

Spatial-Temporal Change in Land Use Pattern in Haryana

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ABSTRACT

Study of land use pattern has played an important role to find out the past use of land and its future trend. It also reflects the socio-cultural and economic development of the people of an area. The progress of an area can be measured to a certain extent by the way in which its land used and maintained. The present study is an attempt to analyse the changes in land use pattern in Haryana. For the present study data of 1991-92 and 2011-12 have been used. The changes have been examined in term of change in percentage share of land use categories in total area of the state. The present study reveals that the total geographical area of the forest cover in Haryana has declined from 3.88 percent in 1991-92 to 0.90 percent in 2011-12, a decrease by 2.98 percent. Proportion of fallow land to total area has declined from 5.06 per cent in 1991-92 to 3.01 per cent in 2011-12, net sown area decreased from 80.49 per cent to 80.41 per cent respectively. On the other hand the land not available for cultivation includes land put to non-agricultural uses, barren and uncultivated land has increased from 9.14 percent in 1991-92 to 14.28 percent in 2011-12. The changes in land use pattern in various agro climatic zones have also been identified.

1. Introduction

Land use means the utilization of land by man for doing different functions. Land and its use are the basis for survival of mankind. Since the beginning of civilization, agricultural land use one of the primary uses of land. There is variability in the land use pattern at different places. Because there are various physical and climatic factors which control the land use pattern of different areas. Human and economic elements also play an important role in deciding the land use pattern of the areas. This reveals that the agricultural land use patterns are the result of interaction between natural conditions and human circumstances. Due to these factors the land use is changes over space and time.

In geographical study, it is important to study the changing land use pattern, because that reflects the socio-cultural and economic development of the people of an area. The study of land use also enables us to find out the past use of land and its future trend. Land use is an important aspect of geographical studies and the progress of an area can be measured to a certain extent by the way in which its land used and maintained (Rao, 1986). To analysis the relationship between the land and man, it is essential to analyse the changes in land use. The intensive use of land depends upon the population concentration, economic prosperity through better agricultural production, human establishments, industrial location and communication and transportation system, while extensive use of land is related to sparse population, dispersed settlement and crude form of transport. At present, the population is increasing at a faster rate so more land is put under cultivation to fulfill the demand of food. India is one of those countries where agriculture dominates landscape. In Haryana one of India states also the same situation, where agriculture dominates landscape. There are variations in land use pattern at district level in Haryana. That is why there is a need to analyse the land use pattern at district level in the state.

2. Objectives of the Study

The present study is undertaken with the following objectives-

- To study the existing pattern of land use over the space.
- To examine the inter-district variations in land use pattern in the state.
- To analyse the spatial-temporal change in land use pattern in various agro climatic zones of the state.
- Find out the reasons responsible for changes in land use pattern.

3. Database and Methodology

Database

The present research work is based on secondary data. The secondary data has been collected from Statistical abstract of Haryana, Government of Haryana.

Methodology

In the present research work percentage method has been used and the changes have been examined in term of change in percentage share of land use categories in total area of the state during 1991-92 and 2011-12. The data will be examined for the state at the level of districts. To avoid anomalies created by year to year fluctuations in weather, data for three successive years at any point of time will be used in the present research work.

In different agro climatic zones of Haryana also there are variations in land use pattern. That is why, the study of land use pattern has been done separately in four agro climatic zones of the state.

Economic and Statistical Organization, Planning Department Haryana, (2007) has divided the state into four

agro climatic zones. An agro-climatic zone is a land unit uniform in respect of climate and length of growing period which is climatically suitable for a certain range of crops and cultivators (FAO, 1983). Haryana has been divided into four following agro climatic zones:

1. **Northern Zone**-Panchkula, Ambala, Yamunanagar, Kurukshetra, Karnal and Panipat districts.
2. **Central Zone**- Kaithal, Jind, Sonapat, Rohtak and Jhajjar districts.
3. **Western Zone**-Bhiwani, Hisar, Fatehabad and Sirsa districts.
4. **Southern Zone**- Faridabad, Gurugram, Palwal, Nuh, Rewari and Mahendragarh districts.

4. Spatial-Temporal Change in Land-Use Pattern in Haryana

There are five major land use categories such as- net sown area, land not available for cultivation, fallow land, cultivable waste land and forest land, has used in the study to find out the spatial change.

Census of India has classified land utilization in nine different categories. In order to find out the spatial change in

land use pattern in the four agro climatic zones, the nine categories are merged into five major land use categories as the merged categories were having negligible change. These five land use categories according to their percent share of occupied area are as follows:

- I. Forest land
- II. Land not available for cultivation
- III. Other uncultivated land excluding fallow lands
- IV. Fallow land
- V. Net sown area

In the state there are changes in land use pattern spatially and temporally. These changes have been examined in term of changes in percentage share of different land use categories in total reported area during 1991-92 and 2011-12. The land use pattern of the study area reveals that there has a change in land use pattern during the time period. The total geographical area of the forest cover in Haryana has declined from 3.88 percent in 1991-92 to 0.90 percent in 2014-15, a decrease by 2.98 percent (table 1). The area under forest had decreased because of Increase in population, and to feed the growing population there has been a need to increase in cropped area.

