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LAND USE PATTERN AND ITS SPATIAL DYNAMICS IN HARYANA: A GEOGRAPHICAL ANALYSIS

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ABSTRACT:

Land is a significant determinant of all the productive and economic activities. The study of land use is inevitable in the current scenario of increasing human and animal population and resulting in widening ratio of land to man. State of Haryana is agriculturally prosperous state with fertile soils in most of the area. During 2010-11, the total cultivable area covered 85.36 percent area of the total reporting area in the state followed by land put to non-agricultural land use amounting 13.76 per cent and barren and uncultivable lands 2.38 percent. These figures were 88.21, 8.99 and 1.48 per cent respectively during 1980-81.

Net area sown, fallow lands, permanent pasture and other grazing lands, cultivable waste and land under miscellaneous tree crops and groves accounted for 80.70, 3.14, 0.63, 0.63 and 0.25 percent respectively, during 2010-11 of the total reporting area. It indicates that there is hardly any scope to increase the total cultivable area in future as it has already reached its saturation point.

The present chapter pertains to study land use pattern, and change in the land use pattern over the time in the state. Five major categories of land use such as, net sown area; land not available for cultivation; fallow land; cultivable waste land; and forest land has been analyzed separately. The changing pattern of land use is analyzed for four points of time: starting from the period of 1980-81, 1990-91, 2000-01 and 2010-11 (triennial averages).

INTRODUCTION

All human activities take place on the land. All the man's activities on it and the diverse uses to which land is put to such as industry, agriculture, settlements, etc. are referred as land use. Changes in land use are of great significance as these changes in turn effects the socio-economic and environmental conditions in any region. In the current era of globalization, liberalization and the rise in developmental activities and increasing population pressure on resources, the land use pattern is undergoing through a change at a faster pace.

The use of land resources is fundamental to all discussions on future planning and policies. Therefore for the fair growth of agricultural economy of any region, a study of changes in land use pattern and connected factors is imperative. It will be definitely of great help in locating the imbalances in consumption of land resources and in deciding the course of actions to correct them. Study on land use pattern will also help in the simultaneous growth of crop production, forests and pastures for livestock.

Fertile land including soil, water, associated plants and animals, is the most important resource in Haryana. A large section of the population in state depends directly upon the land resource. All agricultural production, animal and forests production depend on the extent of the productivity of land. Thus, it is a noteworthy determinant of all the productive and economic activities. The total area of the state under cultivation has reached its saturation level and there is barely any scope for bringing any more area under plough. Hence cautious use of land is mandatory in the state.

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Broadly speaking, Haryana has a plain topography, with variations in geomorphology, soils, climate and irrigation facilities, therefore the diversity in land use pattern are obvious. Physiographically, major parts of the state falls within the Indo-Gangetic plain. The major forest covered areas in the state are the Shiwalik Hills in the north. However, a few of the small reserved forests are found near Ambala, Jind, and Hisar districts. The rocky, barren and shrub covered small hills, which form part of Aravalli ranges, are located in the southern part of Haryana mainly in the district of Rewari and Gurgaon. Sand dunes of different scale are also found in the Aeolian plains of south-western Haryana. Most of the waterlogged and salt-affected areas are found in the central belt of the state from south of Karnal to south of Rohtak districts.

The study of land use becomes unavoidable in the current scenario of increasing human and animal population and widening ratio of land to man. Per capita availability of land has been declining in the country as a whole in the wake of increasing population. The pressure of increasing population on land has already resulted in negative impact on the natural resources and eco-system in the state. Thus, this warranted an urgent need to study the change of land use to meet the requirement of the masses.

OBJECTIVES

To analyze spatio-temporal trends in land use pattern in Haryana from 1980-81 to 2010-11.

DATABASE AND METHODOLOGY

Data has been taken from the statistical abstract of Haryana (concerned time period).

- Methodology has been adopted in consonance with basic objective of the study. State has been divided into four homogeneous agro climatic zones. This division has been taken from Economic & Statistical Organisation, Planning Department, Haryana. The state has been divided into following agro climatic zones with districts included.
    1. Northern:- Panchkula, Ambala, Yamunanagar, Kurukshetra, Karnal, Panipat
    2. Central:- Kaithal, Jind, Sonipat, Rohtak, Jhajjar
    3. Southern:- Faridabad, Gurgaon, Rewari, Mahendergarh
    4. Western:- Bhiwani, Hisar, Fatehabad, Sirsa
- At each point of time three yearly average of data on area under individual land use have been taken and used for working out the share in total area
- Chorochromatic maps are used to represent different category of land use.
- The temporal points at which the analysis of cropping pattern are done are 1980-82, 1990-92, 2000-02 and 2010-12.

SPATIO-TEMPORAL CHANGES IN THE LAND USE PATTERN

Land is a significant determinant of all the productive and economic activities. The study of land use is inevitable in the current scenario of increasing human and animal population and resulting in widening ratio of land to man. State of Haryana is agriculturally prosperous state with fertile soils in most of the area. During 2010-11, the total cultivable area covered 85.36 percent area of the total reporting area in the state followed by land put to non-agricultural land use amounting 13.76 per cent and barren and uncultivable lands 2.38 percent. These figures were 88.21, 8.99 and 1.48 per cent respectively during 1980-81.

