

Understanding Changes in Agricultural Land Use and Scientific Cropping Pattern in India.

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Abstract

Land is the most basic of all the resources bestowed by nature on man and it is granted to all for their survival. With the growing population and demand on land, it is vital to research land usage in order to properly plan the region's resources. Land use can be described as human beings' use of land, with an emphasis on the land's functional role in economic activity. Agriculture has been in India since the dawn of time. It is extremely important to India's economy. Until 1971, over 80% of India's people lived in rural areas and relied on agriculture, either directly or indirectly. At the time, it provided around 45 percent of the country's Gross Domestic Product (GDP). We can say that the success of India's industrial sector is mainly dependent on the success of the agricultural sector. In reality, agriculture's success determines the country's overall economy. India's agriculture sector also makes a significant contribution to the country's export commerce. Changes in land use features, both qualitative and quantitative, are detailed, with the level of depth determined by the spatial level of study and the availability of required data. Land is a country's most valuable resource and a key role in its economic growth. Apart from providing shelter and other social needs, it supports all primary activities.

Keywords: land, agriculture, India, etc

1. INTRODUCTION

Land is the most basic of all the resources bestowed by nature on man, and it is granted to all for their survival. With the growing population and demand on land, it is vital to research land usage in order to properly plan the region's resources. Land use can be described as human beings' use of land, with an emphasis on the land's functional role in economic activity. However, land usage has its own set of issues, and other uses place a premium on their full potential. All other natural resources are available because of the land as a basic resource. Land as a resource requires prudent and sensible planning, and land use surveys are critical in assisting us in understanding the trend of land use. Overexploitation and poor use of land resources have resulted in widespread soil erosion, siltation, floods, droughts, and rapid destruction of forests, flora, and animals in recent decades. This decline has affected both the environment and the quality of life.

The study of land use becomes critical and inescapable at this point. There are several land use activities that are carried out to alter the natural character of land into an artificial one in order to meet the needs, demands, and desires of humans. Man is highly active in influencing the things on the surface of the earth for his own gain and interest. This type of human behaviour is producing a significant amount of change in the natural phenomena that occur on the earth's surface. Human actions are changing the world's landscapes in pervasive ways by converting large areas of tropical forests into agricultural land by clearing these forests through various means and engaging in subsistence agriculture, intensifying farmland production, or expanding urban centres to meet the demands. Agriculture is an important part of the Indian economy. In India, agriculture is the agricultural source of income for more than half of the population. Despite technical advancements and the conquering of nature, physical forces have a strong influence on agricultural activities around the world. Developing countries are currently confronted with two major agricultural issues. The first is fulfilling rising food demand and supplying agro-products to an ever-increasing population, while the second is agriculture's uneven development and shifting land use patterns.

The land use pattern is complex and changeable. It is, in particular, a variable. The complicated land use pattern in a given area is the result of thousands of years of trial and error in colonisation. The current land use pattern in India is the consequence of the long-term operation of a wide range of environmental conditions, although it has been influenced by economic and historical factors. For better land utilisation, there is a requirement for rational planning. Geographers can play a crucial role in this regard by becoming involved in the study of land use. Geographers are continually studying the man-space interactions by focusing on the varied activities of man with his immediate environment. Geographers, using survey, mapping, analysis, and interpretation skills, would provide the necessary foundation for developing a sensible land use planning scheme. There are a variety of land uses available. Some are permanent, while others are always changing. Human beings have always attempted to interfere with the use of land in order to meet their needs and desires through various techniques. In fact, land use is so dynamic because it is the consequence of human beings'

ongoing efforts to satisfy varied desires. With the advancement of science and technology, land use types are now evaluated and investigated in a highly geospatial environment, which provides us with the most appropriate, dependable, and correct data. For rational land use planning, especially for optimising the use of arable land, a scientific study of land use is required. As maps of land use become acknowledged as crucial instruments of regional planning and development, land use research is at the forefront of geography's advancement into the applied sciences. When a region's resource base is being assessed, land use studies are critical. The rational use, conservation, and management of land resources are critical to the development of any region's agricultural economy. Land use studies are especially important in locations where the kind and degree of land use are essential to the regional economy.