Table 1
Haryana: Area under different land use (1991-92 and 2011-12)

Land use Categories and Sub Categories	1991-92		2011-12		Percent change
	Area in (000, ha)	Percent area	Area in (000, ha)	Percent area	
Total area according to village paper	4379.67	100	4370.67	100	0.00
Forest	170	3.88	39.33	0.90	-2.98
Land put to non-agricultural uses	305.33	6.97	521.33	11.93	4.96
Barren and non-cultivable lands	95	2.17	103.00	2.36	0.19
Land not available for cultivation	400.33	9.14	624.33	14.28	5.14
Land under miscellaneous tree crops & groves not included in net area sown	4	0.09	8.00	0.18	0.09
Permanent pastures and other grazing land	26.33	0.60	26.67	0.61	0.01
Cultivable but barren land	32.33	0.74	26.67	0.61	-0.13
Other uncultivated land excluding fallow lands	62.67	1.43	61.33	1.40	-0.03
Fallow land	221.67	5.06	131.67	3.01	-2.05
Net sown area	3525.00	80.49	3514.67	80.41	-0.07
Total cultivable area	3809.333	86.98	3681.33	84.23	-2.75
Total Cropped Area	5780.67	131.99	6456.67	147.73	15.74

Source: Statistical Abstract of Haryana 1990-92 and 2010-12

Haryana: Area under different land use (1991-92 and 2011-12)

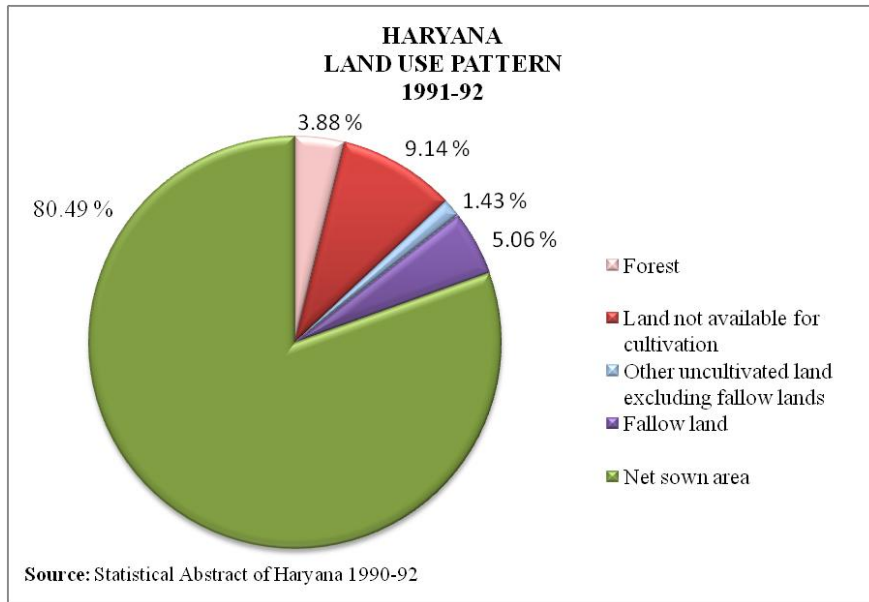


Fig. 1

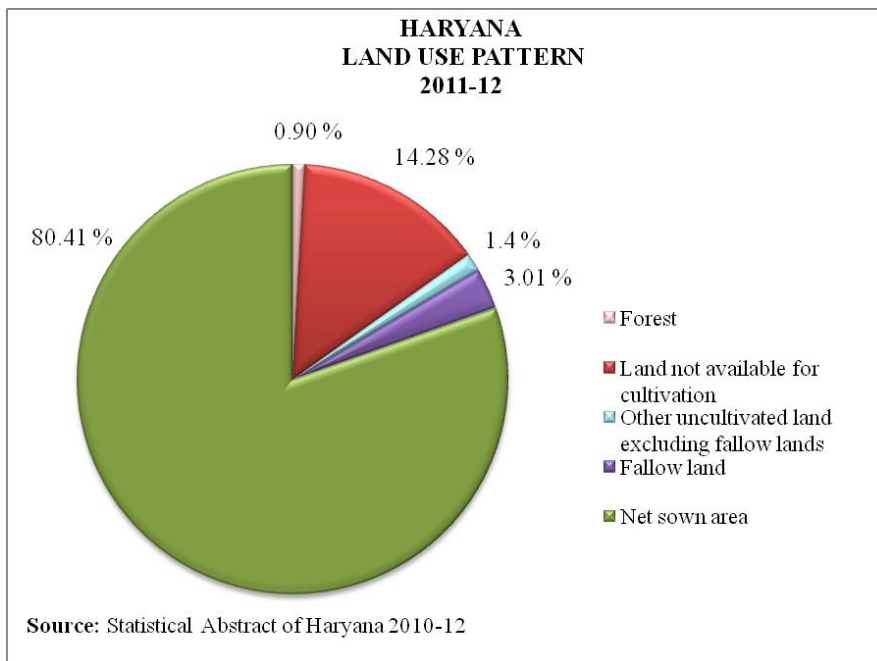


Fig. 2

The land not available for cultivation includes land put to non-agricultural uses, barren and uncultivated land which was recorded 9.14 percent in 1991-92 and increased to 14.28 percent in 2011-12 (fig. 1, 2). The state has only 0.09 per cent in 1991-92; it is increased to 0.18 per cent in 2011-12 of the land under miscellaneous tree crops and groves. The area under permanent pastures and grazing land was 0.60 per cent in 1991-92 this percent share was 0.61 per cent in 2011-12. It means that there is a slightly increase in area under permanent pastures and grazing land. Cultivable waste land was recorded as 0.74 per cent of the area in 1991-92 which was declined to 0.61 per cent in 2011-12. The share of fallow land has declined from 5.06 percent in 1991-92 to 3.01 percent in 2011-12 that is happen because of the pressure of population, the fallow land has been gradually converted into agricultural land. It is observed from the table 2 that the total reporting area of the net

sown area has decreased from 80.49 per cent in 1991-92 to 80.41 per cent in 2011-12.

