



# A GEOGRAPHICAL REVIEW OF LAND USE PATTERN IN HARIDWAR DISTRICT

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## ABSTRACT

Land use is a man-made dynamic process in which human uses land resource to fulfill their various economic, social and cultural needs and the same time it also provides a base for development. The proper management, for sustainable development of land, can improve the eco-system and its productivity in a particular region. The study is an effort to identify the current pattern of land use in Haridwar district of Uttarakhand. The total reported area of the District was 2,32,798 hectares, about more than two-fifth of that was under net sown area and about one-fourth is covered under forest area. The other land excluding agriculture was about 12.68%, and present fallow land was reported by 2.00%. The groves & gardens were extended on 1543 hectares (0.67%), cultivable waste land was 1738 hectare (0.74%) followed by other fallow land (1.43%) non-cultivable land about 1.46%, and pasture land 66 hectare (0.03%) in 2014–15. The main objective of the paper is to outline and assess the land use change in Haridwar District during 2000 to 2015 and current pattern of land use by using the secondary data sources of State Government of Uttar Pradesh, India.

**Keywords:** Land utilization, Net Sown Area, Pasture Land, Cultivable Waste Land, Fallow Land, Non-Cultivated Land.

## INTRODUCTION

Land use refers to the conversion of a whole or a part of land for specific purposes like agricultural activities, house building, or industry purposes etc. It is also called one kind of citation of land using for different purposes. Land use pattern refers to the distribution and interaction of natural and man-made resources that lie on the earth surface. Many geographers has argued that the primary aim of the study about the general pattern of land use is to portray the plan and distribution of land to various uses ranging from field to factory, forest to foundry, pasture to pond and sandy stretch to settlement (Kumar, 1986, p. 64). Land is an important part of physical environment having different natural uses. After equipped with human's skill and their knowledge, this is the most important natural resource that would

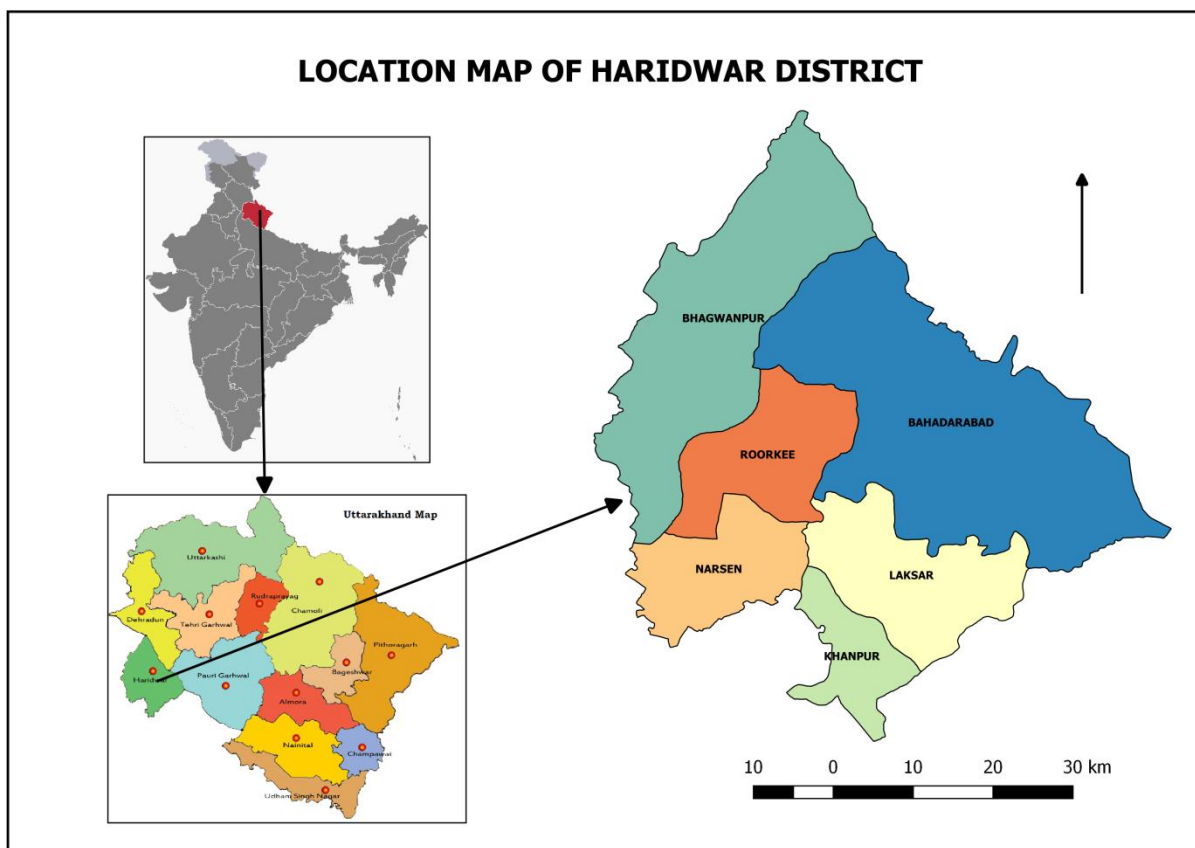
be reshaping and utilization for the different purposes and hence, the natural land starts converting into cultural land escape as land use. As a result, a variety of land use categories has seen in all parts of the world. The reflections of interaction between man and nature decide the composition of land use of any territory of any dimension.

