

## STUDY OF DEMOGRAPHIC CHARACTERISTICS AND CHANGES IN LAND USE / LAND COVER

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Sangeeta\*  
Dr. Tarun Kumar Yadav\*\*

### ABSTRACT

*This research paper aims to investigate the intricate relationship between demographic characteristics and changes in land use/land cover. The study employs a multidisciplinary approach, integrating demographic analysis with remote sensing and geographic information system (GIS) techniques to provide a comprehensive understanding of the dynamics influencing land use changes. The research focuses on identifying patterns, drivers, and implications of demographic shifts on land use/land cover, offering valuable insights for sustainable development and land management policies. The phenomenon of land use and land cover change has been readily observable, with significant consequences seen in several regions of India. The alteration in land use and land cover has had a significant influence on several aspects including habitat, biodiversity, soil quality, water resources, and forest extent.*

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**Keywords:** Demographic, Characteristics, Changes, Land Use, Land Cover.

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### Introduction

The first use of the term might be attributed to Stamp in the year 1948. The phrase in question is used to denote the exploitation of land for various activities such as agriculture, building, leisure, and other endeavors, which may lead to diverse outcomes like soil erosion, pollution, and land degradation. The alteration of land use and land cover may be attributed to either human activities, environmental factors, or a combination of both. Land use refers to the deliberate and systematic process of managing and transforming natural habitats or untouched wilderness areas into constructed environments, which may include cultivated fields, pastures, and human settlements. Land use refers to a series of human actions undertaken with the intention of exploiting land resources to produce goods and derive benefits. The regulation and management of land use is a longstanding practice. Land use restrictions were an integral component of the Indus civilization dating back to the period between 3300 and 1300 B.C. The Indus Valley civilization may be cited as a prominent example of managed land use. The Indus Valley civilization is renowned for its well-organized towns characterized by meticulous land use and thoughtfully designed layouts. Notable features include the construction of baked brick dwellings, the implementation of an efficient drainage system, the provision of adequate water supply, and the presence of clusters of substantial non-residential structures. In order to achieve optimum land use, it is necessary to possess comprehensive data pertaining to both current land use and land cover, in conjunction with an understanding of the dynamics of land use.

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\* Department of Geography, Shri Jagdish Prasad Jhabarmal Tibrewala University, Vidyanagari, Jhunjhunu, Rajasthan, India.

\*\* Department of Geography, Shri Jagdish Prasad Jhabarmal Tibrewala University, Vidyanagari, Jhunjhunu, Rajasthan, India.

Land Cover The word "landscape" is often used to refer to the vegetation, natural or manmade characteristics present on the Earth's surface during a certain period of observation. The primary determinant of global change that significantly impacts the environment and biological systems is a single, crucial variable. In a broad sense, land cover refers to the physical and natural features that encompass the land surface, including elements such as bodies of water, plants, exposed soil, and man-made buildings. Land use refers to the manner in which land cover is used and allocated for various purposes. The term "land-cover" refers to the visible (bio) physical layer that encompasses the surface of the Earth and its immediate subsoil. The components included within this context are flora, water (including surface water and ground water), arid regions, ice formations, soil composition, and topographical features. The changing of land cover is closely associated with the progress of a particular area, while development refers to the process of modifying land. The alteration of land use and the change of existing land cover represent significant human interventions within the earth system.

#### **Impacts of Land Use and Land Cover Changes on Land Surface Temperature**

Land is a fundamental component of the ecosystem, serving as a vital natural resource that is essential for the existence of many ecosystems on Earth, including those inhabited by humans. The utilization of said resource under the category of land use delineates land cover as the vegetation that encompasses a certain area. The modification of land use and land cover (LULC) encompasses not only environmental aspects but also political, social, and economic dimensions. Furthermore, it allocates resources to several areas, including but not limited to the procurement of cultivable land, the preservation of ecosystems and biodiversity, the management of water bodies, the mitigation of greenhouse gas emissions, the maintenance of forest cover, the regulation of ambient climatic conditions, and the enhancement of soil quality.

The land use and land cover (LULC) is a significant factor in the characteristics of a watershed, particularly in relation to water resources. Land resource managers, planners, and decision makers are confronted with significant and intricate land use and land cover (LULC) changes in the present context. These changes have been primarily driven by human-induced ecological modifications, including the expansion of agricultural land, deforestation, industrialization, and urbanisation. Consequently, LULC statistics have become a crucial aspect for professionals involved in managing and planning land resources. The alteration in the land use and land cover (LULC) configuration within a certain region may be attributed to a combination of natural and human factors. The reduction of land use and land cover change (LULC) and mitigation of soil erosion within watersheds may be achieved by the implementation of various strategies, such as the promotion of plant cover, adoption of no-tillage practises, and expansion of thick forest regions. GIS and satellite remote sensing (RS) are widely recognised as the predominant techniques for conducting surveys and monitoring land use and land cover (LULC) changes in various regions of interest over a certain period. As previously established, land use and land cover (LULC) modification is mostly attributed to human activities, with agricultural and urban growth being the primary contributors. The dynamic and nonlinear character of human impact on land use and land cover (LULC) is primarily driven by a combination of environmental, political, social, and economic variables. The alteration in land use and land cover (LULC) is mostly driven by changes in climate, which may be attributed to human factors.