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Net area sown, fallow lands, permanent pasture and other grazing lands, cultivable waste and land under miscellaneous tree crops and groves accounted for 80.70, 3.14, 0.63, 0.63 and 0.25 percent respectively, during 2010-11 of the total reporting area. It indicates that there is hardly any scope to increase the total cultivable area in future as it has already reached its saturation point.

The different facets of change in diverse land use categories, from 1980-81 to 2010-11 are presented in Table 1.1. It is observed that there is change in cultivatable area, it has declined by -2.86 percent during the period 1980-81 to 2010-11. On the other hand the barren and non-cultivable land registered an increase, with the change registered at 0.97 percent, over the period of thirty years, which may be the result of an increase in salinity/alkalinity and water logging in some districts.

Further from the above Table it is observed that during 1980-81 to 2010-11, the land put to non-agricultural uses has increased significantly i.e. by 3.80 percent. In 1980-81, land put to non-agricultural uses stood at 7.58 percent of the total reporting area and in 2010-11, this figure rose to 11.38 percent. Increase in the area devoted to non agriculture is direct result of urbanization, industrialization and the state government policy to create an industrial state. This change may also be due to decline in the area under cultivable waste, fallow land and forests, which were declining and on the verge of virtual abolition. The further increase in the land for non-agricultural use would definitely lead an encroachment of cultivable area, which is a grave problem as cultivable land is a resource of the state. Therefore rigorous efforts are obligatory to save the cultivable area from being transferred to non-agricultural uses. The only significant progress during 1980-81 to 2010-11, that has been witnessed, was the increase in the area sown more than once i.e. gross cropped area, it increased from 38.17 percent in 1980-81 to 66.84 percent in 2010-11, and resulted in an increase in total cropped area (cropping intensity) by 28.67 percent.

This may predominantly be accredited to the increasing irrigation facilities, use of fertilizers, and introduction of hybrid varieties of seeds and development of scientific dry land technology. Presently, two-thirds of the net sown area of the state is under crops sown more than once. The major land use categories of the state are given below from 1980-81 to 2010-11 (table 1.1).

Table 1.1 Land Use in Haryana: 1980-81 to 2010-11

	Particulars	1980-82		1990-92		2000-02		2010-12		Percent Change
		Area in (000,ha)	Percent Area	Area in (000,ha)	Percent Area	Area in (000,ha)	Percent Area	Area in (000,ha)	Percent Area	
1	Total area according to village paper	4655	100	4381	100	4391	100	4371	100	0.00
2	**Forest**	**130**	**2.79**	**169**	**3.86**	**92**	**2.09**	**39**	**0.90**	**-1.89**
3	Land put to non-agricultural uses	353	7.58	295	6.73	387	8.81	497	11.38	3.80
4	Barren and non-cultivable lands	66	1.41	101	2.31	100	2.27	104	2.38	0.97
5	**Land not available for**	**419**	**8.99**	**396**	**9.03**	**487**	**11.08**	**601**	**13.76**	**4.76**

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	cultivation(3+4)									
6	Land under miscellaneous tree crops & groves not included in net area sown	0	0.00	4	0.08	6	0.14	11	0.25	0.25
7	Permanent pastures and other grazing land	29	0.62	23	0.52	27	0.61	28	0.63	0.02
8	Cultivable waste land	50	1.07	31	0.71	24	0.54	28	0.63	-0.44
9	**Other Uncultivated Land Excluding Fallow Land (6+7+8)**	**79**	**1.69**	**58**	**1.32**	**57**	**1.30**	**66**	**1.52**	**-0.17**
10	**Fallow land**	**171**	**3.68**	**200**	**4.57**	**208**	**4.74**	**137**	**3.14**	**-0.54**
11	**Net sown area**	**3856**	**82.84**	**3559**	**81.23**	**3548**	**80.80**	**3527**	**80.70**	**-2.15**
12	**Total cultivable area(9+10+11)**	**4106**	**88.21**	**3816**	**87.11**	**3813**	**86.83**	**3731**	**85.36**	**-2.86**
13	Area sown more than once	1777	38.17	2155	49.18	2606	59.34	2921	66.84	28.67
14	**Total Cropped Area(10+12)**	**5633**	**121.02**	**5713**	**130.41**	**6154**	**140.14**	**6448**	**147.54**	**26.52**

Source: Statistical Abstract of Haryana (various issues)

The area under forests was 130 thousand hectares which accounted 2.79 percent in 1980-81. But it was remained only 40 thousand hectares which is 0.91 percent of the total reporting area of the state in 2010-12. It shows that despite too much emphasis on forestation, there is hardly any increase in the area under forests since the Green Revolution crops intensification drive. This is the most alarming situation which needs special attention. To maintain ecological balance, the area under forests must be one third of the total area whereas it remains only 0.91percent, which is far below the norms set under the National Forest Policy.

An inspection of the sustained land use changes in the state discloses that a major portion of the land was dedicated to agriculture and the area under agriculture had reached at a stability level and there is very little scope left for further expansion. The wastelands, uncultivable land, pastures and groves had also already declined. The area under forests represents the ecologically most sensitive land cover type. However, in spite of several programs and policies launched by the Government in the field of forestry, the national target seems to be a distant dream to be achieved.

