

THE CHARACTERISTICS AND LAND USE / LAND COVER CHANGING: A STUDY OF BHIWANI DISTRICT

Sangeeta*
Dr. Tarun Kumar Yadav**

ABSTRACT

The main aim of the study is to study of research examines the negative impact caused by urbanization in Bhiwani district and the impact of urban expansion and land use/land cover changes on socio - economic conditions of the population of study area. It is concluded that the There was an unequal distribution of crop types seen between the years 1985 and 1986. Furthermore, the cultivation of the Bajra-Gram-Gower crop accounted for more than 40% of the total land area. The southwestern region of the area exhibited a combination of several elements. In the locations, the proportion of irrigation plants was found to be less than 25% in those regions where irrigation plants were ranked highly for wheat and gram cultivation. In the year 1985, there were three distinct kinds including all possible seed variants. During the year of 2009-2010, there was a relatively equal distribution of crop kinds throughout the area. Presently, the number of crop kinds has decreased from nine to six. A combination of plants in the year 1985 consisted of a limited selection of three plant kinds. Currently, a total of five to seven plants have been cultivated. The implementation of irrigation infrastructure led to an increase in agricultural production shown in the crop mix of the 2009-10 period.

Keywords: Characteristics, Land Use, Land Cover, Changing, Bhiwani District.

Introduction

The Earth's ecosystem has been modified by human activities via the alteration of land use and land cover (LULC) throughout the course of the last several centuries. Land use and land cover (LULC) modifications have significant influence on biogeochemical cycles, climate change dynamics, and food production over many spatial extents ranging from regional to global scales. Since the year 1850, the alteration in land use and land cover (LULC) has been a significant factor in the release of carbon dioxide (CO₂) caused by human activities, accounting for around 35% of global emissions. Nevertheless, it is important to note that these environmental changes manifest themselves over several geographical and temporal dimensions, which might vary significantly throughout different locations. During the 20th century, India had a significant surge in its population, which escalated six times from 200 million to 1200 million. This demographic shift was accompanied by notable economic expansion, particularly in the 1950s, leading to consequential land use and land cover (LULC) modifications. According to the findings of Richards and Flint (1994), there was a notable decline in the overall forest area, which dropped from 100 million hectares to 81 million hectares, while the agricultural area saw an increase from 100 million hectares to 120 hectares between the years 1880 and 1950. The temporal trend of deforestation

* 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.

between the years 1880 and 2000 significantly influences the temporal trend of carbon emissions resulting from changes in land use. Hence, the precise assessment of land use and land cover (LULC) is crucial in comprehending the interplay between human activities, climatic systems, and ecosystems, as well as in the development of national-level policy. The Department of Economics and Statistics (DES), Government of India, provides a comprehensive land use and land cover (LULC) dataset for India. This information is derived from a village-level survey and aggregated at the district level. However, it is important to note that this dataset is only accessible for the time period spanning from 1950 to 2010.

Land use and Land Cover Change Detection using Geospatial Techniques

The recognition of satellite-based data's potential for providing significant information for land use and land cover (LULC) is now widespread. Although first attempts were made in the mid-seventies to apply various interpretation approaches in LULC mapping. In recent decades, a multitude of methodologies for land use and land cover (LULC) mapping and change detection have been developed and used on a global scale. Global observations indicate that there is a rapid conversion of land cover into different land use groups. LULC changes occurring on the Earth's surface are often categorized into land use and land cover, two distinct terms that are sometimes used interchangeably. The investigation of land use and land cover (LULC) and their associated implications is a fundamental prerequisite for effective planning and sustainable management of natural resources. The researchers have posited that land use exerts substantial influence on the operation of socio-economic and environmental systems, resulting in major tradeoffs in terms of sustainability, food security, biodiversity, and socio-economic vulnerability for both human populations and ecosystems.

