



# A Comparative Study Of Changing In General Land Use Pattern In Upper Bhagirathi Basin

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**Abstract:** Land use is an important aspect of geographic study. Land use is considered as a very important implement in provincial directing and development<sup>1</sup>. The aim of the study is the proper understanding of the function and operation of the change in land use pattern in the Study area. Because of being a hilly region, the land use pattern of the “Upper Bhagirathi Basin” is of primary level, which is going a head in manner of development. From the types of land use category, only the general land use applied in the study area are discussed in this paper.

**Key words** - . land under forest, cultivable waste land, fallow land, horticulture, cultivated land, land under other uses.

## I. INTRODUCTION

Among all the natural resources land is the most significant resource, of human society whose utilization shows a reciprocal relation relationship between the prevailing ecological conditions of a particular region and man. According to Vanzetli, “Land use is the reward of combination of the natural and cultural acquisition”.

Changes in the land use pattern refers to the change occurs in existing land use pattern from past. It also describes how and why these changes occur and who were the major factors. For proper understanding of existing land use pattern the land use pattern in 1971 was also studied to trace the actual change occurs in the basin. An effort has been made to map, describe and interpret the problems and changes in the land use pattern that have been occurred during the study period. This has helped in knowing the problems related to general land use pattern of the area and are important in taking new initiatives for the future planning of the region.

## DATA SOURCE AND METHODOLOGY

For the present work, Nyay Panchayat has been taken as a unit. The published as well as unpublished data from tahsil (Dunda and Bhatwari), development blocks (Chinyalisaur, Dunda and Bhatwari) have been collected. In spite of these data, data from statistical and horticulture department of the Vikas Bhawan (Uttarkashi) has also been collected at Nyay Panchayat level for the present study.

## GEOGRAPHICAL LOCATION OF THE STUDY AREA

The study area 'UPPER BHAGIRATHI BASIN' lies in the North – Eastern part of Distt-UTTARKASHI (UTTARAKHAND). It's Longitudinal and Latitudinal extent is  $30^{\circ} 50'$  to  $31^{\circ} 22'$  North Latitude and  $78^{\circ} 20'$  to  $79^{\circ} 20'$  East Longitude. Its total geographical area is 5280 km/sq. the study area is outlined on the basis of the area drained by the river Bhagirathi, which pierced the whole region into two parts and flows in the middle of the valley. The river is drained by the water of the many small and big tributaries from both the slopes northern and southern that create fertile valley patches in which most of the population resides.

From the administrative point of view the study area comes under two - Tahsil namely- Dunda and Bhatwari which are further divided into three development blocks namely- Chinyalisaur, Dunda and Bhatwari respectively. The study has 311 Revenue and four forest villages, including two urban settlement(Uttarkashi Town and Gangotri Notified Area). The study area comes under higher and lesser Himalaya, whose relief varies from 700mt to 900mt due to which variation is found in vegetation and in type of soil.

## LAND USE PATTERN

From the total area of the Basin (49,303 hectare) 18,729 hectare (37.97%) area is under forest and pasture, 4,751 hectare (9.63%) area is under non- cultivable land, 4087 ha (8.28%) area is under culturable waste land, 2,310 hectare (3.94%) is under fallow land, 3,297 hectare (6.68%) is under horticulture, 3,231 hectare (5.55%) area is under other uses and only 16,541 hectare (33.54%) (including net sown area and fallow) is under cultivation in 2001. See fig 2.1