All the major categories of land use of the state are shown in the above table. In this chapter five major land use categories have been discussed, which is as under:

1) Land not available for cultivation
2) Fallow Land

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3) Other Uncultivated Land
4) Forest Land
5) Net Sown Area

(1) LAND NOT AVAILABLE FOR CULTIVATION:

Land not available for cultivation includes area under non agricultural uses and barren and uncultivable land. All land occupied by buildings, roads, railways, water e.g. rivers and canals, land covered by mountains, deserts and so on falls under this category.

In 1980-81, 8.99% of the land fell under this category which was increased to 9.03% in 1990-91 and it further increased to 11.08% in 2000-01. Maintaining the pace of growth the land not available for cultivation reached to 13.76% in 2010-11. In terms of total land it had increased from 419 thousand hectare in 1980-81 to 601 thousand hectare in 2010-11. Within a time frame of thirty years land not available for cultivation increased by 4.76%. This is an indication of increasing pressure on land.

(2) FALLOW LAND

Fallow land includes all the land which had been used for cultivation earlier but was currently out of cultivation. The fallow land further divided in two categories one is current fallow and other fallow land. The main reason to keep the land fallow is poor fertility of the soil, absence or not optimum irrigation facilities, vagaries of monsoon and economic constraints of farmers. In 1980-81, 3.68% of the land was in the category of fallow which increased up to 4.57% in 1990-91 and again increased to 4.74% in 2000-01. But it showed a decreasing trend in 2010-11 and it came down to 3.14%. Overall it showed a -0.54% change from 1980-81 to 2010-11. In the state salinity, alkalinity and the problem of water logging has increased, causing the increase in fallow land.

(3) OTHER UNCULTIVATED LAND

The Wasteland Survey and Reclamation Committee has defined Other Uncultivated Land as that land which was available for cultivation but had not been used for cultivation for some or the other reason. This land was for cultivation in the past but was not being used (cultivated) at present and nor it had been cultivated for last five years or more in succession because of physical, socio-economic and demographic limitations.

The proportion of Other Uncultivated Land showed a decreasing trend and it came down from 1.07% in 1980-81 to 0.63% in 2010-11. Thus showing a -0.44% change over a period of thirty years. The main reason for high shares of Other Uncultivated Land can be attributed to undulating and dissecting topography, soil erosion, occurrence of sand dunes and salinity and alkalinity in the soil in the canal irrigated areas and acquisition of land by government for public purposes.

(4) FOREST LAND

This category of land use includes all areas that are actually under forests whether state owned or privately owned and classed and administered as forests under any given legal enactment dealing with the forests. Besides the forests the area along roads, railways, Canals and social forestry is also included in this category.

Forest area is continuously on decline and from 2.79% in 1980-81 it came down to 0.90% in 2010-11, posing a threat to the sustainable development and ecological balance of the state. The decline is witnessed in almost all the districts of the state. Forest land has been used for

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industrial, residential and commercial purposes to meet the demand of ever increasing population.

(5) NET SOWN AREA

Net sown area refers to that part of the cultivated land on which sowing is actually done at least once during a year. It is an important indicator of the level of agricultural development and agricultural production. Net sown area accounted for 84.84% in 1980-81 to 80.70% in 2010-11. It has declined marginally with -2.15% change in period of thirty years i.e. from 1980-81 to 2011-12.

It has been observed that net sown area has come to a saturation level in the state where any further increase can't be visualized in the present scenario. Because of the expansion of the urban area and industrial development more and more agricultural area has been brought under the construction work, human settlement and other non agricultural uses. The phase of 1980-81 was when green revolution was on its boom and agriculture had reached to its zenith in this era. After that coming to saturation level net sown area did not show any further progress.

High proportion of net sown area in some districts can be attributed to the fertile lands, developed irrigation facilities, economic well being of farmers, use of fertilizers, HYV seeds and mechanization of agriculture. Low proportion of net sown area in some districts can be ascribed to rugged terrain, poor soils, absence of canal water, poor quality of ground water and land put to non agricultural purposes.

ZONE-WISE ANALYSIS OF CHANGE IN LAND USE PATTERN; (1980-81 T0 2010-11)

For analyzing the land use pattern on the zonal basis and to find out the regional disparities in various land use categories in the state, a detailed analysis from 1980-81 to 2010-11 has been done. Study period has been divided on the decennial basis i.e. 1980-81, 1990-91, 2000-01 to 2010-11. Triennium averages has been taken at each point of enquiry level.

SPATIO-TEMPORAL TRENDS IN LAND NOT AVAILABLE FOR CULTIVATION

In 1980-81, land not available for cultivation is recorded at 9.5% for the total geographical area of the state. Southern agro-climatic zone has maximum area under this category with 14.42% and central agro-climatic zone has least area under this category. Southern agro-climatic zone is less developed agriculturally, where as central agro-climatic zone is agriculturally more developed and having fertile lands as compared to southern agro-climatic zone. Inter-district variation is no less significant if we have the glance at the table of 1980-81. This can be observed that it varied from 18.72% in Ambala to 5.56% in Jind. Districts of Gurgaon, Faridabad and Mahendergarh recorded 16.04%, 13.24% and 13.81% of their area respectively. While district Hisar, Sirsa, Bhiwani in southern agro-climatic zone, Karnal, Kurukshetra in northern agro-climatic zone and Rohtak in central agro-climatic zone recorded less than 10% of their area under this category.