In fact, there are many uses of the land within physical, social and economic framework which often operate together. There are two sets of limits which determine the pattern of land use in any particular region. First, the absolute or outer limits which are set by nature and second, the relative limits which are set by culture, human attitudes and actions that determine the range of actual and probable use within the limits (Zimmermann, 1951). Human has been using natural resources to fulfill their basic needs from beginning of their origin. He expanded his basic needs and desire that forced him to produce more and more goods and facilities. This cupidity of human being became fatal for nature and created imbalance between human being and nature which ultimately resulted various problems of environmental and socio-economic degradation. The most common reason for the problem is rapid population growth and unplanned uses of resources.

A number of micro and macro level surveys have been conducted in these aspects, which are directly and indirectly related to land use. However few studies are being mentioned here. Among the British geographers Prof. L D Stamp (1960) was the pioneer worker in this field in early 1930. It is followed up, by the geographer of the A.M.U. Aligarh, Prof M. Shafi who produced a Ph.D. thesis (1956 and 1960) on Land Utilization in Eastern Uttar Pradesh under the supervision of Prof Stamp. The first credit goes to Shafi for intensive land use study on large scale. He has selected twelve villages for detailed study from varied environmental conditions. He also corrected the field produce and nutritional level of the village people and considered per capita of daily intake of energy 200 kcal as the minimum requirement for taking into account a loss of ten per cent in the process of post harvest. He also published a number of papers of this credit (1964, 1965, and 1974) and edited several books. The work in this field has also been done by Enyedi (1964) Geographical Types of Agricultural Budapest Applied Geography in Hungary, Bhatia (1967 a & b) Spatial Variations, Changes and Trend in Agricultural Efficiency in Uttar Pradesh and A New Measure of Agricultural Efficiency in Uttar Pradesh, Khusro (1965) Measurement of Productivity at Macro and Micro Level, Vasanti Devi (1964) Some Aspects of the Agricultural Geography of South India, Dikshit (1973) Agricultural Regions of Maharashtra, Geographical Review of India, Hussain (1976), Singh and Dillon (1984), Singh (1972), Dillon (1973) etc. in particular. Chatterjee, (1952) did land use survey of Howrah district (West Bengal). Mishra, A.N. (1966) worked on recent change in land use in the Tarai Region of Uttar Pradesh. Shafi, (1969) presented a plan for land use and classified the land and their capability. Lambin, (1997) explained the modeling and monitoring of processes of land cover change in tropical region. Tonape, & Barakade, (2011) also have analyzed the agricultural land use pattern at micro level in Satara district (Maharashtra). Talukdar, & Singh, (2011) traced out the changing land use pattern in Tinsukia District of Assam. Gupta & Singh, (2012) depicted environmental implications of land use change in Jaipur City. Gautam & Sharma (2012) traced out the land use change in District Maharajganj, U.P. Sharma & Tiwari, (2013) depicted the land use pattern in Eastern Uttar Pradesh. In India, pressure of rapid growth of population and heavy demand of goods compelled to change in land use pattern. The proper management and sustainable use of land can help to improve the eco-system and its productivity of a particular region. And, it may also manage a balance between human being and natural resources. The main objective of the study is to compare and analyze the land use pattern during the years 2000 and 2015 and to find the current pattern of land use in the district of Haridwar