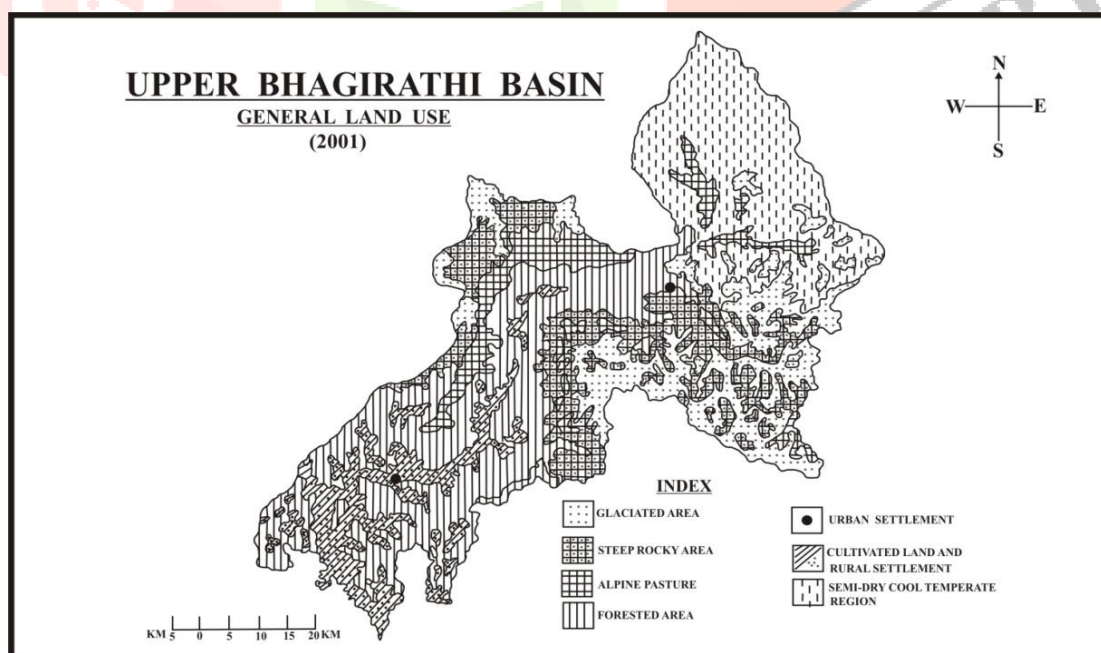


FIG.2.1

The study area has been grouped under the following land use categories: (see table 1)

- I. Land under forest
- II. Land under pastures.
- III. Land not available for cultivation.
- IV. Culturable waste land.
- V. Cultivated land.
- VI. Fallow land.
- VII. Horticulture.
- VIII. Land under other uses.

**Table 1**  
**“Upper Bhagirathi Basin”**  
**General land use (area in hectare) 2000-2001**

S. No.	Block/ Nyay Panchayat	Total Area	For est Land	Past ure Land	Non- Cultiva ble land	Cultu rable Waste Land	Cultivated land			Hort icult url land	Land Under Other uses
								Net sown area	Fallow land		
	Chinyalisaur/										
1	Jibya	2364	532	434	248	126	849	782	67	72	103
2	Dharkot	2059	506	338	195	18	830	704	126	48	124
3	Barethi	2326	663	256	156	151	881	805	76	111	108
4	Tuliyara	2285	707	298	300	114	606	404	199	132	128
5	Khalsi	2936	838	347	251	119	961	853	108	165	255
6	Chamyari	1997	498	310	294	109	535	445	90	136	115
	Total	13967	3744	1983	1444	637	4662	3993	666	664	833
	Dunda/										
7	Nakuri	2962	531	680	303	133	989	871	118	73	253
8	Matli	2354	334	335	327	164	909	840	69	110	175
9	Pipali	3517	785	780	233	160	1267	1189	78	149	143
10	Genvala	3331	730	535	223	63	1326	1214	112	342	112
11	Bhatiyara	2906	959	319	286	126	880	859	21	150	186
12	Badeth	2775	803	323	300	162	870	791	79	115	202
	Total	17845	4142	2972	1672	808	6241	5764	477	939	1071
	Bhatwari/										
13	Harsil	3105	536	659	212	698	788	650	138	598	150
14	Bandrani	2398	411	401	154	252	1027	776	251	464	100
15	Saura	2276	386	233	206	403	1043	861	182	286	105
16	Gangori	2970	462	400	187	387	1181	1036	145	178	175
17	Sald	2621	564	580	237	323	638	443	195	49	230
18	Joshiyada	1961	307	257	373	255	418	313	105	45	306
19	Mustiksaur	2160	324	368	266	324	543	392	151	74	261
	Total	17491	2990	2898	1635	2642	5638	4471	1167	1694	1327
	Rural total	49303	10876	7853	4751	4087	16541	14228	2310	3297	3231
	Forest	463374									
	Urban	1212									
	Basin total	513889									

SOURCE : 1.TAHSIL DUNDA AND BHATWARI

2. DISTRICT STATISTICAL HAND BOOK UTTARKASHI.

Area under various land use categories in 1971 and 2001, is shown in fig.2.2 (a) & (b).