2. AGRICULTURE IN INDIA

Agriculture includes land-based crop production, sericulture, animal husbandry, apiculture, agroforestry, and pisciculture, among other things. India is mostly an agricultural nation. Agriculture has been in India since the dawn of time. It is extremely important to India's economy. Until 1971, over 80% of India's people lived in rural areas and relied on agriculture, either directly or indirectly. At the time, it provided around 45 percent of the country's Gross Domestic Product (GDP). Agriculture's relative importance has dwindled since then due to the quick development of other occupations such as mining, manufacturing, transportation, and trading, among others. Agriculture and related sectors now account for about 25% of GDP, and agriculture continues to be the backbone of India's economy, with 65-70 percent of the population relying on it for their living. Agriculture, in addition to providing food and fodder for vast populations of humans and livestock, is the primary source of raw materials for a number of important businesses. Sugarcane, cotton, jute, and oil seeds are some of the most notable agricultural raw materials utilised in industries. In terms of agriculture, India is a one-of-a-kind country. Its vast stretch of level plains, excellent soil, high percentage of cultivable land, and extensive climatic diversity, which includes appropriate aggregate rainfall mixed with sufficient warmth, ample sunshine, and a lengthy growing season, give a firm foundation for agriculture.

The success of India's industrial sector is mainly dependent on the success of the agricultural sector. In reality, agriculture's success determines the country's overall economy. India's agriculture sector also makes a significant contribution to the country's export commerce. Agricultural and agro-processed items make up the majority of India's export trade. Tea, coffee, cashew kernels, raw cotton, oil cakes, tobacco, spices, fruits, and vegetables are the most important agricultural exports. Agriculture in India has its own quirks. Subsistence agriculture, population pressure on agriculture, importance of animals, reliance on monsoon, variety of crops, predominance of food crops, subsistence in character, tradition bound, low productivity, lack of a definite agricultural land use policy, low status of agriculture in society, poverty and indebtedness of farmers, inadequate agricultural research and education, training and extensibility are some of the distinguishing characteristics of Indian agriculture. Small and fragmented landholdings, lack of timely supply of seeds, manures, fertilisers, and biocides, lack of irrigation facilities, lack of mechanisation, soil erosion, agricultural marketing, inadequate storage facilities, inadequate transportation, scarcity of capital, and so on are all problems that Indian agriculture faces.

Geo-climatic, social, and cultural-political factors all have an impact on agricultural practises, cropping patterns, and production. Physical factors, institutional issues, infrastructural considerations, and technical factors all have an impact on Indian agriculture. All of these factors have an impact on cropping patterns, agricultural growth, and crop productivity in a region, both individually and together. The agricultural systems of the country are extremely diverse. The Planning Commission and the National Remote Sensing Agency (NRSA) divided the country into different agro-climatic regions based on different characteristics, with the goal of optimising agricultural production, increasing farm income, generating more rural employment, and making judicious use of available irrigation water, as well as reducing regional inequalities in agricultural development.

3. UNDERSTANDING CHANGES IN LAND USE/LAND COVER

• Land Cover and Deiming Land Use

"The biophysical state of the earth's surface and near subsurface is referred to as land cover". Land covers, in other words, "describes the physical status of the land surface, such as agriculture, mountains, or woods". Meyer and Turner (1994) add the following: "It includes things like the