## GEOGRAPHICAL LOCATION OF STUDY AREA

Haridwar district is situated in south – western part of Uttarakhand state of India. It lies from 29 35' to 30 40' North latitude and 77 43' to 78 22' East longituted and falls in Survey of India Degree Sheet nos. 53 J, F, G and K. It is bounded in the north by Dehradun district, in the east by Garhwal district, in south by Muzaffar nagar and south-west by Bijnor districts of Uttar Pradesh and in west by Saharanpur district of Uttar Pradesh. The geographical area of the district is 2360 sq. kilometers. The shape of the district is rectangular. Haridwar district has been divided into three Tehsils viz. Roorkee, Bhagwanpur and Laksar and six development Blocks namely Roorkee, Bhagwanpur, Laksar, Khanpur, Bahadrabad, and Narsan and comprises 622villages. Topographically the district presents much more varieties of features than any other districts of the Gangetic plain of India. In the north part of the district are steep hills of the Shivalik chain and below the hills is the submontane and the terai tract. The surface is broken by several rivers and their are many tributaries. The greater portion of the district is open and highly cultivated. Above physical diversities may effect the pattern of land use in Haridwar district. So an enthusiasm arises for the study of land use pattern in the district.



## DATA SOURCE AND METHODOLOGY

The study is based on secondary data source, which have been collected from the district statistical handbooks of Haridwar District published by Economic and Statistics Division, Dehradun, Uttarakhand, India. This data has been collected by state government agency. For analysis, we used the simple crosstabulation in the year of 2000 as a base year to consider the change in land use form 2000 to 2015. The dynamics of land use change has been analyzed at block level to find present pattern by considering the current data of 2014–15.

## LAND USE PATTERN

The land use of the study area is categorized into nine categories of land use pattern and recognized by State Planning Institute, Dehradun, Uttarakhand. These categories are forest, cultivable waste land, present fallow land, other fallow land, non-cultivable land, other land excluding agriculture, pasture land, groves and gardens and net sown area. The first three higher shares of net sown area, forest and other land excluding agriculture. These were continuously leading in the year 2000, 2005, 2010 and 2015 while shares of other categories recorded with variations in different years. However, only three categories i.e., net sown area covers about 116082 hectares and having out of share of 49.86%, followed by forest (72431 hectares, 31.11%) and other land excluding agriculture (29525 hectares, 12.68%) covered more than 93.65% share of the total land use reported area of the district in 2014–15. (Table 1, Fig. 2)

Table 1. Year wise land use of district Haridwar, Uttarakhand, (Area in Hectares)

Years	2000		2005		2010		2015	
Land Use	Area	%	Area	%	Area	%	Area	%
Forest	70873	30.77	72431	31.35	84537	34.76	72431	31.11
Cultivable waste land	2075	0.90	2061	0.89	1636	0.67	1738	0.74
Present Fallow Land	3702	1.60	2601	1.12	2894	1.19	4675	2.00
Other Fallow Land	3361	1.45	3905	1.68	3945	1.62	3347	1.43
Non-cultivable Land	1989	0.86	2488	1.07	2814	1.15	3391	1.45
Other Land Excluding Agricultural	26035	11.30	26656	11.56	27531	11.36	29525	12.68
Pasture Land	63	0.02	51	0.02	70	0.02	66	0.02
Groves & Gardens	522	0.25	758	0.32	774	0.31	1543	0.66
Net Sown Area	121676	52.85	120166	51.99	118961	48.92	116082	49.86
Total Reported Area	230296	100	231117	100	243162	100	232798	100