Coming to the next decade i.e. 1990-91, District Karnal, Faridabad, Gurgaon, Rewari and Mahendergarh accounted for 15.33%, 20.19%, 20.19%, 15.09%, 12.66% and 12.89% of their area under land not available for cultivation category respectively. While district Ambala, Kurukshetra, Kaithal, Panipat, Sonepat, Rohtak, Jind, Hisar and Sirsa accounted for 5.04%, 9.06%, 6.28%, 6.98% 9.74%, 5.99%, 7.45%, 8.00% and 2.11% respectively. In 1990-91, Gurgaon, Sirsa, Hisar and Jind were having 13.64%, 13.23%, 7.42% and 6.18% respectively which was far more than the state average of 4.85%. In 2000-01, District Ambala,

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Panchkula, Yamunanagar, Panipat, Faridabad and Gurgaon fell in the category of high proportion of land under not available for cultivation category (Fig. 1.1). While districts Rohtak, Bhiwani, Jind, Hisar, Fatehabad and Sirsa showed the similar trends as of the previous decade.

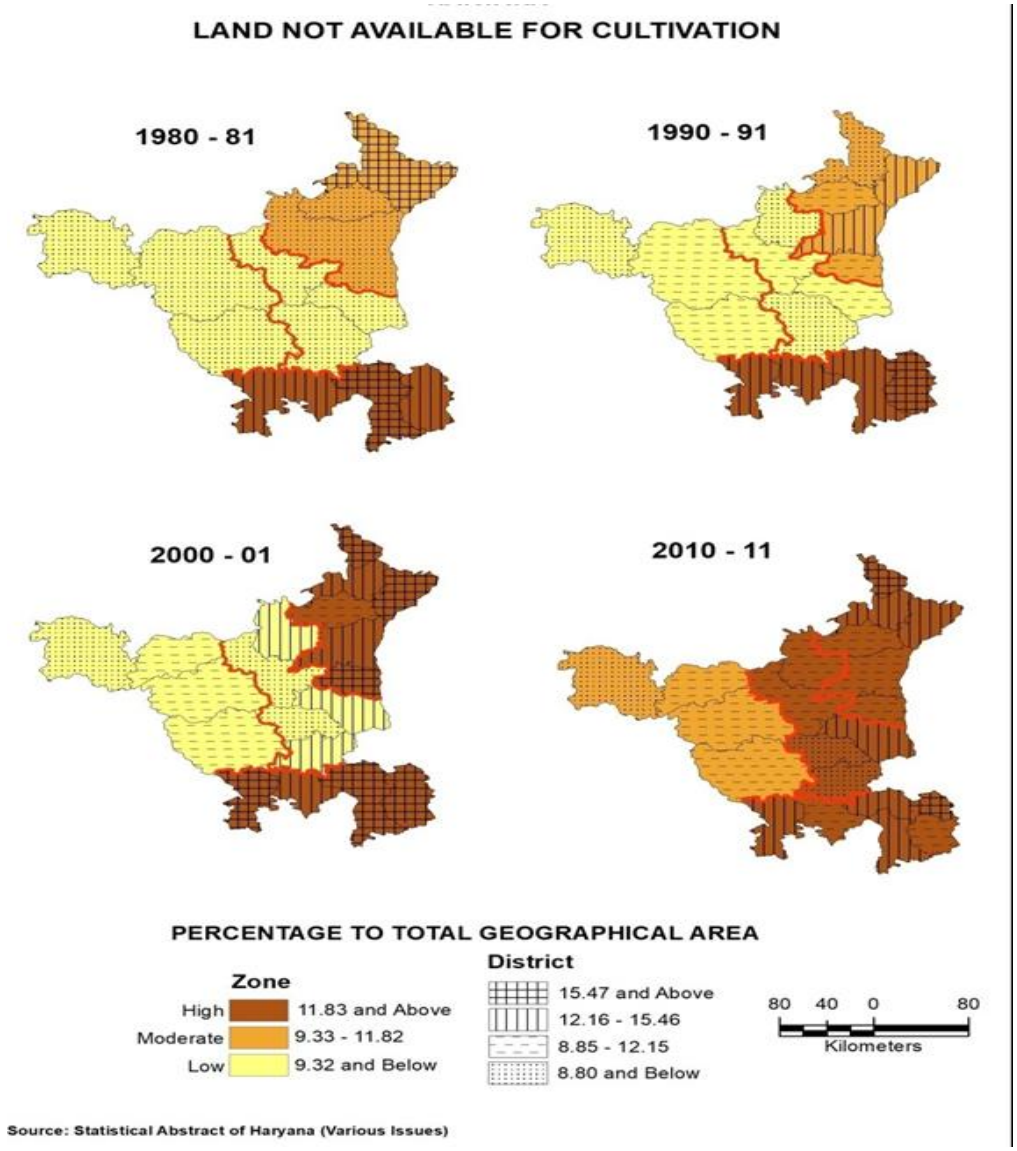

Fig. 1.1

Coming to 2010-11, all the districts except Sirsa, Rohtak, Jhajjar and Kurukshetra showed the tremendous increase under the category land not available for cultivation. District Faridabad noticed a whopping 50.46% of its area not available for cultivation followed by Panchkula (38.46%) and Gurgaon (27.65%). Various developmental activities are being carried in these districts including construction work, multinational companies and an attraction for foreign investment.