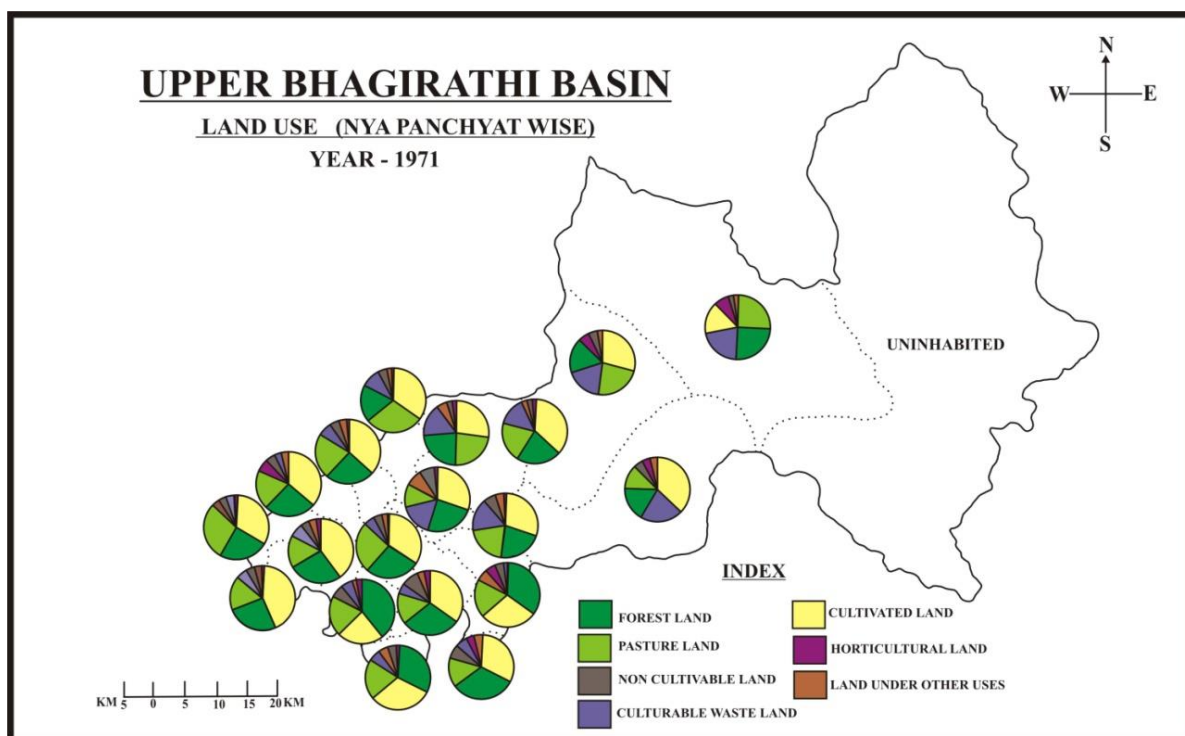


FIG.2.2(a)