Source: Sankhyikiya Patrika, District Haridwar, 2000, 2005, 2010 and 2015

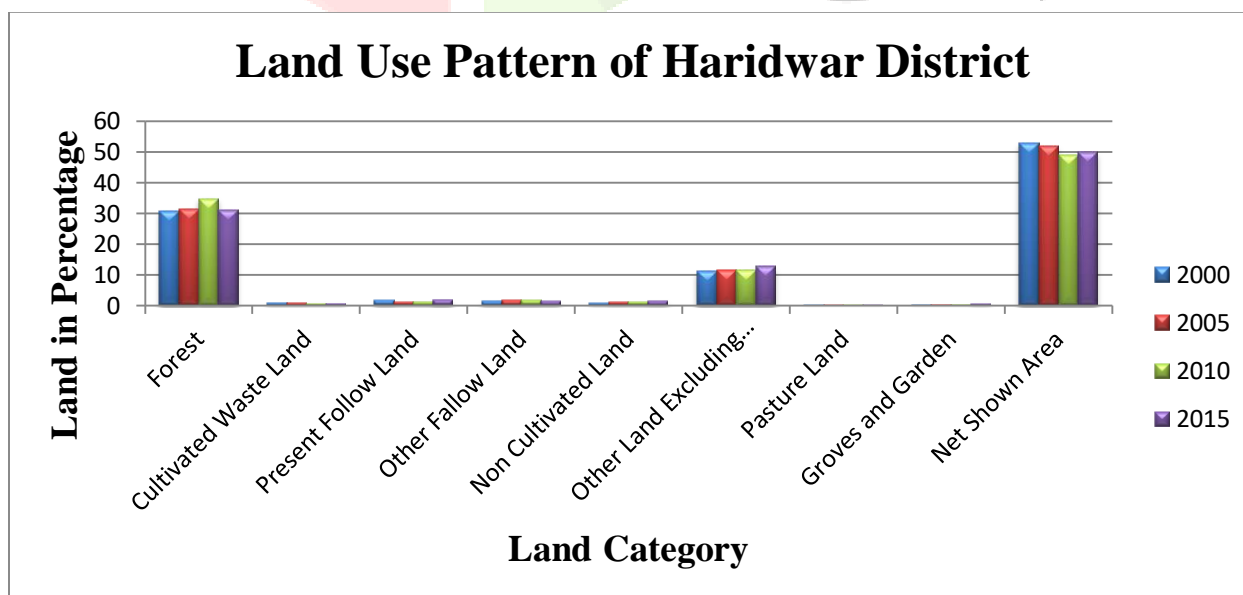


Figure 2 Land use Category in Haridwar ( 2000, 2005, 2010 and 2015).

Here an attempt is made to understand land use pattern the district is divided in six blocks and tried to study all nine categories of land use pattern recognized by State Planning Institute, Dehradun, Uttarakhand. It reveals the concentration of land use in the six blocks of the Haridwar district for the year of 2014-2015. (Table 2&3, Fig 3)

Table 2 Block Wise Area of Land Use in District Haridwar (Area in Hectares), 2014-15

Blocks	Total area	Forest	Cultivable waste land	Present Fallow Land	Other Fallow Land	Non-cultivable Land	OtherLand Excluding Agricultural	Pasture Land	Groves & Gardens	Net Sown Area
Bhagwanpur	31289	243	210	828	705	385	4799	15	325	23779
Roorkee	23507	0	143	803	578	605	4993	14	259	16112
Narsan	27058	0	110	344	452	933	4443	7	154	20615
Bhadrabad	48367	9643	459	1782	957	698	9758	6	732	24332
Laksar	27993	1503	530	664	340	403	4259	7	71	20216
Khanpur	14061	717	286	254	315	367	1075	17	2	11028

Source: Sankhyikiya Patrika, District Haridwar, 2015

Table 3 Block wise land use of the total reported area (in Percent), 2014-15

Blocks	Forest	Cultivable waste land	Present Fallow Land	Other Fallow Land	Non-cultivable Land	OtherLand Excluding Agricultural	Pasture Land	Groves & Gardens	Net Sown Area
Bhagwanpur	2.00	12.08	17.71	21.06	11.35	16.36	22.72	21.06	20.51
Roorkee	0	8.23	17.17	17.30	17.84	17.02	21.21	16.79	13.87
Narsan	0	6.34	7.36	13.50	27.51	15.15	10.60	9.98	17.75
Bhadrabad	79.65	26.40	38.11	28.59	20.60	33.30	9.09	47.44	20.96
Laksar	12.11	30.50	14.20	10.15	11.88	14.52	10.60	4.60	17.41
Khanpur	5.94	16.45	5.43	9.40	10.82	3.65	25.78	0.13	9.50