Changing Agricultural Pattern and its Impacts on Land use in Bhiwani District

India is a country of significant agricultural importance, with over 66% of its people engaged in rural activities. Agriculture is a fundamental endeavour that is responsible for the production of most of the sustenance that is consumed by individuals. In addition to providing sustenance, grains also serve as a source of raw materials for several industries. The term 'Agriculture' originates from the Latin word 'Ager', which connotes Land, and 'Culture', which implies progress. Therefore, the term "agriculture" encompasses the scientific and artistic practises involved in cultivating crops and raising livestock with the intention of generating economic profit. Cultivating plants from soil for the sustenance of the human population is considered a skillful endeavour. The growth of agriculture may be attributed to the settlement of farmers in specific geographical areas, thereby leading to notable achievements in this field. Agriculture is a fundamental and essential activity pursued by individuals. It continues to be a critical and significant foundation. Despite the global expansion of urbanisation and industrialization, it is noteworthy that over 51% of the global workforce remains employed in the agricultural sector. The agricultural sector has emerged as a significant driver of economic growth and development in many countries, playing a pivotal role in contributing to their national economies. The primary objective of agriculture is to enhance crop productivity by cultivating plants that possess stronger root systems and heightened competitive abilities. Additionally, agriculture aims to facilitate farmers' growth by enhancing soil quality and ensuring enough water availability. Agriculture serves as a fundamental and integral component of the Indian economy. In the Indian context, it is observed that around 64% of the populace residing beyond the nation's borders depend on agricultural activities as their primary source of sustenance. The agricultural practises on the globe are heavily influenced by physical factors. Indian agriculture is not an exceptional circumstance in this regard; now, India is grappling with two primary concerns pertaining to its agricultural sector. There are two primary factors that need to be addressed in the context of agriculture. The first factor pertains to meeting the growing need for food and other related necessities. The second factor involves ensuring the production of agricultural goods to sustain the ever-increasing population. Additionally, the second factor encompasses the issue of uneven agricultural development and the dynamic patterns of land use in agriculture.

Literature Review

Debnath, Jatan & Sahariah, Dhruvajyoti (2022) The use of satellite remote sensing and geographic information system (GIS) has brought about a significant transformation in the field of mapping, quantification, and evaluation of land surface processes. This is especially evident in the analysis of historical and projected patterns of land use-land cover (LULC) change. Significant alterations in the dynamics of land systems within global river basins have been documented due to human activities, including variables such as population growth, urbanization, development, and agricultural practices. Like many other river basins, the Brahmaputra basin, spanning over China, Bhutan, India, and Bangladesh, is now experiencing comparable environmental challenges.

Ahmed, Rayees & Ahmad, Syed (2021) Anthropogenic activities have emerged as a prominent force among the many natural and human factors that influence the land surface and contribute to the formation of Landuse and Landcover (LULC). These human-induced actions have resulted in significant and transformative alterations to LULC patterns worldwide. The scenario pertaining to the Kashmir Himalayas has a similar pattern. Land use and land cover (LULC) alterations are pervasive and have emerged as a significant catalyst for several environmental challenges within the area.

Nayak, Sridhara (2021) The present research investigates the changes in land use and land cover (LULCC) that occurred between 1981 and 2006 in central India, as well as their potential influence on the surface temperature within this geographical area. The land use maps were generated using the Advanced Very High Resolution Radiometer (AVHRR) datasets in order to examine the land use and land cover change (LULCC) that occurred between 1981 and 2006. The effects of LULCC were assessed using the Observation Minus Reanalysis approach.

Benedict, Xavier (2020) The analysis of land use and land cover (LU/LC) is a crucial element in comprehending the intricate interplay between human activities and the environment. The Pulicat Lagoon, situated in India, is recognized as the second biggest brackish water body inside the country. It serves as a significant habitat for many migratory water birds originating from diverse places. The area serves as a habitat for several types of aquatic birds and marine creatures. Landsat data is used for the examination of alterations in land use and land cover inside Pulicat Lagoon.