#### **Demographic Characteristics and Subsequent Changing Land use Pattern**

The demographic description of a population is influenced by the preexisting environment of a certain place. Moreover, the land use pattern is influenced by the salient demographic features of the people residing in a certain location. The process of development is primarily influenced by the demographic characteristics of a given region, which constitute the fundamental components of spatial dynamics. Historically, it has been widely acknowledged as both a determinant and an outcome of progress. The circumstances have been used as a plausible justification for the insufficient provision of fundamental social amenities, the subpar rate of child survival, the sluggish pace of economic advancement, and, most significantly, the deficient articulation of any developmental strategy or plan. The word Demography refers to the inherent and unchanging personal and background characteristics that distinguish individuals from one another. In essence, demography serves as a valuable source of information pertaining to individuals within a certain population. In their study, Gosal and Krishnan conducted an analysis of demographic elements of development using a set of fourteen indicators. These indicators included many dimensions, including urbanization, literacy, and occupational structure. Specifically, one indicator was focused on urbanization, while four indicators were related to literacy, and the other nine indicators were associated with occupational structure.

### **Importance of the Study**

Land use/land cover changes that have occurred during the past 50 years in several Mediterranean countries have been extensive (and widespread) and fall somewhere in the middle of these two extremes. Land use and land cover change, as well as the potential for a direct or indirect link between these changes and the observed environmental degradation in the Mediterranean area, have received considerable attention in recent years. There has been a shift away from traditional agricultural economies in coastal Mediterranean regions like the Valencia province, which has been exacerbated by demographic trends which tend to focus on cities or large urban regions. Land cover metamorphosis in coastal Mediterranean regions like the Valencia province is the result of these socioeconomic and demographic trends.

The current land cover, surrounding productive agricultural regions, and environmental assets are all put under additional strain by these dynamics. For environmental evaluation and informed decision-making, information on land use and land cover changes, as well as how they vary over time, is essential. The value and utility of this data are greatly enhanced when it is made available in digital map form for the purposes of data integration and geospatial analysis and surveillance.

### **Literature Review**

Pande, Dr. Chaitanya & Moharir, Dr. Kanak & Khadri, Syed (2021) The evaluation of land-use and land-cover change detection mapping to the efficient planning and management policies of the environment, land-use policy, and hydrological system in the research region is the main topic of this work. In this research, a soil and water conservation project was implemented over a five-year period to see what changes occurred in the various land-use and land-cover classifications as well as in the vegetation.

Nath, Bibhash & Ni-Meister, Wenge (2021) The expansion of urban environments is occurring at an unprecedented pace in order to accommodate the growing population and facilitate economic growth. The alterations seen in landscapes have led to heightened pressures on hydrological cycles, biogeochemical processes, and the overall sustainability of natural resources. The present research aimed to assess the spatio-temporal dynamics of land use and land cover (LULC) in Guwahati city, India, throughout the period from 1990 to 2020.

Nedd, Ryan & Light, Katie & Owens, Marcia (2021) Land is an inherent natural resource that has been used by human beings for sustenance and a multitude of endeavors. The issue of land use/land cover change (LULCC) has garnered significant attention from several nations over an extended period of time. Rapid population expansion, migration, and the transformation of rural to urban regions are among the primary factors contributing to land use and land cover change (LULCC). Land use and land cover (LULC) have a significant influence on the interactions between the land surface and the atmosphere, hence affecting climate dynamics.

Ali Shah, Shoukat & Kiran, Madeeha (2021) Land use and land cover changes at the regional scale are essential for a diverse array of purposes, including land planning, mitigation of global warming, prevention of erosion, and mitigation of landslides, among others. This research examines the detection of land use and land cover change in the taluka of Mirpur Mathelo, Ghotki, using the use of remote sensing and Geographic Information Systems (GIS). The program used for this study was ArcGIS 10.3. Initially, the performance of supervised classification was evaluated using Landsat imageries obtained between the years 2013 and 2020.

### **Research Methodology**

The data collecting process, using the technique of field work, will consist of three distinct steps. Firstly, an assessment will be made to determine the suitability of the study. Subsequently, specific towns will be selected from within this district. Finally, respondents will be chosen from these selected towns. The designated temporal scope for the study must include the years 1980 to 2010. The collected data is analyzed using appropriate quantitative methods and presented via the use of tables, graphs, and charts. A comprehensive analysis was conducted to investigate the temporal and geographical aspects of land usage in both general and agricultural contexts. The data obtained for the period from 1990-91 to 2016-17 underwent a transformation into the overall land area rate. To mitigate the fluctuations, a four-year dataset is collected and the median value is used for analysis. The rate is split into many categories. The land use plan was effectively shown via the creation and interpretation of coherent graphs. The data will be analyzed using empirical methods such as correlation, regression, crop rotation, crop integration, crop diversity, crop concentration, and agricultural efficiency.