Source: Sankhyikiya Patrika, District Haridwar, 2015

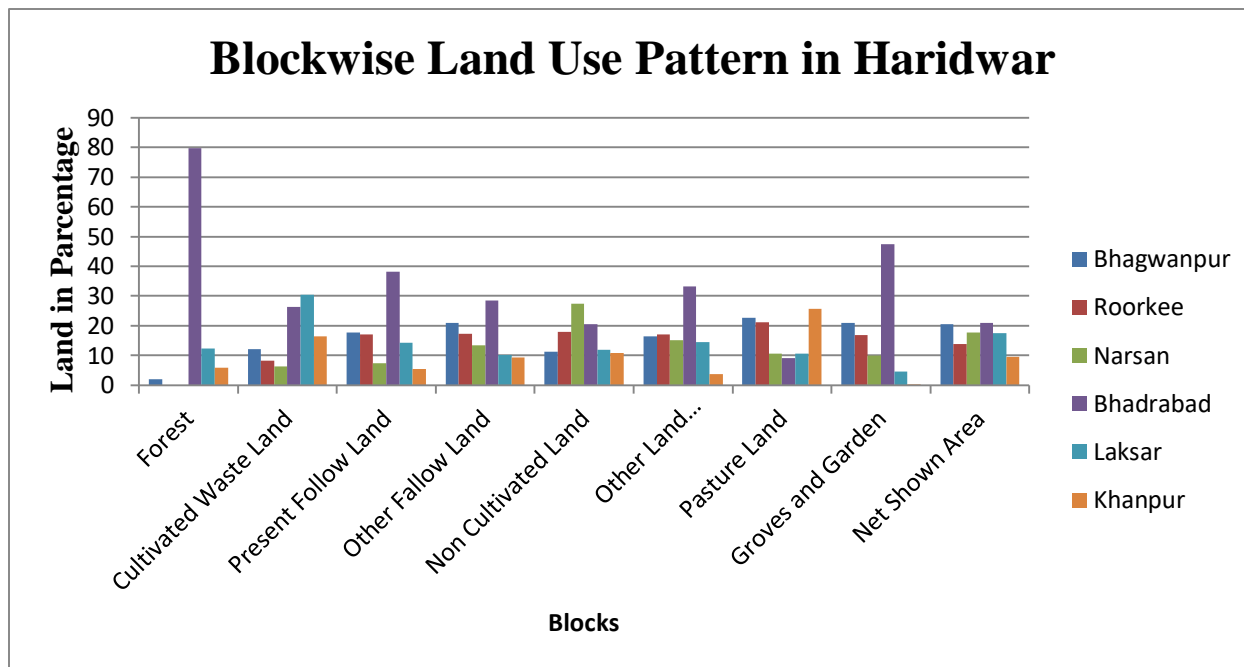


Figure 3: Block wise Land use Pattern in Haridwar

## Area under Forest cover

This includes all lands classed as forest under any legal enactment dealing with forests or administered as forests, whether state-owned or private, and whether wooded or maintained as potential forest land. The area of crops in the forest and grazing lands or areas open for grazing within the forests are remain included under the forest. Forests play an important role in the economy of Haridwar district. The study area recorded about 70873 hectares (30.77 %) forest of the total reported area in 2000 which was increased by 0.58% and reached at 72431 hectares and it was about more than one-fourth of total in 2005. After 2005 the forest area is continuously increasing and it was recorded by 34.76% in 2010. But the forest area is decreased and it was 3.65% in 2015. The total proportion of forest area were recorded by 84537 hectares (34.76%) in 2010, and with a slight decrease, it became 72431 hectares (31.11%) in 2015 (Table 1). The highest concentration of forest was in Bahadrabad 9643 hectares (79.65%) followed by Laksar 1503 hectares (12.41%), Khanpur 717 (5.94%), Bhagwanpur 243 hectares (2.00%), while Roorkee and Narsan block had no forest area at all in 2014–15 (Tables 2 and 3).