5. Spatial-Temporal Analysis of Land Use at District Level in Haryana State

There are variations in land use pattern at district level in Haryana. That is why there is a need to analyse the land use at district level in the state. The five land use categories according to their percent share of occupied area are as follows:

- I. Forest land
- II. Land not available for cultivation
- III. Other uncultivated land excluding fallow lands
- IV. Fallow land
- V. Net sown are

Forest land

Area under forests includes all actually forested areas or administered as forests under any legal enactment dealing with forests whether state owned or private. Besides the forests, the area along roads, railways, canals and social forestry is also included in this category. In the present study there is a decrease in the forest cover during 1991-92 to 2011-12 (fig. 3, 4). The area under forests was 170 thousand hectares which

accounted 3.88percent in 1991-92. But it was remained only 39.33 thousand hectares which is 0.90percent of the total reporting area of the state in 2011-12. It is observed that of the total geographical area of the forest cover in Haryana has declined from 3.88 percent in 1991-92 to 0.90 percent in 2011-12, a decrease by 2.98 percent (table 2, 3).

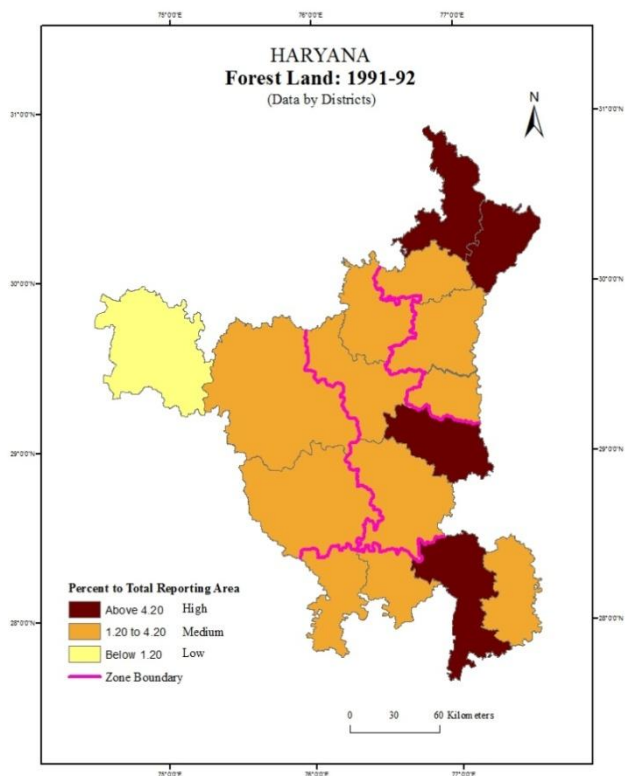


Fig-3

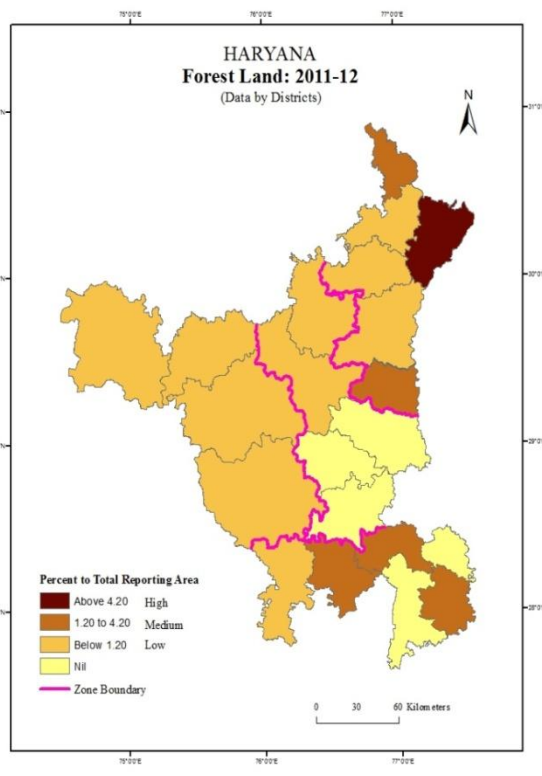


Fig-4

The area under forest had decreased because of increase in population, and to feed the growing population there has been a need to increase in cropped area. That is why the area under forest converted into agricultural land. Furthermore the accelerated industrial development and conversion of forest land in to residence area are also the factors which are responsible for the decline in the forest area.

This small proportion of area under forests also showed considerable spatial variation in districts. The highest and

lowest proportion of area under forest in 2011-12 was found in Yamunanagar district in northern agro climatic zone with 8.53 per cent and Fatehabad district in western agro climatic zone with 0.13 percent. While in 1991-92, the highest and lowest proportion of area under forest was found in Ambala district in northern agro climatic zone with 21.09 percent and lowest in Sirsa district with 1.17 percent. Maximum share of forest was found in these areas because of the topography of the areas, which is suitable for forests.

