Prakriti- The International Multidisciplinary Research JournalYear 2025, Volume-2, Issue-2 (Jul-Dec)

Environmental impacts of land use and land cover changes in Solan District of Himachal Pradesh

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ARTICLE INFO

Key words: Burgeoning, Diversity, Land use, Spatio-temporal, Undermine.

doi:10.48165/ pimrj.2025.2.2.4

ABSTRACT

The way in which a part of landscape serves a functional purpose is defined as land use. The natural features on the surface undergo continuous change and these changes may be as old as the human history is. But the rate or scale of this change has become much faster in the recent past which is resulting into various environmental problems. Land use/land cover is an issue of global importance as the world's about eight billion people compete for food, water and shelter. India is the seventh largest and second most populous country in the world with amazing physical and cultural diversity. The massive conversion of valuable and limited land resource to agriculture, construction and other land uses are undermining the capacity of this resource to sustain a burgeoning human population. Knowledge about existing land-use/land cover and trends of change is essential for the proper planning, management and regulations of the use of such resources. In the present study effort has been made to analyse the environmental impacts of this spatiotemporal changes in land use/land cover in Solan district of Himachal Pradesh.

Introduction

The land is a fragile eco-system which supports all living thing of the earth. Increasing human and cattle population demand for more space for its existence. Above all the restless nature of human beings continues to stride for achieving more and more development without caring environment. The land use/land cover has been changing at national, state and district level due to rapid urbanization, industrialization, transportation and many other developmental activities. This has been resulting into increase in the amount of green house gases, degradation and deterioration of soil and various kinds of pollutions. The air, water and noise pollution have reached to alarming level due to changing taking place in land use/land cover (Shukla et al., 1992). The quality of the environment has also deteriorated due to the contamination of air and water as a result of excessive use of insecticides and pesticides. Raina, (1997) has rightly remarked that in last few years the climatic season are not getting their proper time. This may be attributed to the deforestation as well as other land use and land cover changes. The congestion and noise pollution is yet another environmental problem of modern time which are coming into fore as a result of increase in built up category. The Solan district in general and its urban centre in particular is becoming the first

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choice of people to live in because of its moderate climate and developed transport network. The industrialization is an important reason of increasing built up environment and land use and land cover changes. There are various industries that have got located into various parts of the district Solan. The cement plant at Darlaghat (Arki) and several other units at Parwanoo, Nalagarh, Baddi and Barotiwala areas had adversely affected the clean environment of the hilly district. While the expansion of urban areas and development of transport network has caused the deforestation in certain areas of the district.

Study Area

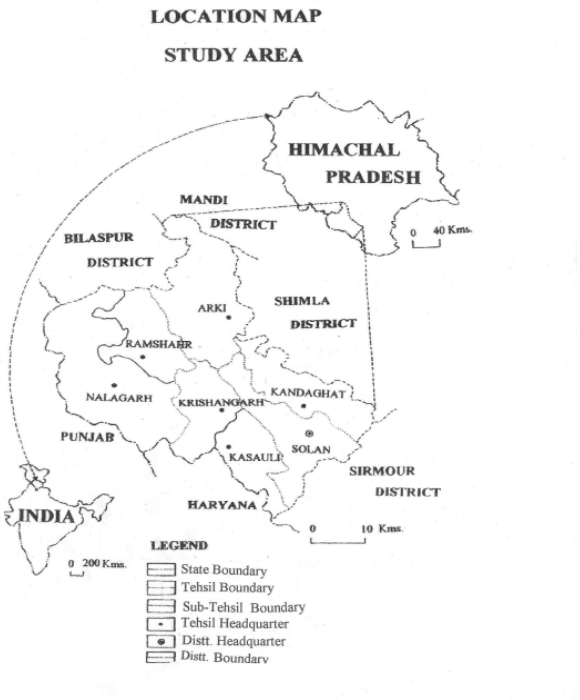


Fig.-1.1

The district of Solan constitutes the study area of present research work. It is situated between 30045' to 31021'10" north latitude and 76036' to 77015'20" east longitudes covering an area of 1936 square km. (Census of India, 1991). The terrain of the district varies from hilly to mountainous except three valleys - Saproon Valley in Solan tehsil, Doon Valley in Nalagarh tehsil and Kunihar Valley in Arki tehsil. The elevation varies from 300 to 3000 meters above mean sea level. The area of the district has been divided in to 4 sub-division with headquarter at Solan, Kandaghat, Nalagarh and Arki, five tehsils and two sub tehsils (See Fig.-1.1).
The soils of the region are young and thin which vary from light to sandy heavy and in the valley areas, it is sandy and sandy loam. Due to significant variations in the altitudes of the district the temperature also varies considerably.