Research Methodology

The use of rigorous research methodology is an essential component of every research investigation. In this study, the examination approach will be employed, considering the basic viewpoints and their elements. The research process will be designed to effectively achieve the desired objectives. The user's text does not provide any information to rewrite in an academic manner. The whole of the examination work is predicated upon primary and secondary sources. Primary data will be collected via an intensified field research approach, including the implementation of studies, coordination of farmer and local institution leader gatherings, and individual observations. The overview encompasses several perspectives, including general land utilization, crop land utilization, ranchers' methods for enhancement, fertiliser use, advice, remuneration, and farming-related challenges. Auxiliary data will be collected from various sources such as distributed reports, abstracts, journals, archives, evaluation handbooks, financial audits, the Gazette of Maharashtra and Bhiwani District, the National Sample Survey, Kharland research, reports from development organizations, and soil study units.

Agricultural Land use Dynamics in District Bhiwani

According to Weaver (1954), it is common practise to cultivate mature plants in a mixed or combined manner. Crop types and partnerships have emerged as significant components of agricultural practises. The agricultural practitioners within a certain region are engaging in the practise of cultivating different crops, as opposed to a monoculture approach, due to the inherent physical and cultural heterogeneity of their land. The geographical distribution of crops contributes to the increased incidence of certain crops or the composition of crop mixtures, resulting in the allocation of agricultural lands. The examination of crop combinations is a fundamental component of agricultural geography and offers valuable insights for optimising crop cultivation within regional agricultural planning. The concentration or diversity of crops is influenced by several factors, including agro-climatic conditions, topography, socio-economic factors, technical irrigation practises, and administrative policies. The objectives that are addressed in the present paper. The concept of crop combination seems to be accurate, since it facilitates the identification of changes resulting from the region-specific advantages of closely related plants that coexist with varying degrees of success. An examination of the evolving plant interaction may readily investigate the dynamics of the cultivation process. The delineation of this border proves to be quite advantageous in enhancing comprehension of the agricultural landscape. To enable comprehensive tracking and interpretation of diverse crop varieties, diligent efforts are consistently undertaken to gather data on agricultural produce at the most granular level, namely operating holdings.

Weaver (1954) highlights three significant observations about the fundamental significance of the spatial distribution of crops.

- Understanding the nature and scope of the combination is essential in order to have a comprehensive understanding of the geographical distribution of each plant that occupies a variable location.

- The concept of crop combination is a complex phenomenon that needs thorough explanation, clarification, and examination.
- This section pertains to a structure containing vital agricultural knowledge that must be accessible to construct a progressively intricate framework of a genuine agricultural region.

Human habitats include several elements such as terrestrial surfaces, climatic conditions, aquatic bodies, soil composition, indigenous flora, and the presence of native fauna. The resource complex in question must assume a strategic role in facilitating the advancement of human economic, social, and cultural development. This role can be effectively understood by drawing comparisons to the historical economic landscapes of different nations. The complex's significance lies in its ability to offer a diverse array of essential raw materials that are necessary for fulfilling the needs of individuals. However, historically, the development and use of this extensive tool have regrettably relied only on a trial-and-error approach, resulting in inadequate implementation in several regions around the globe. Consequently, in a hypothetical scenario devoid of sustenance and other fundamental raw resources, this critical resource has undergone a gradual deterioration. Effective land management is a fundamental prerequisite. In nations where efforts are being made to enhance agricultural practises via the use of scientific methodologies, there exists a noteworthy prospect to rectify land utilization deficiencies and mitigate potential mistakes by means of precise planning and meticulous map categorization.