Table 2: Haryana land use pattern, 1991-92

Districts/Agro climatic zones	Forest	Land not available for cultivation	Other uncultivated land excluding Fallow Land	Fallow land	Net sown area
	Percent to Total Reporting Area				
Ambala	21.09	4.47	1.60	3.04	69.81
Yamunanagar	13.69	12.74	1.14	1.71	70.72
Kurukshetra	2.66	9.02	1.23	0.00	87.09
Karnal	3.22	15.23	1.02	0.29	80.23
Panipat	3.27	8.64	5.37	1.64	81.07
Northern	9.20	10.18	1.89	1.34	77.39
Kaithal	3.12	6.52	0.85	0.00	89.50
Sonipat	4.26	10.11	2.66	2.84	80.14

Rohtak	2.08	6.50	3.38	3.30	84.30
Jind	2.53	7.72	1.21	7.24	81.30
Central	2.80	7.44	2.15	3.51	83.94
Faridabad	3.04	20.03	0.96	0.80	75.16
Gurugram	5.33	15.27	0.73	13.94	64.73
Rewari	2.80	11.85	1.29	1.72	82.33
Mahendragarh	2.92	13.06	2.23	1.55	80.24
Southern	3.73	15.31	1.24	5.49	74.23
Bhiwani	2.05	8.76	0.00	3.24	85.95
Hisar	1.53	7.98	0.00	8.02	82.47
Sirsa	1.17	1.48	2.73	13.11	81.50
Western	1.57	6.40	0.75	8.12	83.15
Haryana	3.88	9.14	1.43	5.06	80.49

Source: Statistical Abstract of Haryana 1990-92.

Land not Available for Cultivation

The land not available for cultivation includes land put to non-agricultural uses, barren and uncultivated land. During 2011-12, the proportion of land not available for cultivation in the state was 14.28 percent on the other hand this proportion was 9.14 percent during 1991-92. It is observed that of the total geographical area of the land not available for cultivation has increased by 5.14 percent. In terms of the total land it had

increased from 400.33 thousand hectares in 1991-92 to 624.33 thousand hectares in 2011-12 (table 2, 3). The reasons responsible for increase in the proportion of land not available for cultivation are the developments of industrial areas, expansion in the area of urban places. The changes are also due to the developmental measures undertaken by the government for construction of national highway two lanes to four lane, government buildings, etc.

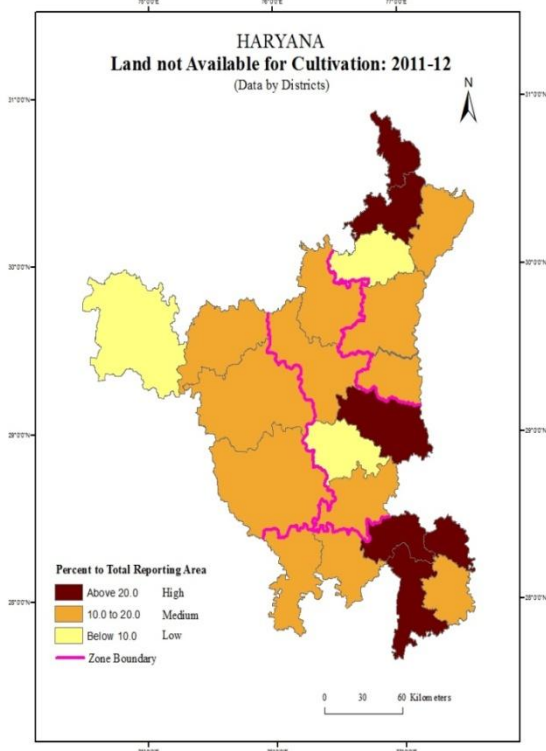


Fig-5

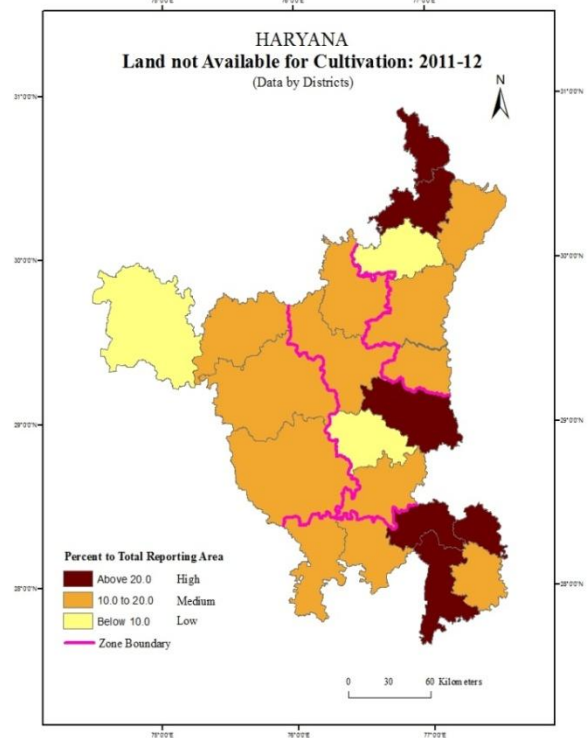


Fig-6

The spatial distribution of land not available for cultivation showed variations in the districts of the state. The higher proportion of this category was found in the southern agro

climatic zone districts i.e., Faridabad with 53.24 percent followed by Gurugram as 28.33 per cent while, the lower in Sirsa in western agro climatic zone with 5.38 per cent followed

