.S Geological Survey likewise completed a research program to create 1:250,000 scale land cover maps for Alaska using Landsat MSS data (Fitzpatrick et al. 1987) [14]. Every one of the seven TM groups were used to create a 21-class land cover map (EOSAT, 1992) [15]. Georgia Department of Natural Resources in 1992 used Landsat Thematic Mapper data finished mapping the whole State of Georgia to recognize and measure wetlands and other land cover composes (ERDAS, 1992) [16]. Likewise, The State of southern Carolina Lands Resources Conservation Commission did a nitty gritty land cover map made out of 19 classes from TM multi-fleeting and multi-spectral data (EOSAT, 1994) [17].

In Indonesia mix of MSS Landsat and land use map was completed for land use/land cover design research (Dimyati, 1995) [18] using remote sensing techniques to compute the list of changes. This was finished by the superimposition of land use/land cover images of 1972, 1984 and land use maps of 1990. Adeniyi and Omojola (1999) [19] in their Land Use Land Cover change assessment in Sokoto – Rima Basin of North– Western Nigeria used remote sensing and GIS techniques to ponder changes in the two dams in the vicinity of 1962 and 1986. The work uncovered that land use/land cover classes changed yet with settlement as yet remaining the biggest.

In India, National Remote Sensing Agency (NRSA) of Department of Space under National Urban Information System (NUIS) plot used Cartosat-1, Resourcesat-1 and LISS-VI+PAN blended satellite data to complete national level urban land use thematic mapping at 1:10,000 size of 564 urban areas/towns including State capitals and Union Territories; 23 urban communities with Million or more populace; NCR towns; and one town from each class and each State and Union Territories (NRSA, 2008) [20].

III. CONCLUSION

Observing the earth surface is conceivable with the extensive variety of multi-source remote sensing data information and doable strategies to watch the changes. There are part of strategies have been developed in past decades and these strategies additionally prevail to create quality outcomes however mechanization, cost , time and exactness is the genuine challenge that should be meet. In past decade, new protest based systems have been acquainted with survived the specified inadequacies and up to some level these procedures meet the objective of creating attractive results of progress location with incredible potential however it doesn't mean traditional strategies are futile, they are additionally helpful in other setting. Object oriented approaches are profoundly prescribed because of their effective nature in introducing point by point change data. The capability of this worldview can be consolidated with reexamination of traditional strategies to expand the usefulness and it is conceivable to utilize the two techniques at the same time to create results with better precision. This is a wide zone of research; every one of the strategies we have examined above has incredible potential and promising abilities in the field of remote sensing and change detection.

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