Objectives

i) To examine the land use and land cover changes in the study area in recent past.

ii) Understand the physical and economic impacts of these changes on environment.

Data Source

The present study is based both on primary as well as secondary data. The primary data has been collected through personal observation, interview method and questionnaires. The random sampling method has been used for this purpose. The secondary data has been obtained from various published and unpublished records of department of Land Record, office of the Commissioner Revenue, publications of Department of Economics and Statistics, publications of Department of Forest, District Statistical Department, District Gazetteer and Census Handbooks of various Censuses.

Methods and Approaches

The present research study follows the following methodology in order to reach meaningful results. Library consultation has been done for the review of literature. The maps/diagrams have been prepared and photographs have also been taken in the field for visual interpretation. The present study incorporates inductive as well as deductive methods and makes use of regional, ecological and behavioural approaches in the analysis and presentation of this study.

Land Use/Land Cover and Environment

To understand environmental implications of land use/land cover changes in a region, it is very important to understand the difference between land use and land cover. The simple land use classification is not sufficient for analysis of changes but land use functions of a land cover type needs to be known to understand the changes in land cover (Gautam, 2004). Land use and land cover are closely intertwined and cannot be separated from each other. Hence the environmental impacts cannot be assessed without understanding the status of both the changes. In order to meet the growing demands of ever increasing population on finite resources the use of modern technology has increase rapidly during recent past. This thoughtless transition in cultural practices has brought

dramatic changes in land use/land cover pattern of the study region. The land use/land cover changes that occurred during the last 30 years of the 20th century and recent past have created various environmental problems. They include increase in temperature, decrease in annual amount of precipitation, disturbance in seasonal rhythm, depletion of natural resources and deficit of water including the potable water. The disasters like landslides flash floods, drought, soil erosion, rise in the pollution level, loss to bio-diversity and deterioration in the quality of life are some of the common environmental implications in the study area.

Physical and economic implications of land use and land cover changes

There is no doubt in saying that the faster pace of development has accelerated the land use/land cover changes in the region during the past 2-3 decades. These changes which are caused by physical and economic processes may result in multi-facet impacts on whole of environment but some of the commonly noticed implications in the district have been discussed.

Physical implications

The physical implications of land use/land cover changes in the study region can be put under the following categories.

1. Land Degradation

Photo Plate 1.1 Land degradation is a human induced or natural process which negatively affects the capacity of land to function effectively with in an ecosystem. The principal causes of land degradation include inappropriate land use, soil erosion, land slide, floods, chemical contamination, loss of organic matter through improper farming practices; mounting population pressure and increased use of new technology have accelerated the process of land degradation. Photo Plate 1.1shows that the area devoid of vegetation has been
further degraded due to construction of road near Subathu along the Kuthar Khad in the district.
In Solan district about 2.022 lakh hectare cropped land damaged/degraded during last fifteen years (1990-2005) due to various natural calamities (Anonymous, 1990-2005). While hundred hectares of virgin land has also been degraded or destroyed because of various developmental activities and other improper land use practices

2. Landslide

"Landslide" denotes a downward and outward movement of slope forming materials composed of natural rocks, soils or combinations of these materials (Varnes, 1958). The improper land use development especially connected with the expansion of agricultural practices on steeper and more marginal slope, careless construction of roads and changing vegetative cover to varieties of other land uses make the landscape more susceptible to slope failure (Mukhopadhyay, 2000). While topography, geology, climate, soils and vegetation are some of natural causes which also contribute to landslides. The results of landslides is loss of agricultural land, crops, housing, infrastructural facilities and even the biodiversity and ultimately emergence of waste land. In study region 15000 hectares cropped area covered by debris of land slide and siltation and 350 hectares land has also been lost due to same process in the year 2005. Landslide and siltation created loss of Rs. 6850.00 lakh to agricultural sector during the above mentioned period (Anonymous, 2005).