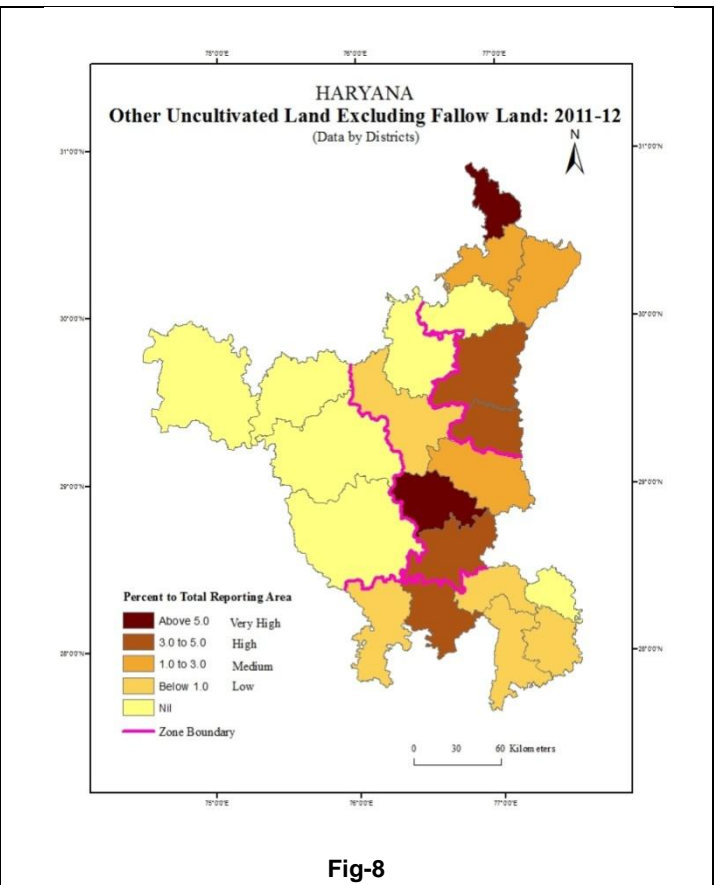
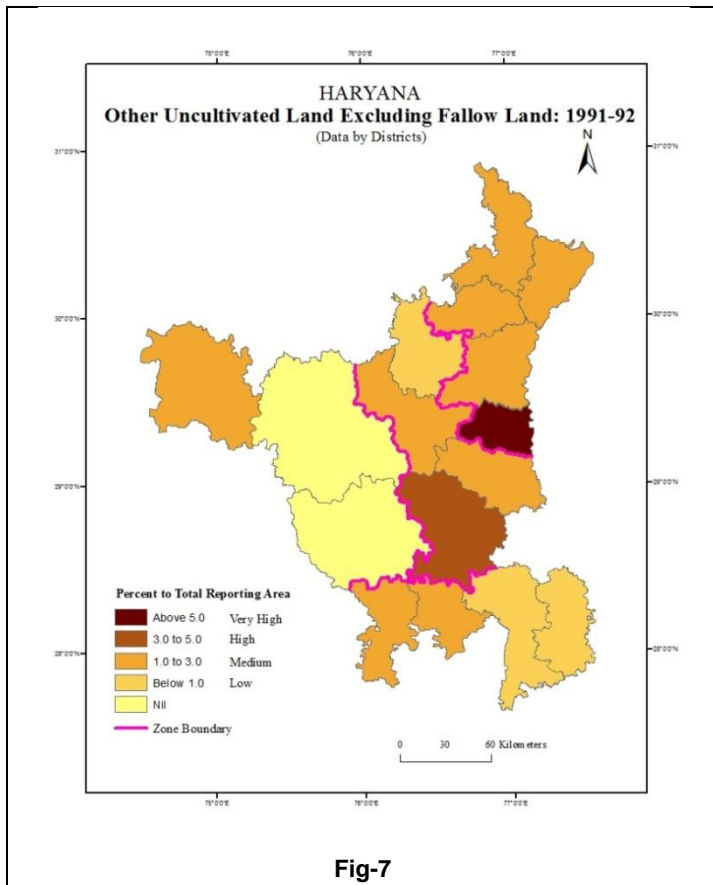
by Rohtakin central agro climatic zone during the period of 2011-12 (fig. 5). In 1991-92, the higher share of this category was found in Faridabad district with 20.03percent, whereas lowest in Sirsa district (fig. 6).

The low share of this category was found in these districts because of the suitability of land for agriculture also the land under settlements and industries is less in these districts. In Sirsa there is an increase in irrigation facilities due to this more area of the district came under cultivation.

Other uncultivated land excluding fallow land

The area under other uncultivated land excluding fallow land includes Land under miscellaneous tree crops and groves not included in net sown area, permanent pastures and other

grazing land and cultivable waste land. The state has only 0.09 per cent in 1991-92; it is increased to 0.18 percent in 2011-12 of the land under miscellaneous tree crops and groves which includes land under useful trees, thatching grasses, bamboo bushes and other groves for fuel, orchards around the homestead etc. It is observed that this category of land has been increasing gradually. That is happened because of the pressure of population. The people of the state cultivate miscellaneous tree crops for survival on the one hand and for increase of family income on another. The area under permanent pastures and grazing land was 0.60 Percent in 1991-92 this percent share was 0.61 percent in 2011-12 (table 2, 3). It means that there is a minor percent change in area under permanent pastures and grazing land.