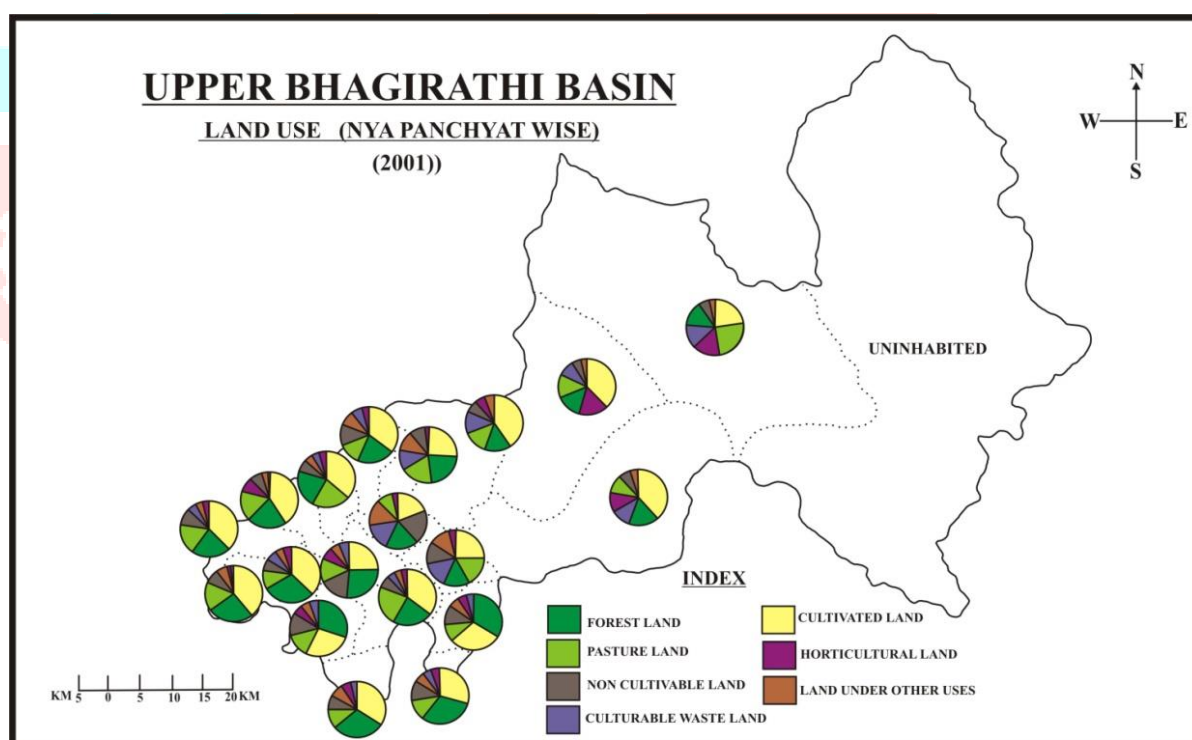


FIG.2.2.(B)

## I. FOREST LAND

Forest is an area (within the notified forest boundary) bearing an association predominantly of trees and vegetation types capable of producing timber and other forest products.

From the total geographical area of the basin i.e. 51,3889 hectare 84.77% (4633.74 hectare) is covered by forest. This is reserved forest, which is under department of forest.

Whereas area occupied by general forest (forest under village) during 1971 was 25.06% (12,359 hectare) that decreased to 22.05% (10,876 hectare) in 2001. Spatial distribution of area under general forest at Nyay Panchayat level varies from below 15% to above 25%.

Barethi, Tuliya Khalsi, Bhatiyara and Badeth Nyay Panchayat covers above 25% area under forest. And Nakuri, Matli,

Sald, Jibya, Dharkot, Chamyari, Pipali and Genvala Nyay Panchayat covers between 15% to 25% area under forest. While the percentage is under 15% in Harsil, Bandrani, Saura, Gangori, Joshiyada and Mustiksaur.

Increase in area under forest is mainly confined to only Barethi (2%), Bandrani (0.4%) and Saura (2%) nyaypanchayat due to increase in sapling under agricultural forestry.

Decrease is more common than increase, it varies from 1% to 7% (see fig.2.2.b). Nyay Panchayat recorded decrease of above 5% are Matli, Harsil, Gangori and Mustiksaur. While rest are recorded under 5% of decrease. The reason for decrease in area under forest is because most of the forests of study area are situated on the steep and precipitous slopes of the fold mountains where, the landslide occurs and this causes the low percent of forest cover in some of the Nyay Panchayat. Secondly, no measures to control forest fire. Thirdly, the area are denuded of the forest cover due to constant grazing, excessive unplanned cutting of trees and general lack of application of principles of land use under forest management.

## II. PASTURE LAND

The pasture areas situated at an altitude of above 3,000 m and known as “buggyal” (a local name). Pasture land comprised 20.24% (9981 hectare) of the total area of Upper Bhagirathi Basin in 1971 that reduces to 15.92% (7,853 hectare) in 2001.

Nyay Panchayat wise Nakuri, Pipali, Harsil and Sald occupied highest percentage (above 20 %) under this category because of the location of these areas as; they are situated above 3,000 m. While rest are recorded between 10% to 20% area under pasture .

The area under pasture recorded decrease throughout the study period. Decrease above 5% is confined to Jibya, Barethi, Tuliya, Khalsi, Bhatiyara and Gangori. While in remaining 13 Nyay Panchayat 5 % of decrease is recorded. Decrease in the area under pasture is because of over grazing, increasing pressure of animals' population on pasture land.

## III. LAND NOT AVAILABLE FOR CULTIVATION

This category includes land put to non-agricultural use, barren and uncultivable land like mountains, riverbeds, and settlement. In other words it includes land, which cannot be brought under cultivation unless at a very heavy cost.