## Cultivable Waste Land

It includes the land available for cultivation but either not used for cultivation or used for cultivation once but not cultivated during last five years. Such lands may be either fallow or covered with shrubs and jungles, which are not put to any use. It may be in isolation or within cultivated holdings. The barren cultivable waste land was normally decreasing from 2000 to 2015. It was recorded 2075 hectares (0.90%) of the total reported area in 2000 and decreased by 0.01% and reached at 2061 hectares (0.89%) in 2005. In 2010, it became 1636 hectares (0.67%) decreasing by 0.22%. But, the cultivable land increased by 0.07% and reached at 1738 hectares (0.74%) in the year of 2015 (Table-1). So, the cultivable waste land was confronting up and down changes in the study area. The highest area of barren cultivable waste land was in Laksar 530 hectares (30.50%), followed by Bahadrabad 459 hectares (26.40%), Khanpur 286 hectares (16.45%), Bhagwanpur 243 hectares (12.08%), but Roorkee 143 hectares (8.23%), and Narsan 110

hectares (6.34%) had less barren cultivable waste land of the total reported area of the blocks (Tables 2 and 3) in 2014–15.

## Fallow Lands

The lands, which are not used for cultivation during one to five years called fallow land. Fallow land is divided into two categories (i) current fallow and (ii) old fallow land.

(i) **Current Fallow Land:** This represents cropped area, which is kept fallow during the current year. Current fallows are in cycle order having being left fallow for current year to restore fertility of soil. It registered 3702 hectares (1.60%) of total reported area in 2000 which decreased by 0.48% and became 2601 hectares (1.12%) in the year of 2005. But after 2005, the current fallow land is continuously increasing by 0.07% in 2010 and 0.81% in 2015. The total proportion of current fallow land became 2894 hectares (1.19%) in 2010 and 4675 hectares (2.00%) in 2015 (Table 1). The highest concentration of current fallow land was in Bahadrabad 1782 hectares (38.11%) followed by Bhagwanpur 828 hectares (17.71%), Roorkee 803 hectares (17.17%), Laksar 664 hectares (14.20%) and Narsan 344 hectares (7.36%), but Khanpur 254 hectares (5.43%) blocks had low distribution of current fallow land of total reported area in 2014–15 (Tables 2 and 3).

(ii) **Other Fallow Land:** The marginal, sub-marginal or other lands which are left uncultivated for two to five years or more are known as other fallows. These are cultivated lands which have been left fallow because of rainfall deficiency or economic reasons. It was 3361 hectares (1.45%) in 2000 and increased by 0.23% in 2005, but continuously decreased by 0.06% in 2010 and 0.19% in 2015. The total proportion of other fallow land was 3905 hectares (1.68%) in 2005, 3945 hectares (1.62%) in 2010 and 3347 hectares (1.43%) in 2015 (Table 1). The highest concentration of other fallow land was 9758 hectares (28.59%) in Bahadrabad followed by Bhagwanpur 4799 hectares (21.06%), Roorkee 4993 hectares (17.84%) and Narsan 4443 hectares (13.50%) while lower concentration was in Laksar 4259 hectares (10.15%), and Khanpur 1075 hectares (9.40%) of the total reported area of the blocks in 2014–15 (Tables 2 and 3).

## Non -cultivable Land

The land under this category includes all barren and uncultivable land like, mountains, deserts, etc. Land which cannot be brought under cultivation except at an exorbitant cost is classified as uncultivable. Such lands may be as isolated blocks or within cultivated holdings. It was 1989 hectares (0.86%) in 2000 and continuously increasing by 0.21% in 2005, 0.08% in 2010 and 0.3% in 2015. The proportion of non-cultivable land was 2488 hectares in 2005 (1.07%), 2814 hectares (1.15%) in 2010 and 3391 hectares (1.45%) in 2015 (Table 1). Narsan 933 hectares (27.51%) and Bahadrabad 698 hectares (20.60%) blocks registered high non-cultivable land while Roorkee 605 hectares (17.84%), Laksar 403 hectares (11.88%), Bhagwanpur 385 hectares (11.35%) and Khanpur 367 hectares (10.82%) blocks had low non-cultivable land of the total reported area of the district in 2014–15 (Tables 2 and 3).