Cultivable waste land includes land available for cultivation, but not cultivated during the current year and the last five years for one reason or the other. Such lands may be fallow converted with shrubs and jungles. Cultivable waste land was recorded as 0.74 percent in 1991-92 and it was declined to 0.61 percent in 2011-12 of the total geographical area of the state. There are spatial variation in the districts has also been identified in cultivable waste land. It varied from 0.19 percent in Yamunanagar district to 2.86 percent in Rohtak district of

western agro climatic zone in 1991-92, whereas during 2011-12 it varied from 0.31 percent in Sonapat district to 5.31 percent in Rohtak district of central agro climatic zone (fig. 7, 8). The average cultivable waste land thus displays distinct variation. Notable change has been observed in the Sirsa district. This district has shift from higher to no share of cultivable waste land because of the larger part of district came under cultivation.

Table 3
Haryana land use pattern, 2011-12.

Districts/Agro climatic zones	Forest	Land not available for cultivation	Other uncultivated land excluding Fallow Land	Fallow land	Net sown area
	Percent to Total Reporting Area				

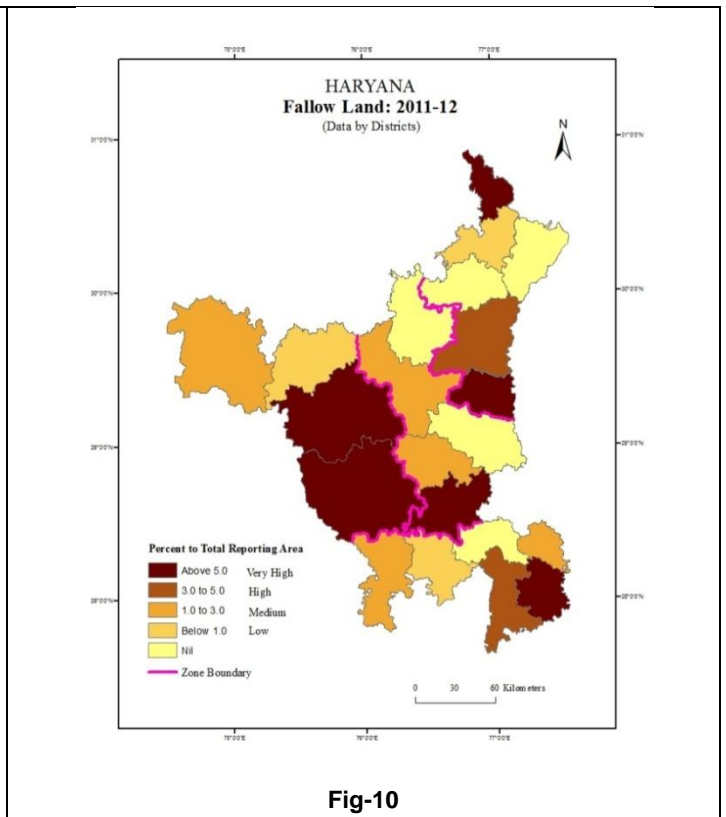
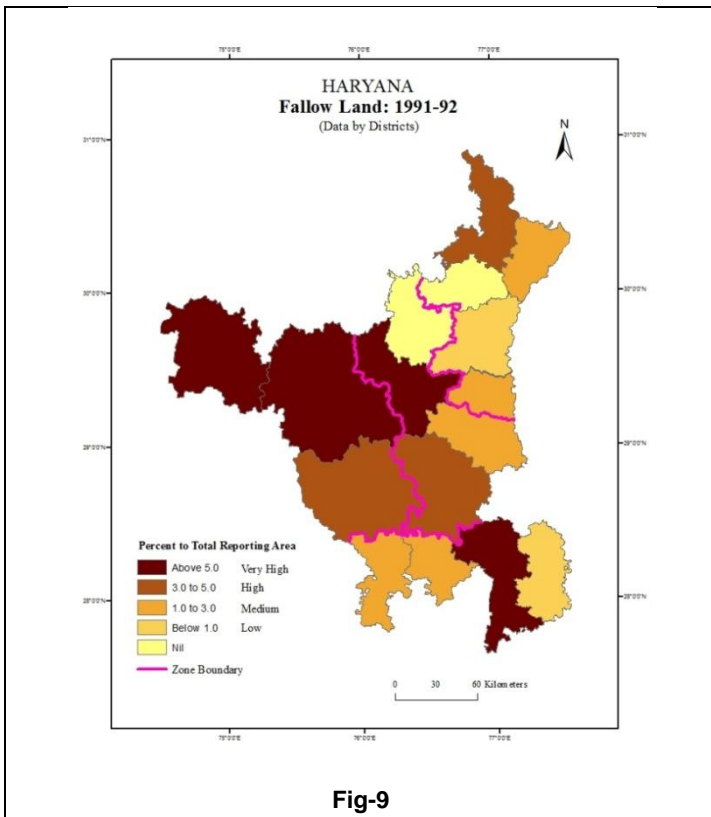
Ambala	0.65	28.14	1.30	0.43	69.48
Panchkula	2.34	35.09	9.94	9.36	42.11
Yamunanagar	8.53	18.22	1.16	0.00	72.48
Kurukshetra	0.60	9.72	0.00	0.00	89.88
Karnal	0.41	11.38	4.61	4.20	79.67
Panipat	2.05	14.10	4.62	5.64	73.59
Northern	2.34	16.97	2.91	2.55	75.33
Kaithal	1.02	10.83	0.00	0.00	87.85
Sonipat	0.00	24.26	2.66	0.00	72.77
Rohtak	0.00	7.78	6.59	2.99	82.83
Jhajjar	0.00	10.12	4.36	8.73	77.14
Jind	0.36	12.95	0.24	1.08	85.73
Central	0.31	13.44	2.38	2.29	81.64
Faridabad	0.00	53.24	0.00	1.39	45.37
Palwal	1.72	12.75	0.98	5.64	78.68
Gurugram	2.50	28.33	0.83	0.00	67.78
Nuh	0.00	21.40	0.68	3.83	73.87
Rewari	1.32	11.70	3.09	0.44	83.22
Mahendragarh	1.03	19.76	0.34	1.20	77.49
Southern	1.14	21.60	1.06	2.11	73.85
Bhiwani	0.57	10.23	0.00	7.51	81.62
Hisar	0.25	12.13	0.00	5.45	82.34
Fatehabad	0.13	10.17	0.00	0.27	89.69
Sirsa	0.23	5.39	0.00	1.95	92.51
Western	0.32	9.38	0.00	4.27	86.11
Haryana	0.90	14.28	1.40	3.01	80.41