The Upper Bhagirathi Basin had 4.98% (2,457 hectare) of its total area under non cultivable land in 1971, which increased to 9.63% (4,751 hectare) in 2001. Its distribution at Nyay Panchayat level varies from 6% to 19% .



Joshiyada, Chamyari, Matli, Tuliya and Mustiksaur records highest percentage i.e. 19%, 15%, 14% 13% and 12% respectively because of their closeness to road head, urban area. While proportion of this category is relatively small (below 10%) in Dharkot, Barethi, Khalsi Pipali, Genvala, Bhatiyara, Harsil, Bandrani, Saura, Gangori, Sald.

Area under this land use category, records increase throughout the study period. Nyay Panchayat wise high increase (above 10%) is only confined to Joshiyada. while substantial increase (between 5% to 10%) recorded in Jibya, Dharkot, Tuliya, Nakuri, Matli, Bhatiyara and Mustiksaur Nyay Panchayat of the three blocks. The increase is the result of natural disaster to some extent and increasing population. Secondly, due to steep slopes, rocky areas etc. which make impossible to bring this land for agricultural and other purposes. While in of the rest area under 5% of increase is recorded.

#### IV. CULTURABLE WASTE LAND

Culturable wasteland includes land which can be brought under cultivation but which has not been cultivated. Total area under this land use category in 1971 amounts 5180 hectare (10.02%). It came down to 3987 hectare (7.71%) in 2001.

Nyay Panchayat wise, the distribution of culturable wasteland in 2001 varies from below 5% to over 15% at nyay Panchayat level. At Nyay Panchayat level the high percentage (above 15%) are recorded in Harsil and Saura while Bandrani, Gangori, Sald, Joshiyada and Mustiksaur records between 10% to 15% under this category.

While Dharkot, Tuliya, Nakuri and Genvala records between 5% to 10% area. And rest are recorded below 5% area under culturable waste land.

The increase involved in change under culturable wasteland category during the span of three census decades is confined to Jibya(1%).

Whereas decrease in culturable wasteland is more common than increase. Decrease of 5% is confined to Dharkot. Barethi, Harsil and Saura records under 1% of decrease in area under culturable waste land because some of the villages of these Nyay Panchayat suffer from serious physical problems such as soil erosion, landslide, slopes etc.

While rest areas are recorded 1% to 5% of decrease under culturable waste land. The decreased in land under this category is due to utilization of the land under horticulture, for settlement and other purpose.

#### V. CULTIVATED LAND

The total cultivated land amounts 16,344 hectare (33.45%) in 1971, which rose to 0.39% i.e. 16541 hectare (33.54%) of total area in 2001. Though, Agriculture is the main occupation of the people of study area but still the area under cultivation is very low, the availability of cultivable land itself is the greatest restricting factor on the development of agriculture because being a hilly region it's 70% area is under forest, pasture, the area is rocky, snowy, inaccessible, have steep slope, and lack in irrigation facilities because mainly the area is depended on monsoon and low technological development are some reasons for less area under cultivation.

In Nyay Panchayat the very high percentage (above 40%) are recorded in Bandrani, Saura and Gangori. Though, the percentage is high but land is left fallow for three or five years in these areas to retain moisture.

Areas recorded percentage (between 30% to 40%) are Jibya, Dharkot, Barethi, Khalsi Nakuri, Matli, Pipali, Genvala, Bhatiyara and Badeth. The high percentage of cultivated land in these areas is because they are situated in the fertile valley patches secondly, facilities of irrigation, transport, marketing is available here.

While Tuliya, Chamyari, Harsil, Sald Joshiyada and Mustiksaur of Bhatwari block recorded low percent below 30 % of area under cultivation. Low percentage in Harsil and Sald is because of the steepness of slope, its maximum area is under forest, pasture and rocky and snowy, poor fertility of soil while in Joshiyada and Mustiksaur is because of the urbanization in these areas.

The extent of cultivated area in upper Bhagirathi basin has not shown large change over the past three decades. Being a hilly region not much effort can be taken to increase the area under cultivation but steps can be taken to maintain this land and save it from further decrease.

The increase involved in change (above 5%) is confined to Harsil and Bandrani while Jibya, Chamyari, Pipali, Genvala, Bhatiyara, Saura and Gangori records between 2% to 5% of increase because of improvement in irrigation facilities, utilization of culturable waste land in agriculture.