SPATIO-TEMPORAL TRENDS IN FALLOW LAND

If we have a look at the fallow land in 1980-81, the percentage for the state stood at 3.89% and among districts, Gurgaon showed the highest percent share of fallow land i.e. 14.72% while district Sirsa stood at the lowest level with 0.16% area under fallow land category. Southern agro-climatic zone was having maximum area and northern agro-climatic zone was

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having minimum area under the fallow category. Districts Bhiwani, Hisar, Sonipat and Jind were having more than 3.5% area under the fallow land category. District Faridabad, Kurukshetra, Karnal, Panipat were having less than 1% of their land area under this fallow category.In 1990-91, the total percentage of the fallow land increased in the state and western agro-climatic zone had the maximum area under the fallow category. Area under the fallow category in the northern agro-climatic zone further declined and observed less than one prcent area under the fallow land. In 2000-01, state average was 4.74% and it decreased a little from the previous decade. Western agro-climatic zone has the maximum percent area in the fallow category and while least percentage of fallow land was recorded in central agro-climatic zone. District Sirsa, Hisar, Jind, Gurgaon and Panchkula were all above the state average. District Faridabad, Kurukshetra, Karnal, Panipat were still having less than 1% of their land area under this fallow category (Fig. 1.2).

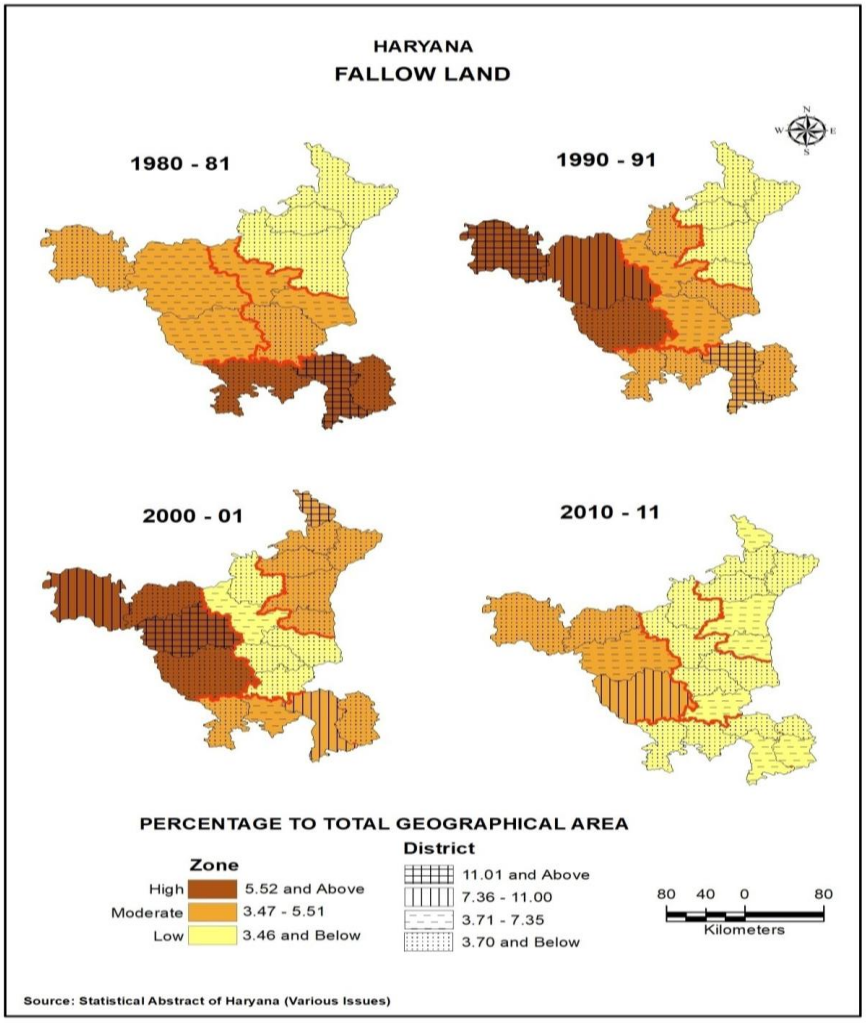

Fig. 1.2

In 2010-11, state average further declined from the previous decade and it came down to 3.08%. Again western agro-climatic zone has maximum and central agro-climatic zone has minimum percentage of area under fallow land. Among districts, Hisar, Bhiwani, Mewat, Jhajjar, Panipat, Karnal and Panchkula recorded more area under fallow category than the state average. Decreasing ratio of fallow land definitely points towards the intensification of agriculture in the state.