Source: Statistical Abstract of Haryana 2010-12.

Fallow land

Fallow lands other than current fallows include all lands which are taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years. Thus, this land may be considered as land put under occasional agricultural land use. This land use category includes all the land which is taken up for cultivation, but was

temporarily out of cultivation. The fallow land includes current fallow and other fallow land. Current fallow land means the land which is kept fallow during the current agricultural year to regain fertility or for some other reasons. Other fallow land includes land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year.



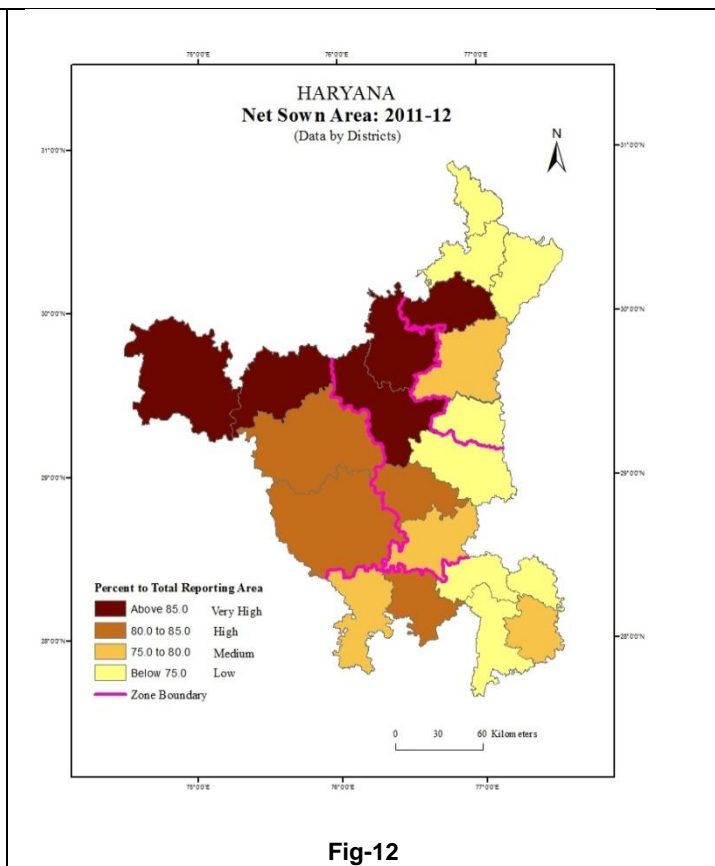
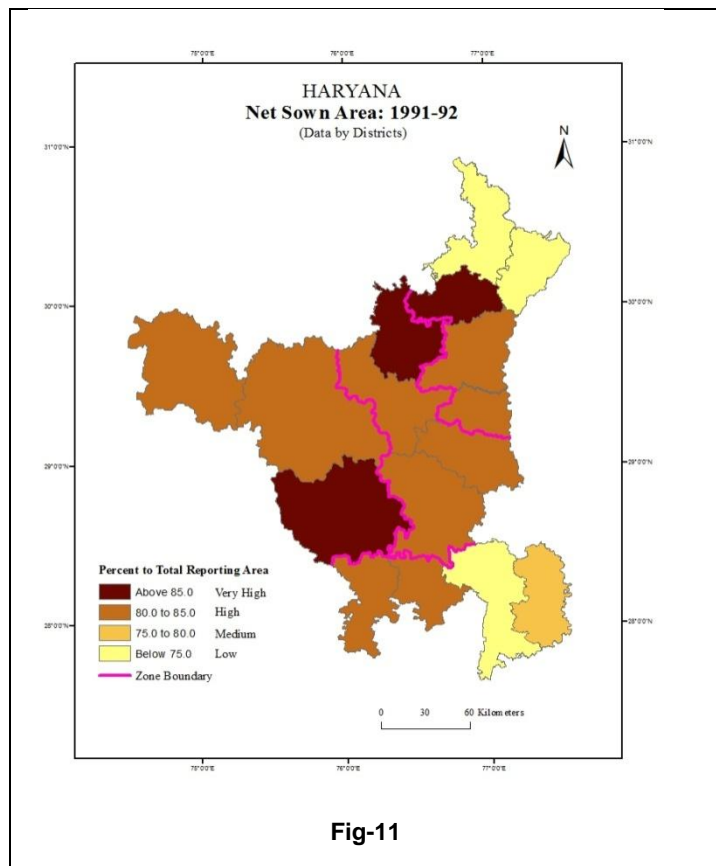
And not more than five years. During 2011-12, the proportion of Fallow land in the state was 3.01 percent on the other hand this proportion was 5.06 percent during 1991-92. It is observed that of the total reported area of the fallow land has decreased 2.05 percent. In terms of the total land it had decreased from 221.67 thousand hectares in 1991-92 to 131.67 thousand hectares in 2011-12 (table 2, 3). The main reasons for fallowing the land are low soil fertility, lack of irrigation facilities, uncertainty of rainfall, decline in fertility of