4. Degradation of Environment

It is needless to say that population is an important resource for any development, but yet it is also a major source of environmental degradation when it exceeds the limits of carrying capacity of the supportive system. The expansion of agricultural land for food security, construction of roads and other developmental activities and overgrazing have been dwindling the vegetative cover of the region. The quality of environment has been also deteriorating due to several environmental hazards and injudicious human acts. The over use of insecticides, pesticides and fertilizers in agricultural fields have been intensifying the problem of water and air pollution and have also degraded the fertility of land. In study region the consumption of fertilizers in terms of plant nutrients increased from 1695 metric tonnes in 1985 to 2339 metric tonnes in 2002-03 (Statistical Out Line of H.P., 1985 & 2001).

5.. Depletion of Natural Vegetation

Photo Plate 1.2

T he per capita forest land in India has dwindled to 0.1 hectares as compared to the world average of 1 hectare. The situation looks grim as nearly one per cent of the land surface of India is turning barren every year due to deforestation (Sharma, 1998). It is more satisfying that overall area under tree cover has slightly increased in Solan district. It increased from 20002 hectare in 1971-72 to 20290 hectare in 2001. Though there was an overall increase in forest area but this has been declining rapidly in certain area at tehsil level.
Field observation reveals that it has increased only in government land rather than private land. Apart from this there is no unanimity between the local people and forest officials about the land and species to be planted (Annual Season and Crop Report 1971-72/2000-01). Photo Plate 1.2 shows that the natural vegetation has to pay high toll in order to pave the way for developmental activities at Arki District Solan.

6. Loss of Biodiversity

Land use/land cover changes due to transition socio-economic practices have posed serious threat to the rich biodiversity of the region. The construction work on virgin forests land and destruction of small vegetation for expansion of agricultural land and other developmental activities have reduced the biodiversity of the region. Though the forest cover has increased slightly in the district as a result of afforestation , but field observation reveals that these planted species are of homogeneous nature (mainly chir pine). The change in agricultural practices and modification of landscapes for numerous developmental activities has telling effect on flora and fauna of the study region. Some of the species of birds and plants have reached to the stage of extinction. The most noticeable example may be the sharp decline of vultures. It is hard to find the vultures flying today though it was not uncommon a few years ago. Similarly many of the plant species have also been endangered. The herbal plants like 'Ritha', 'Beheda', 'Harad' and 'Aloevera' are at the stage of extinction in the study region.

7. Climate Change

The climatic change may be attributed to some kind of change in the temperature, precipitation and humidity level of the area. There is no denying the fact that climate change cannot be observed at tehsil or district level and neither a period 2-3 decades is enough to arrow a conclusion of change in climate. Nevertheless some of the changes commonly observed in the study area are decline in precipitation and increase in temperature. The amount of rainfall and time has been quite fluctuating which is from the annual rainfall that decreased from 2410.2 mm in 1978 to 856.5 mm in 2001 (Anonymous 1985 & 2001). The rise of temperature has been reported by a very high number of respondents during the field study. The delay and uncertainty in rainy season is quite common in the study region which prolongs the dry spell in a year.

Economic implications

Economic development and natural environment are strongly intertwined with each other. All economic activities affects environment while natural environment also influences economic progress.

1. Industrialization

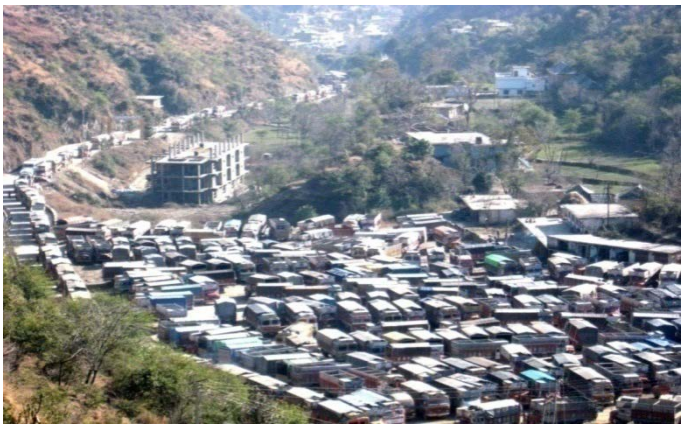


Photo Plate-1.3

Industries are developed in response to human needs converting certain raw materials into manufactured goods of greater utility. Industrialization in Solan district is relatively a recent phenomenon but district has made significant achievements in this field in the past few years. At present Himachal has 196 medium and large scale industries and