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SPATIO-TEMPORAL TRENDS IN OTHER UNCULTIVATED LAND

In 1980-81, 1.79% of the total area of the sate was reported as other uncultivated land. Central agro-climatic zone has the maximum area under this category (2.29%) followed by northern agro-climatic zone (1.86%). Notable change of spatial variation in the district has also been observed in other uncultivated land. It varied from 5.76% in Faridabad to less than 1% in Bhiwani, Hisar and Sirsa district. In 1990-91, state average of the other uncultivated land stood at 3.87% which was higher than the previous decade. In central agro-climatic zone maximum percentage (2.29%) was recorded followed by northern agro-climatic zone (1.86%). Spatio-temporal variation has been observed in the proportion of other uncultivated land in 1990-91 as well and Faridabad came down to less than 1% (table, 1.1). Highest proportion was observed by Panipat (4.98%) followed by Rohtak (3.37%) in this decade. And in 2000-01, western agro-climatic zone observed a drastic decline in the other uncultivated area and it disappeared from the zone. Central agro-climatic zone and northern agro-climatic zone this time too excelled in the category of other uncultivated land. Among district Rohtak, Jhajjar and Karnal showed an increase. In 2010-11, share of other uncultivated land to the total geographical area stood at 1.50%, registering a decline of -0.28% since 1980-81, northern agro-climatic zone recorded maximum percentage (2.91%) of area under this category where as western agro-climatic zone in this decade too registered an absence of this category. Among districts, Panchkula jumped to 10.65% where as Rohtak also showed a double increase in the other uncultivated land with 8.57% area under the said category. Districts of Jhajjar, Karnal and Panipat also showed values more than double of the state's average (Fig. 1.3).

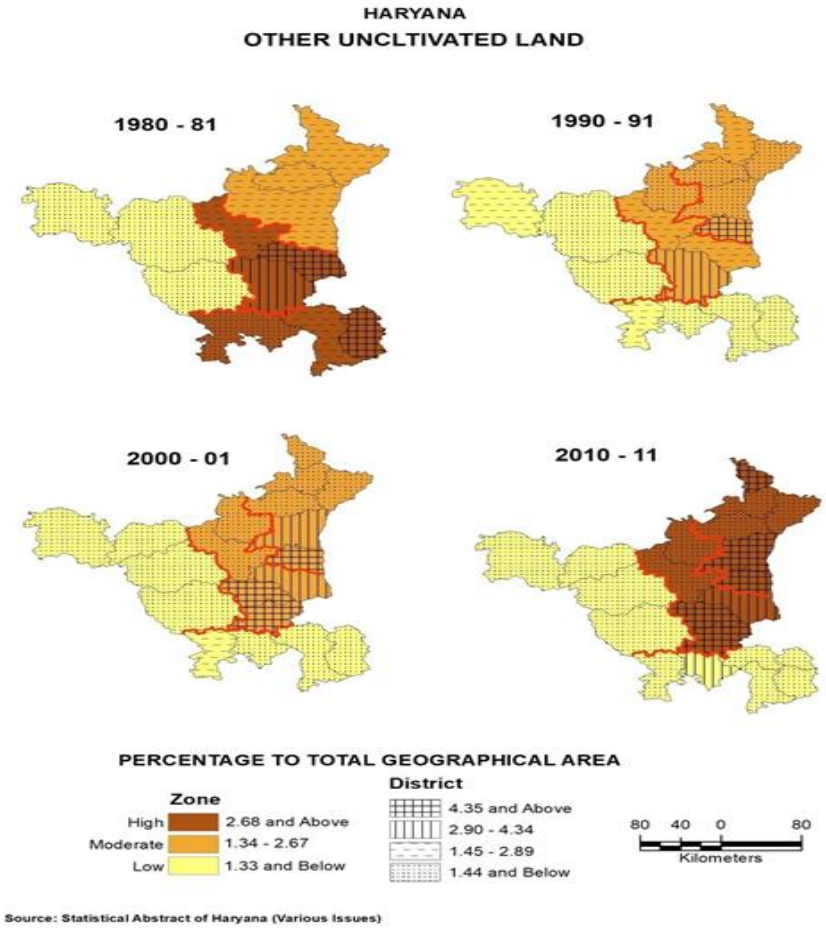

Fig. 1.3

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Although share of other uncultivated land in the state is very minimal but the declining ratio of this category certainly points towards the changing agrarian structure in the state.

SPATIO-TEMPORAL TRENDS IN FOREST AREA

The forest area stood at 2.95% of the total geographical area in the state in 1980-81. If we analyze the forest area in the state, it can be inferred that northern agro-climatic zone has maximum area under forests in 1980-81, and western agro-climatic zone has least area under forests (1.48%), southern agro-climatic zone and central agro-climatic zone have almost similar area under forests to their total geographical area, 2.75% and 2.50% respectively. Among districts, Ambala in the northern agro-climatic zone has maximum area under forests and Hisar in the western agro-climatic zone has least area under forests. In 1990-91, percent of forest area increased in the state and the same was recorded at 3.87% to the total geographical area (table, 1.1). In this decade too northern agro-climatic zone recorded maximum area under forests. District Ambala and Panchkula recorded maximum area under forests; this is due to the sub-tropical location of these districts, vicinity to hills and high rainfall. In 2000-01 and 2010-11, forests area declined in the state (Fig. 1.4).