soil, and limited economic means of farmers. The highest percent share of fallow land was recorded in Panchkula with 9.36 percent followed by Jhajjar district as 8.73 per cent while, the lower in Fatehabad with 0.27 per cent followed by Ambala (0.43 percent) and Rewari district (0.44 percent) during the period of 2011-12. There is no fallow land recorded in Yamunanagar, Kurukshetra, Kaithal/Sonipat and Gurugram districts of the state during 2011-12 (fig. 10). In 1991-92, the higher share of this category was found in Gurugram with 13.94 percent followed by Sirsa district (13.11 percent) while, the lower in Karnal district with 0.29 percent (fig. 9). Notable change has been observed in the Sirsa and Gurugram districts. Sirsa has shift from higher to lower share of fallow land

because of the larger part of district came under cultivation due to development of irrigation facilities, mechanisation of agriculture and Gurugram shift from higher to no fallow land because of the larger part of the district came under residential and industrial use.

Net sown area

Net sown area represents the total area sown with crops and orchards. Area sowed more than once in the same year is counted only once. It plays an important role in measure the level of agricultural development and agricultural production. In the present study there is an decrease in the net sown area during 1991-92 to 2011-12. The net sown area was 3525 thousand hectares which accounted 80.49 percent in 1991-92. But during 2011-12, it was 3514.67 hectares which is 80.41 percent of the total reporting area of the state. It is observed that the total reporting area of the net sown area has decreased by 0.07 percent during 1991-92 to 2011-12 (table 2, 3). To fulfill the demand of food of the growing population there is a need to increase net sown area. But, that is not happening through decrease in area under different land use categories like area under forest, area not available of cultivation etc.



Thus, there is only way to increase in area under agriculture is to re-use the cropped land using innovation measures.

During 1991-92, maximum proportion of net sown area was recorded in Kaithal district with 89.50 percent while, the lower in Gurugram district with 64.73 percent (fig. 11). On the other hand during 2011-12 maximum proportion of net sown area was recorded in Sirsa district with 92.51 percent followed by Kurukshetra (89.88 percent) and Fatehabad (89.61 percent) district (fig. 12). Main reasons responsible for high share of net area sown in these districts are farmers use new techniques of farming, Fertilizers, HYV seeds and also because of high irrigation facilities provided, fertile soil and flat topography.

The lower proportion of net sown area was recorded in Panchkula district which is in northern agro climatic zone with 42.11 percent followed by Faridabad district (45.37 percent). Main reasons responsible for that are spread of urban areas on agricultural land and also industrial development. The agricultural land also converted into non-agricultural uses like human settlements, construction work etc. In Panchkula topography is not suitable for agriculture.

6. Conclusion

The study clearly reveals that there are changes in land use pattern spatially and temporally during the time period. The total geographical area of the forest cover in Haryana has declined from 3.88 percent in 1991-92 to 0.90 percent in 2011-

12, a decrease by 2.98 percent. In all the agro climatic zones the area of forest cover declined over the time period. The area under forest had decreased because of increase in population, and to feed the growing population there has been a need to increase in cropped area.

The land not available for cultivation includes land put to non-agricultural uses, barren and uncultivated land which was recorded 9.14 percent in 1991-92 and increased to 14.28 percent in 2011-12. In all the agro climatic zones the area under land not available for cultivation has increased during the period. Total reported area under Cultivable waste land was recorded as 0.74 per cent of the area in 1991-92 which was declined to 0.61 per cent in 2011-12. However, this is the only category of land which offers opportunity for expansion of agricultural land and also the fallow land has declined from 5.06 per cent in 1991-92 to 3.01 per cent in 2011-12 that is happen because of the pressure of population, the fallow land has been gradually converted into agricultural land. It is observed that the total reporting area of the net sown area has decreased from 80.49 per cent in 1991-92 to 80.41 per cent in 2011-12. In all the agro climatic zones net sown area has increased over the time period in the state. The net area sown has a special significance. It plays an important role in measure the level of agricultural development and agricultural production. It is important to fulfill the demands of increasing population that is why man is trying to bring every inch of land under use. But it has done in a proper planning manner.

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