amount and type of surface vegetation, water, and earth components, among other things. "The term originally referred to the type of vegetation that covered the land surface, but has since broadened to include human structures, such as buildings or pavement, as well as other aspects of the physical environment, such as soils, biodiversity, and surfaces and groundwater," according to Moser (1996). "Land use encompasses both the method by which the land's biophysical features are modified and the goal behind that manipulation - the reason for which the land is used". Meyer (1995) claims, in a similar spirit, that "The mode in which humans use the land and its resources, as well as the purpose for which they do so, is referred to as land use. Land use, in a nutshell, "denotes the human use of land". "Land use itself is the human employment of a land-cover type, the mechanism by which human activity appropriates the outcomes of net primary production (NPP) as determined by a complex of socio-economic determinants," Skole (1994) continues. Finally, according to FAO (1995), "land use refers to the function or purpose for which land is used by the local human population, and can be described as human activities that are directly related to land, make use of its resources, or have an impact on them."

Chapin and Kaiser (1979) put it this way: "There is a strong propensity to think of land in terms of raw material yields required to sustain people and their activities at territorial scales involving enormous land areas.'Land' is a resource at these scales, and 'land use' means 'resource usage.' At the urban scale, however, the emphasis is primarily on the use potential of the land's surface for the site of diverse activities, rather than describing land in terms of its production potential of its soils and submineral composition." Several additional works dealing with land use in the context of urban and regional research and planning imply this sense of the term "land use".

- **Recognizing Changes in Land Use and Land Cover**

It is vital to first comprehend the meaning of change in order to recognise it in real-world circumstances while analysing land use and land cover change. Land use and land cover change, at its most basic level, refers to changes in the spatial extent (increases or decreases) of a certain type of land use or land cover. Even at this level, the detection and measurement of change is influenced by the geographical scale; the higher the spatial degree of detail, the greater the changes in the area of land use and land cover that can be recognised and recorded. However, the meaning and understanding of change is significantly broader in the case of both land cover and land use. The relevant literature distinguishes between two types of land cover change: conversion and modification. The term "land cover conversion" refers to the process of switching from one form of cover to another. Land cover modification refers to changes in structure or function without a complete switch from one type to another; for example, productivity, biomass, or phenology could all be affected. Natural activities such as climatic variations, volcanic eruptions, changes in river channels, and sea level changes, among others, result in changes in land cover. However, the majority of current and recent land cover changes are due to human actions, such as changes in land use for production or settlement. "Land use alters land cover in three ways," according to Meyer and Turner (1996): "converting the land cover, or changing it to a qualitatively different state; modifying it, or quantitatively modifying its condition without full conversion; and maintaining it in its condition against natural agents of change."

4. AGRICULTURAL LAND USE IN INDIA

Rice was planted on 42.68 hectares, wheat on 25.2 hectares, coarse cereals on 33.5 hectares, and total cereals on 101.49 hectares in 1993-94. Total pulses occupied 23.4 mha; total foodgrains occupied 124.8 mha; fruits occupied 2.94 mha; vegetables occupied 4.2 mha; total oilseeds occupied 28.5 mha; total fibres occupied 8.36 mha; tobacco occupied 0.42 mha; sugarcane occupied 3.74 mha; spices occupied 2.36 mha; and other crops occupied 10.64 mha.

4.1 Agricultural Land Use and Scientific Cropping Pattern

It is vital to utilise scientific cropping patterns in order to increase agricultural production from limited land resources. In this aspect, the cropping system approach offers a lot of promise. Cropping system technology acceptance and its deployment are dependent on physical and socioeconomic resources that are accessible or may be made available when needed. Land, topography, water availability, intensity and duration of sunshine, labour availability, currency or credit, power supply, and market demand must all be considered when developing location-specific and farm-based cropping patterns. The crux of the problem is adequate resource usage of a farm in an integrated farming system with crops as the main enterprise. According to Carandang (1980), the cropping

system concept consists of two basic components: farm resources and production technology. There are two sorts of farm resources: physical and socioeconomic. Land, sunlight, and water are examples of physical resources. Socioeconomic elements, on the other hand, include things like markets, labour, power, and money. The nature of crops and varieties, tillers, fertility, weed management, insect management, disease control, inter-plant durations, and water management are all factors that influence production technique. Both farm resources and production technologies must be scientifically integrated.