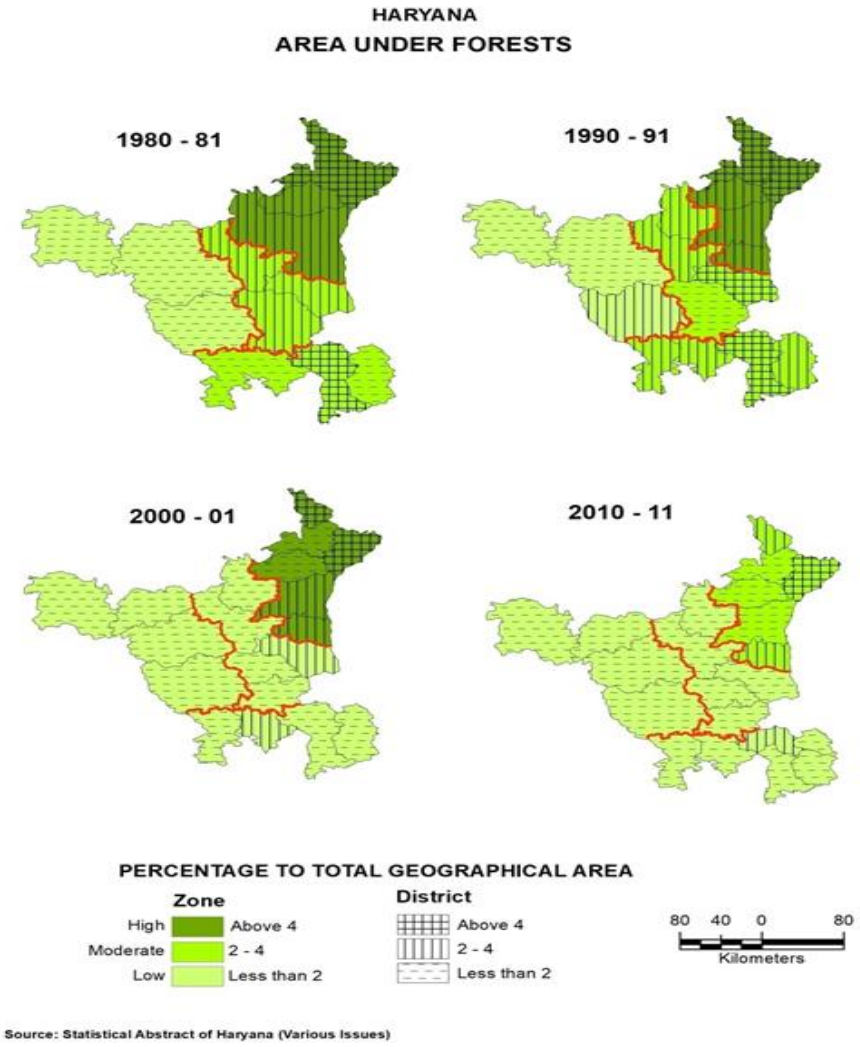

Fig. 1.4

It is recorded at 2.09% and 0.90% respectively. In 2010-11, forests area declined in all the zones drastically. This is due to the fact that there is always an increasing demand to bring more and more land under cultivation and further in the wake of industrialization and

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increasing commercialization, there is heavy pressure on the natural resources in the state. An overall decline of -2.05% in the forest area is recorded in the state.

SPATIO-TEMPORAL TRENDS IN NET SOWN AREA

Net sown area in the state has remained almost static since 1980-81, with a slight decline of -1.13% over the period of thirty years. In 1980-81, net area sown in the state was 81.87% of the total reporting area. More than eighty percent area under plough in the state definitely points towards the agrarian culture in the state. If we have a look at the table of 1980-81, we can observe the inter-zonal disparities in the net sown area, Western agro-climatic zone has the maximum net sown area where as southern agro-climatic zone has the least net sown area in the state. Southern agro-climatic zone of the state with districts of Faridabad, Gurgaon, Mewat, Palwal and Rewari, is a rainfall deficient zone with comparatively less developed irrigation and less fertile soils. This zone is commercially and industrially developed zone of the state. Northern agro-climatic zone of the sate comprising the districts of Karnal, Kurukshetra, Ambala, Panchkula and Yamuna Nagar have the advantage of fresh groundwater, more rainfall and fertile soils in addition of enthusiastic farmers. There are disparities among districts as well, whereas district Sirsa has 93.13% area under net sown category. District Gurgaon had 62.97% area under net sown category (table, 1.1).

In 1990-91, state average for the net sown area was 80.83%. Central agro-climatic zone, comprising the districts of Rohtak, Jhajjar, Sonepat, Kaithal and Jind stood first among the state with 84.08% of the area under plough. Southern agro-climatic zone in this decade too remained at the bottom. Among districts, ten districts showed more than the state average v.i.z. Kurukshetra, Karnal, Kaithal, Panipat, Rohtak, Rewari Bhiwani Jind ,Hisar And Sirsa, six districts stood at less than state's average (Fig. 1.5).