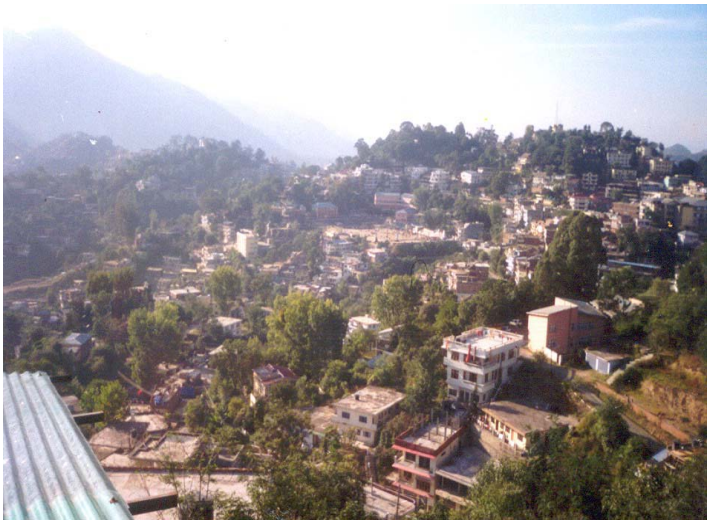
about 30,886 small scale industries. (Economic Survey, 2003-04). There are highest numbers of large and small industrial units in Solan district which account for 66 per cent of the state. A major portion of these units (74%) is concentrated in two tehsils namely Kasauli and Nalagarh. The remaining 26 per cent are located in Solan, Arki and Kandaghat tehsils (Census 2001). This relentless march toward industrialization in the recent past has plundered natural resources like soil, vegetation and mineral wealth of the region. Photo plate 1.3 shows huge accumulation of trucks for cement distribution at Darlaghat district Solan creating worse air and noise pollution.

2. Impacts on Agriculture

Photo plate 1.4

show tomatos and capsicum cultivation (cash Crops) practiced in the village Anji of Kandaghat tehsil, District solan. The area under tomato crop increased very fast in last few years. It increased from 1,877 hectares in 1997-98 to 2,542 hectares in 2001. The production has been reached to 27,824metric tonnes in 2001. The consumption of fertilizers reached to 2396 metric tonnes in 2001while it was only 707 metric tonnes in 1976-77. The consumption of pesticides has also increased considerably from mere 6.566 metric tonnes in 1976-77 to 27.700 metric tonnes in 1983-84 (Anonymous 1976-77 and 1983-84). This change has not affected the environment only but has affected the forward and backward linkages also.

2. Urbanization



(See Photo Plate-1.5)

Rapid growth has been recorded in urban areas in Solan district in the last twenty years. Both the number and size of the town have grown and many of the tiny urban settlements have moved up in the national ladder of town classes. The built up area has gone up both horizontal and vertically thus paving the way for urbanization. The uncontrolled expansion of Solan town has threatened the existence of green cover and the agriculture land. The horizontal expansion of the town has taken a heavy toll as the green cover and agricultural land has been diminishing very rapidly. (See **Photo Plate-1.5)**

Conclusion

The development and natural environment are two phases of the same coin. Any development process is bound to have its impact on environment. Any change over the surface of the earth is the result of large number of physical and economic factors and these factors induce the change within the set physical limits. The present study has tried to analyse the land use and land cover changes along with their environmental implications in Solan district. After analyzing the available data study reveals that the increase in cropping intensity is the result of shift from traditional crops to cash crops. Study discloses that the land which is limited is further getting reduced both in terms of size and its productivity due to increase in the population and over

exploitation. The multifarious developmental activities have resulted in shrinking of land, while poor methods of agriculture and human greed are responsible for the decline in the productivity of land as well as forest cover and biodiversity. The last thirty years have witnessed the relentless march towards development by mean of environmentally incompatible industrialization, urbanization, agricultural development and other developmental activities in the study region. Because of these processes the natural resources in the study region are being plundered without much though for the long term consequences of such actions.

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