Whereas decrease varies between 2% to 5% in rest of the Nyay Panchayat. The decrease of agricultural land in these Nyay Panchayat is because of increasing Population, lack fertile soil, migration of people, etc.

## VI. FALLOW LAND

The term fallow is applied to lands not under cultivation at the time of reporting but which have been sown in the past. The duration of period for which land remains fallow viz. current and old fallow lands is grouped together for the present study.

Fallow land occupied 3.94% (1202 hectare) of the total area in 1971 of the study area. The proportion increased marginally to 3.94 % (2310 hectare) in 2001.

Nyay Panchayat wise distribution of fallow land varies from 1% to 8%. Bandrani, Saura, Sald, and Mustiksaur Nyay Panchayat of Bhatwari block records above 5% of land under this category. The percentage of fallow land in Bhatwari block is considerably high, because the land under wheat crop remain uncultivated because of topographic and climatic conditions make it necessary that this land should be left fallow for 3 years for accumulation of soil which is washed away by rain, landslide, soil erosion. While in rest of the Nyay Panchayat below 4% area under fallow land is recorded.

Periodical changes in the proportion of fallow land in the upper Bhagirathi basin are common in all the Nyay Panchayat. Only in Jibya under 1% of increase is recorded. While of the rest Nyay Panchayat are recorded between 1% to 5% of increase under fallow land. Increase in fallow land is because of lack of irrigation, low fertility of, lack of humus due to which land is left fallow during Rabi season for more than two years in higher area.

## VII. HORTICULTURE

The term Horticulture is derived from the Latin word hortus (garden) and cultura (cultivation), which means garden cultivation. Modern horticulture is the science and art of cultivating fruits, vegetables and ornamental plants.

The area under horticulture is continuously increasing from 1,434

hectare in 1971 to 1,761 hectare in 1981 and from 2,785 hectare in 1991 to 3,297 hectare in 2001. Area under its distribution varies from 2% to 19%. Nyay Panchayat Harsil, Bandrani, Gangori, Matli etc. offers a good climatic condition for the development of horticulture.

Harsil, Bandrani and Saura Nyay Panchayat are recorded above 10% area under this category and between 5% to 10% area are recorded in Barethi, Tuliya, Khalsi, Chamyari, Genvala, Bhatiyara and Gangori Nyay Panchayat while rest of the Nyay Panchayat records below 5% area under horticultural.

Increase of 1% to 3% is common but highest increase is recorded in Harsil and Bandrani 11% and 13% respectively because of its favorable climatic condition for fruit cultivation. While rest recorded between 1% to 3% of increase in horticultural land.

## VIII. LAND UNDER OTHER USE

This category includes the land put to other uses rather agriculture like – settlement, roads, dams, etc. The total area occupied by this land use category in 1971 was 3.68% (1906 hectare) that increase to 5.95% (3078 hectare) in 2001 of total land. Its distribution in 2001 varies from 3% to 15%. see fig 2.2(a).

Area under this category is highest in Joshiyada and Mustiksaur because of the development in these areas. These areas are located near the town area, therefore, concentration population is high here and this land is used for settlement, dams (maneri and maneri Bhali) and other administrative building. While in rest of the Nyay Panchayat there is 3% to 10% area under this category.

Study area recorded increase in area under other land throughout the study period. The increase involved in change is high (8%) in Joshiyada and Mustiksaur.

Jibya, Genvala and Saura records under 1% of increase because the village of these Nyay Panchayat namely, Gaursada, Gadthari, Pahi, Sukki, Jhala are at high altitude and inaccessible due to which people migrate from there towards urban area and other. And in rest of the Nyay Panchayat the increase is common between 1% to 4%.

## CONCLUSION

The area under various general land use categories experienced continuous change throughout the study period. The area under forest records decrease of 3%. Culturable waste land has been decreased to utilized under horticulture and agricultural forestry. Because of natural factors and human effort like soil erosion, land slide etc., cutting of trees, cultivation on steep slope the area under non cultivable land has been increased to 4% during the study period.

The cultivated land records increase of 1% Area under horticulture is recorded continuous increase throughout the study period. It was 1,234 hectare in 1971 which rose to 2,785 hectare in 1981, to 2,785 hectare in 1991 and to 3,297 hectare in 2001 because earning from this is ten times more than the earning



from single year cropping. Land under other uses includes roads, settlement, dams, etc., it increases to 4% because of increasing population and development of the area.

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