4.2 Governmental Intervention in Land Use Research

Individuals live for a few decades; however nations survive for thousands of years. As a result, individual acts should not be allowed to limit future generations' potential. Any national government must protect the interests of future generations without jeopardising the current generation's well-being. As a result, there is a need for better land use planning that considers both public and private interests. Governments have enacted a number of laws in order to facilitate scientific and sustainable land usage. These laws were largely passed after the country gained independence. The governments of Uttar Pradesh and Punjab passed Land Utilization Acts in 1947 and 1949, respectively. Soil conservation programmes are codified under the Uttar Pradesh Soil Conservation Act of 1954. Land Reclamation Acts have been passed in the states of Bihar and Punjab. The Madhya Bharat Land Utilization Act of 1950 prohibits land from being left fallow for extended periods of time. To prevent the misuse of land resources, the Bombay Khar Land Act of 1948 and the Punjab Land Preservation Amendment Act of 1953 were passed. These laws, however, have failed to stop the mismanagement of land resources. Many cases of land misuse have occurred as a result of poor implementation and interpretation of laws.

5. SIGNIFICANCE OF ANALYSING LAND USE CHANGE

As a result of these concerns, the global academic community is reviewing the long-running study of land alteration patterns and processes. A global initiative to "increase the understanding of the dynamics of land use and land cover change globally, with a focus on increasing the ability to project such change" has been established. IGBP and IHDP have produced a Science Plan for Land Use and Land Cover Change (LUCC) to lead research and development in this initiative, in order to promote a high level of international and interdisciplinary coordination. The LUCC Plans' overall goals are to: i) gain a better understanding of global LULC driving forces; ii) investigate and document LULC temporal and geographical dynamics; iii) define the links between sustainability and various land uses; and iv) comprehend the interplay between LULC, biogeochemistry, and climate.

As a result, the development of regional and global models and projections of land use and land cover change will improve. To formalise this knowledge, we must create, consolidate, and integrate appropriate data, as well as analyse these data to uncover the local factors influencing LULC changes and their influence on geography and the economy. However, there are just a few historical LULC datasets that are spatially broad, precise, and flexible for LUCC study. Even when datasets are available, there is a widespread lack of analysis and correlation of such data with the region's broader socioeconomic factors. The following areas require much more documentation and analysis: a) the state and distribution of existing land cover, b) the rate and distribution of historical and current land cover conversion, c) the underlying factors that determine land use and land management practises, and d) the likely changes in LULC given current and historical trends and their impact.

To refine the first two categories, some mix of historical reconstruction and distant sensing is clearly required. The third area of uncertainty will necessitate closer physical and social analysis connections. Changes from one form of land use to another are documented through time and within a given spatial unit in a description of land use change. Changes in land use features, both qualitative and quantitative, are detailed, with the level of depth determined by the spatial level of study and the availability of required data. Descriptive studies of land use change have sparked more in-depth examinations into the "why" of these changes, as well as efforts (policy) to mitigate the negative consequences of the detected changes.

6. CONCLUSION

We can say that the success of India's industrial sector is mainly dependent on the success of the agricultural sector. In reality, agriculture's success determines the country's overall economy. India's agriculture sector also makes a significant contribution to the country's export commerce. Changes in land use features, both qualitative and quantitative, are detailed, with the level of depth determined by

the spatial level of study and the availability of required data. It is vital to utilise scientific cropping patterns in order to increase agricultural production from limited land resources. In this aspect, the cropping system approach offers a lot of promise. Cropping system technology acceptance and its deployment are dependent on physical and socioeconomic resources that are accessible or may be made available when needed. Land is a country's most valuable resource and a key role in its economic growth. Apart from providing shelter and other social needs, it supports all primary activities.

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