Discussion

The overall development of infrastructural facilities in the district is steadily progressing. However, there is a notable lag in the development of infrastructure and resources necessary for agricultural advancement. This includes inadequate irrigation facilities, a lack of financial and institutional support, and an insufficient market system. The land use patterns in the Bhiwani area have seen significant changes during the last 15 years. The impact of these advancements on agriculture is significant. The progressions have a significant impact on the intricate ecological conditions of the region. The impacts on the Earth should be considered while establishing the comprehensive strategy and planning. To ensure a balance between land use changes and the needs of the local population in the sensitive district region, the implementation of a traditional land race-based indigenous learning system, with appropriate scientific modifications and locally suitable practices, would play a significant role in enhancing the value of traditional cropping practices. The use of intensive agricultural techniques in marsh territory may be deemed fair, but when implemented in hilly and mountainous areas without proven improvements and experience, it might have detrimental effects such as deforestation, soil erosion, and reduced land efficiency. To assess the suitability of agricultural innovations, it is essential to conduct a comprehensive analysis and testing of established traditional practices within a contemporary logical framework. The matter of sustainable agriculture in the district mostly pertains to specialized and institutional aspects, including little research and development efforts.

These emerging sectors within the field of agriculture provide opportunities for farmers in the area to diversify their economic activities. Organic farming has emerged as a prominent technique for sustainable agricultural practices that aim to preserve ecological integrity. In the area, farmers have been engaging in organic farming for a considerable period, but on a limited scale and without a systematic approach. The primary goal of organic farming is to establish and maintain an agricultural system that is environmentally sustainable. Organic agriculture relies heavily on locally available resources and is contingent upon the preservation of ecological balance and the optimization of biological processes. The fundamental principle of organic farming is in ensuring the security and preservation of soil and natural ecosystems. Regardless, it should be supported by the latest practical technologies that are not only cost-effective but also easily adaptable for the farmers in the region. Another noteworthy aspect to consider while engaging in organic farming is the potential contamination of products due to a lack of knowledge and appropriate packing and preservation techniques. In any scenario, the practice of sustainable organic farming and the business of olericulture and floriculture, as well as organic farming, should be contingent upon the availability of adequate irrigation resources within the district. Agriculture in the Bhiwani area is reliant on rainfall and limited spring irrigation at upper and central elevations due to the sloping topography of the region. The downward flow of rainwater may lead to accelerated soil erosion and the occurrence of landslides. These issues can be addressed by enhancing the established practice of patio farming. Rather than leaving the porch areas unused, they can be utilized for fence cultivation by planting shrubs and banana plants. This approach can provide agricultural fodder and increase the income of farmers through the sale of shrubs and bananas. Another method of storing fast-flowing rainwater is by excavating small ponds and patches inside the farmed land. The presence of ponds and patches facilitates the retention of swiftly flowing waters, so enabling the accumulation of eroded soils and contributing to the replenishment of groundwater resources.

Conclusion

The term "land" refers to a geographical area where various human activities take occur. The use of land resources by people leads to the phenomenon known as "land use," which exhibits variations depending on the specific objectives it serves. These purposes include food production, the supply of housing, recreational activities, the extraction and processing of materials, and the inherent bio-physical properties of the land. Therefore, the use of land is being molded by the interplay of two overarching factors: human necessities and environmental characteristics and dynamics. The concepts of land use and land cover are distinct and should not be used interchangeably. Scholars in the field emphasize the need of distinguishing between these terms and examining the changes in land cover that occur as a result. Land cover refers to the biophysical condition of the Earth's surface, which encompasses variations that are essential for the accurate examination of land and its immediate subsurface. This statement pertains to the characterization of the terrestrial landscape, specifically referring to its physical attributes such as crops, mountains, or woods. Land cover refers to the assessment and classification of the amount and composition of surface plant, water bodies, and geological components. For instance, man-made constructs such as houses and other similar structures, as well as the specific materials used in housing frameworks. The word "land cover" first denoted the plant type that encompassed the land surface. However, throughout time, its scope has expanded to include many elements of the physical environment, including soils, biodiversity, and surfaces and groundwater. In regions susceptible to natural disasters such as landslides, there is a growing trend of deforestation and loss of vegetation that plays a crucial role in stabilizing the top layer of soil. This is accompanied by the transformation of forested areas into agricultural and horticultural fields, resulting in alterations to both land use and land cover.

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