## Other Land Excluding Agriculture

This category of land includes the lands which are used and classified for nonagricultural purposes such as settlements, roads, railways, canal, ponds, dams, natural water bodies, barren land, mountains and plateaus etc. This type of land was 26035 hectares (11.30%) of the total reported area in 2000 and that has increased by 0.26% in 2005 followed by 0.20% in 2010 and 1.32% in 2015. It became 26656 hectares (11.56%) in 2005, 27531 hectares (11.36%) in 2010, and 29525 hectares (12.68%) in 2015 respectively (Table 1). This category of land was increasing continuously because of growing population, construction of link roads and new settlements in urban and rural areas. The highest proportion of land classified under other than agriculture was in Bahadrabad 9758 hectares (33.30%) followed by Roorkee and Bhagwanpur blocks about 4993 and 4799 hectares each with one-fifth proportion of the total reported area of the district in 2014-15 (Tables 2 and 3).

## Pasture Land

Common land used for grazing is included under this category of land. Haridwar district has very poor condition about pasture land. It was 63 hectares (0.02%) in 2000 of total reported area. In 2005, 2010, and 2015, the proportion of pasture land was 51 hectares (0.02%), 70 hectares (0.02%), 66 hectares (0.02%) respectively (Table 1). The highest proportion of pasture land was in Khanpur 17 hectares (25.78%) followed by Bhagwanpur 15 hectares (22.72%), Roorkee 14 hectares (21.21%), Narsan and Laksar 7 hectares (10.60%) and Bahdarabad 6 hectares (9.09%) of the total reported area of the district in 2014–15 (Tables 2 and 3).

## Groves and Gardens

This includes all cultivable land which is not included in 'Net sown area'. Lands under casuarinas trees, thatching grasses, bamboo bushes and other groves etc. are included under this category. It covered only 522 hectares (0.25%) in 2000 of the total reported area but became 758 (0.32%) in 2005 increased by 0.07% and 774 hectares (0.31%) in 2010 decreased by 0.01%. It recorded positive growth in 2015 by 0.35% and reached at 1543 hectares (6.32%). The highest proportion of this category of land was in Bahadrabad 732 hectares (47.44%), Bhagwanpur 325 hectares (21.06%) and Roorkee 259 hectares (16.79%) while in Narsan 154 hectares (9.98%) and Laksar 71 hectares (4.60%) and Khanpur 2 hectares (0.13%) had low proportion of groves and gardens of the total reported area in 2014–15 (Tables 2 and 3).

## Net sown Area

This represents the total area sown with crops and orchards. Area sowed more than once in the same year is counted only once. In 2000, it was 121676 hectares (52.85%) of the total reported area which decreased by 0.86% and reached at 120166 hectares (51.99%) in 2005. But after 2005, it was continuously decreased and reached at 118961 hectares (48.92%) (Decreased by 3.07%) in 2010 and 116082 hectares (49.86%) in 2015 (Table-1). The highest net sown area registered in Bahadrabad 24332 hectares (20.96%) followed by Bhagwanpur 23779 hectares (20.51%), Narsan 20615 hectares (17.75%), Laksar 20216 hectares (17.41%), Roorkee 16112 hectares (13.87%) and Khanpur 11028 hectares (9.50%) of the total reported area of the blocks in 2014–15 (Tables 2 and 3).



## CONCLUSION

Rapid increasing population in the study area and its dependent mostly on agriculture has put a major issue of land use change in Haridwar district. Decreasing agricultural area and with adverse of increasing population is an indication of food scarcity in the study area. Slight decreasing of forest area and its density have aggravated several problems at meso-level as like the problem of soil erosion, disruption of water cycle, loss of biodiversity and adverse effect of climate change etc. have clearly visible. It is well known that forests maintain not only the ecological balance of nature but also control global warming, caused largely due to emissions of greenhouse gases into the atmosphere. It is a good indication that land under groves and gardens are increasing due to social forestry and people's awareness but pasture and other grazing land are decreasing day by day and that is creating problem for the most common component of agriculture, that is, animal husbandry. Cultivable waste land and old fallow land are decreasing due to increasing land under other than agriculture. Agricultural land use planning must be directed by the extension of agricultural land along with raising the productivity of land, soil conservation, eco-friendly crop protection and better agricultural implements in the study area. New technologies must be met with new challenges at local as well as regional level. Forest is the major resource of the Haridwar District; therefore, it should be protected and developed by eco-friendly means of afforestation. A balance among different land use categories is needed in the study area which can support the natural geo-system.

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