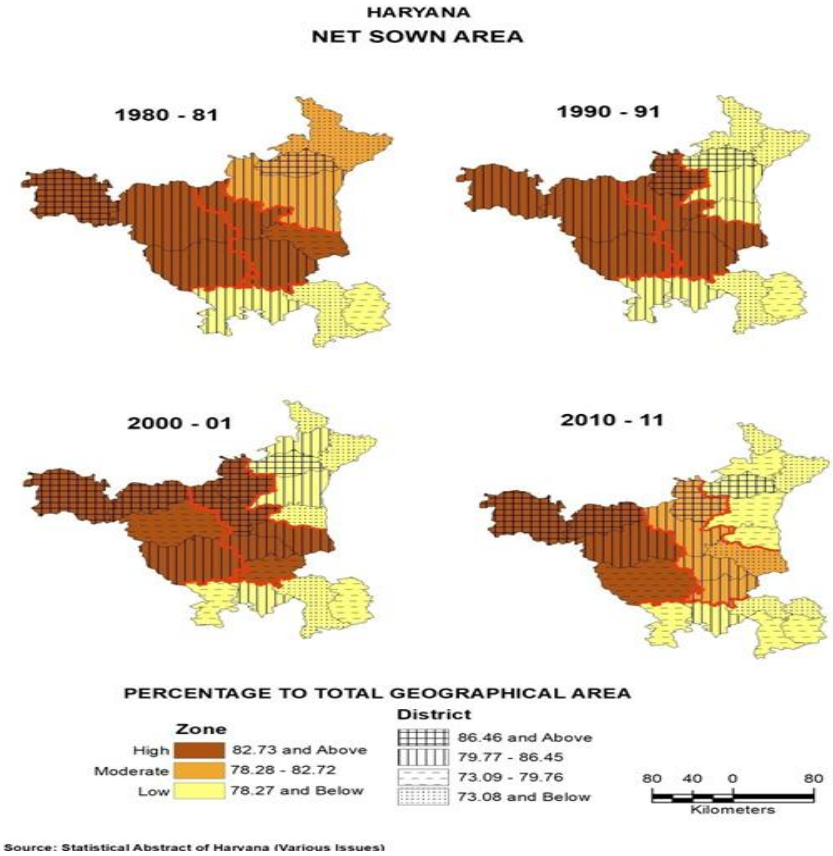

Fig. 1.5

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District Gurgaon was lowest with 65.09% net sown area. Though net sown area showed mixed results as compared to previous decade. It declined in Karnal, Jind, Sirsa, Hisar and increased in many districts in comparison with the previous decade. Western agro-climatic zone registered a decline in this decade.

In 2000-01, net sown area for the state was recorded 80.80%. and remained more or less static in comparison with previous decade (80.83%). It marginally declined in northern and central agro-climatic zone whereas marginally increased in southern and western agro-climatic zone. Among districts it varied from 88.84% in Kurukshetra to as low as 39.06% in Panchkula. Eleven districts stood at more than state average.

In 2010-11, net sown area further came down to 80.74% for the state. Central and southern agro-climatic zone registered a marginal decline, where as northern and western agro-climatic zone registered a marginal increase in the net sown area. Among districts it varied from 92.49% in Sirsa to 43.75% in Panchkula. Eight districts fell in the category of more than the state average. Overall a decline of -1.1% has been recorded in the net sown area in the state.

CONCLUSION:

It has been concluded that there were great variations in land use pattern in different land use categories in the state over a period of thirty years. The total cultivable area decreased by -2.86% change, net sown area decreased by -1.13%, land not available for cultivation increased by 4.27%, decrease in forest cover to no one's surprise is by -2.05%, fallow land also decreased by -0.81% and other uncultivated land decreased by -0.28%. It could be inferred from the above information that agriculture has come to a saturation point in the state and there is hardly any scope to increase the cultivable area in future because the state is now showing a simultaneous continuous progress in the sphere of infrastructure and industrial development. Though we cannot deny the inter-zonal and intra-zonal disparities in all the land use categories which could be attributed to a manifold of natural and anthropogenic factors. The above description suggests a noticeable inter-district disparity in the percentage of land not available for cultivation. One of the main reasons attributed to higher proportion of land not available for cultivation is the development of the industrial areas in some districts of the state namely, Panchkula, Ambala, Sonepat, Panipat, Gurgaon and Faridabad districts which caused an increase in percentage of land in this category. Secondly, expansion in urban places in these districts also resulted in high proportion of land not available for cultivation. The low proportion of land under non agricultural use can be attributed to the fertility of land. The favorable conditions for agriculture encouraged these districts to opt out for intensive agriculture and the land under settlements and industries is also less in these districts.

Inter-zonal and intra-zonal disparities are also noticed in the fallow land category and temporal changes also been observed among districts. The main reason for high proportion of fallow land in Bhiwani, Hisar, and Mewat districts is due to incidence of sand dunes and uneven relief. Whereas in Sonipat, Panipat, Rohtak and Jhajjar districts water logging is a probable reason for this responsible. In Panchkula rocky hills and industrial development is the reason which account for high share of fallow land. In some districts such as Yamunanagar, Kurukshetra, Kaithal, Sonipat, no fallow land is found because most of the current fallow again brought under cultivation through soil reclamation and with enhanced irrigation facilities and mechanization. While in district Gurgaon most of the area was brought under residential and industrial use.

This is quite evident from the agricultural statistics of Haryana that now state has arrived in a situation of stabilized agriculture and now to break the ice an innovative technology is

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required. The kind of revolution that happened in 1960s is now needed again in the state, with a more comprehensive approach, keeping in view the sustainability of environment.

Irrigation plays an important role in increasing cropping intensity, changes in cropping pattern and enhancing crop yield due to its complementarity with improved varieties and fertilizer use. It is quite evident that the scope for expansion of net sown area is more or less exhausted, availability of irrigation is fast approaching the physical, ecological and economic limit, and depletion of groundwater resources due to over exploitation is serious. Therefore it is important to focus on rainfed areas, where there is considerable scope for increasing productivity through soil and water conservation measures. It would also address the issue of growing disparities between irrigated and rainfed areas.

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