## Discussion

The notion of "Land Use and Land Cover Change and Vulnerability Analysis" is a well studied topic in the field of global environmental change. It involves examining the alterations in the environment and assessing the susceptibility of a system to environmental threats. The alteration of land use and land cover (LULC) has significant and direct consequences on the surrounding environment. These changes not only contribute to local and regional climatic variations, but also contribute to global warming. Additionally, LULC changes may result in land degradation by disrupting ecosystem services and livelihood support systems. The worldwide environment has been adversely affected by the primary drivers of urbanization, infrastructure development, and industrialization. These processes have resulted in the conversion of extensive agricultural and forestry land into non-agricultural uses, such as urban settlements, road building, and industrial and mining operations. These alterations contribute to the susceptibility of a system to climatic and socioeconomic disturbances. The issue has emerged as a matter of significant concern for both the administration and the populace. The subject of land use and land cover change, as well as vulnerability, has garnered significant attention in academic studies over the last several decades. Since 1990, there has been a significant focus on doing extensive research on land use and land cover via the implementation of four main initiatives by various authorities and groups. The first initiative known as the "Global Change and Terrestrial Ecosystems (GCTE)" was initiated by the International Geosphere-Biosphere Programme (IGBP) from 1992 to 2003. The GCTE project primarily centered its attention on the topics of climate change, atmospheric composition, and land use, and their respective impacts on the atmosphere and physical climate. The second initiative, known as "Land Use and Land Cover Change (LULCC)," was started in 1994-2005 by the International Geosphere-Biosphere Programme (IGBP) and the International Human Dimensions Programme (IHDP). The study demonstrated a correlation between research on land use and land cover change and pre-existing research programs in the fields of physical and social sciences. After the completion of the Land Use and Land Cover Change (LULCC) project, a further collaborative effort between the International Geosphere-Biosphere Programme (IGBP) and the International Human Dimensions Programme on Global Environmental Change (IHDP) was initiated in 2006. This initiative, known as the Global Land Project (GLP), had its research plan published in 2005. The objective of this study is to comprehend the alterations in land systems in light of the potential for swift and extensive worldwide environmental transformations. In 2016, the Global Land Project (GLP) underwent a name change and was subsequently called the Global Land Programme (GLP). Additionally, it facilitated the organization of the "Land System Science Community." The subject matter has a strong correlation with both land use practices and land use policies. The platform facilitates contact among many groups focused on global environmental change. In 2014, the worldwide Land initiative underwent a shift and became known as "Future Earth." This transition marked the fourth initiative in which several worldwide environmental change projects partnered.

The phenomenon of land use and land cover change has been readily observable, with significant consequences seen in several regions of India. The alteration in land use and land cover has had a significant influence on several aspects including habitat, biodiversity, soil quality, water resources, and forest extent. The Green Revolution in India, which began in 1966, was characterized by the implementation of High Yield Variety (HYV) seeds, the promotion of irrigation infrastructure, the use of chemical fertilizers, and the adoption of pesticides as its fundamental components. Following its initial success in significantly increasing agricultural productivity, the use of this method began to exhibit detrimental consequences, including groundwater pollution, soil erosion, diminished soil fertility, decreased genetic variety, decreasing water levels, water logging, and a deterioration in the nutritional value of crops.

The dynamics of land use and land cover (LULC) in each area are mostly indicative of the socio-economic circumstances that exist and evolve throughout time and place. The primary determinants contributing to land use and land cover (LULC) transformations include the efficient usage of available land resources and the enhancement of socio-economic circumstances for the local people residing within the area. In rural regions, where agriculture serves as the primary means of sustenance, farmers have long adhered to the practice of turning natural vegetation into croplands. This conversion aims to enlarge the current farmland area and enhance the farmers' living standards and economic circumstances. Consequently, the phenomenon results in a significant degradation of the unspoiled ecological state of the area. In recent decades, there has been a significant increase in urbanization, resulting in the widespread conversion of natural vegetation and productive agricultural fields to accommodate the demands of development and expansion. The process is further characterized by the

phenomenon of rural-to-urban migration, when individuals from rural regions relocate to urban centers in pursuit of work opportunities and improved quality of life. Hence, the primary land use and land cover (LULC) changes seen in the watersheds undergoing urbanization include the transformation of pre-existing natural vegetation into agricultural fields, as well as the conversion of both agricultural fields and natural vegetation into developed areas.

### Conclusion

The comprehension of land-use/land cover change has transitioned from a simplistic perspective to one that embraces reality and complexity in recent decades. Initially, the studies mostly focused on the physical dimension of the transformation. However, as the study agenda on global environmental change progressed, more aspects were included. It has been recognized by scientists that changes in land use and land cover have a significant impact on climate due to their effect on land surface processes. During the mid-1970s, researchers acknowledged the significant influence of land cover change on surface albedo, leading to subsequent alterations in surface-atmosphere energy exchanges. These modifications ultimately affect regional climate patterns. A more extensive array of effects stemming from alterations in land-use/cover change on ecosystems, as well as the provision of commodities and services, were further discerned. The major focus is on the global implications on biotic diversity, soil degradation, and the capacity of biological systems to meet human requirements.

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